UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Atomic Safety and Licensing Board

Before Administrative Judges:

ASLBP BOARD 09-876-HLW-CAB01 William J. Froehlich, Chairman Thomas S. Moore Richard E. Wardwell	ASLBP BOARD 09-877-HLW-CAB02 Michael M. Gibson, Chairman Lawrence G. McDade Nicholas G. Trikouros	ASLBP BOARD 09-878-HLW-CAB03 Paul S. Ryerson, Chairman Michael J. Farrar Mark O. Barnett

In the Matter of	)	
	)	
U.S. DEPARTMENT OF ENERGY	)	**Docket No. 63-001-HLW**
	)	
(High Level Waste Repository)	)	**February 24, 2009**

STATE OF NEVADA'S REPLY TO NRC STAFF'S ANSWER TO NEVADA'S PETITION TO INTERVENE AS A FULL PARTY

Honorable Catherine Cortez Masto
Nevada Attorney General
Marta Adams
Chief, Bureau of Government Affairs
100 North Carson Street
Carson City, Nevada 89701
Tel: 775-684-1237
Email: madams@ag.nv.gov

Egan, Fitzpatrick & Malsch, PLLC
Martin G. Malsch *
Charles J. Fitzpatrick *
John W. Lawrence *
12500 San Pedro Avenue, Suite 555
San Antonio, TX 78216
Tel: 210.496.5001
Fax: 210.496.5011
mmalsch@nuclearlawyer.com
cfitzpatrick@nuclearlawyer.com
jlawrence@nuclearlawyer.com

*Special Deputy Attorneys General

TABLE OF CONTENTS

I. INTRODUCTION 1

II. GENERIC LEGAL ISSUES 3

A. Nevada's Expert Opinion Affidavits are in Proper Form 3

B. Nevada Reference to the Phrase "and Similar Subsections" in Its Contentions is Fully in Accord with the Specificity Requirement of 10 C.F.R. § 2.309(f)(1)(i) and Does Not Undermine Compliance With 10 C.F.R. § 2.309(f)(1)(iv) or (vi) 5

C. Nevada's Contention Bases Far Exceed NRC Requirements 6

D. Nevada Does Not Need to Demonstrate that TSPA Contentions Would Violate EPA Dose Standards and a Contention Alleging that DOE's TSPA Does Not Comply with One or More of NRC's Requirements for a Performance Assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) is Material *Per Se* 9

E. NRC Staff Does Not Understand the Role and Importance Alternative Conceptual Models 14

F. A Failure to Address a Technical Study That is Not Part of the Application Does Not Violate 10 C.F.R. § 2.309(f)(1) 17

G. NRC Staff Improperly Shifts the Burden of Proof to Nevada 18

H. NRC Staff Applies the Wrong Standard for the Admission of NEPA Contentions; Nevada has More than Satisfied the Heightened Pleading Requirements for All of Its NEPA Contentions 19

III. REPLIES TO NRC'S RESPONSES TO NEVADA'S CONTENTIONS 24

A. Replies Regarding Safety-Related Contentions 24

REPLY – NEV-SAFETY-01 – DOE INTEGRITY 25

REPLY – NEV-SAFETY-02 – DOE MANAGEMENT 27

REPLY – NEV-SAFETY-03 – QUALITY ASSURANCE IMPLEMENTATION 31

REPLY – NEV-SAFETY-04 – CONTENT OF QUALITY ASSURANCE PROGRAM 34

REPLY – NEV-SAFETY-05 – EMERGENCY PLAN 37

REPLY – NEV-SAFETY-06 – PART 21 COMPLIANCE 39

REPLY – NEV-SAFETY-07 – RETRIEVAL PLANS AND QA 42

REPLY – NEV-SAFETY-08 – ALARA AND THE AGING FACILITY 44

REPLY – NEV-SAFETY-09 – INCREASING CO_2 LEVELS ON FUTURE CLIMATE PROJECTIONS 46

REPLY – NEV-SAFETY-10 – CONSIDERATION OF FORCING FUNCTIONS ON FUTURE CLIMATE PROJECTIONS 49

REPLY – NEV-SAFETY-11 – HUMAN-INDUCED CLIMATE CHANGES ON PREDICTION OF THE NEXT GLACIAL PERIOD 53

REPLY – NEV-SAFETY-12 – PROJECTIONS OF FUTURE WETTER CLIMATE CONDITIONS 57

REPLY – NEV-SAFETY-13 – FUTURE CLIMATE PROJECTIONS NEED TO INCLUDE EXTREME PRECIPITATION EVENTS 60

REPLY – NEV-SAFETY-14 – PRECIPITATION MODEL 63

REPLY – NEV-SAFETY-15 – ALTERNATIVE PRECIPITATION MODELS AND WEATHER VARIABLES 64

REPLY – NEV-SAFETY-16 – QUALIFICATION OF CLIMATE AND INFILTRATION MODELS 66

REPLY – NEV-SAFETY-17 – CALIBRATION AND SIMULATION OF PRECIPITATION MODEL 67

REPLY – NEV-SAFETY-18 – USE OF CLIMATE DATA FROM THE ANALOG SITES 69

REPLY – NEV-SAFETY-19 – FUTURE INFILTRATION PROJECTIONS NEED TO INCLUDE REDUCED VEGETATION COVER 72

REPLY – NEV-SAFETY-20 – NET INFILTRATION ALTERNATIVE CONCEPTUAL MODEL 75

REPLY – NEV-SAFETY-21 – INFILTRATION MODEL AND CHANGES IN SOIL AND ROCK PROPERTIES 77

REPLY – NEV-SAFETY-22 – NET INFILTRATION MODEL WATER BALANCE 80

REPLY – NEV-SAFETY-23 – EVALUATION OF ALTERNATIVE NET INFILTRATION MODELS 84

REPLY – NEV-SAFETY-24 – PRECIPITATION DATA IN NET INFILTRATION MODEL 87

REPLY – NEV-SAFETY-25 – SITE-SPECIFIC DATA IN NET INFILTRATION MODEL 90

REPLY – NEV-SAFETY-26 – SOIL PROPERTIES DATA IN NET INFILTRATION MODEL 92

REPLY – NEV-SAFETY-27 – ROCK PROPERTIES DATA IN NET INFILTRATION MODEL 94

REPLY – NEV-SAFETY-28 – NET INFILTRATION MODEL ROCK PROPERTIES UNCERTAINTY ANALYSIS 96

REPLY – NEV-SAFETY-29 – SPATIAL VARIABILITY OF SOILS AND VEGETATION IN NET INFILTRATION MODEL 99

REPLY – NEV-SAFETY-30 – TEMPORAL VARIABILITY IN PRECIPITATION IN NET INFILTRATION MODEL 101

REPLY – NEV-SAFETY-31 – CALIBRATION OF NET INFILTRATION MODEL 104

REPLY – NEV-SAFETY-32 – USE OF INITIAL CONDITIONS IN NET INFILTRATION MODEL 108

REPLY – NEV-SAFETY-33 – APPROACH TO ESTIMATING PERCOLATION 111

REPLY – NEV-SAFETY-34 – REPRESENTATION OF STORM DURATION FOR NET INFILTRATION MODELING 113

REPLY – NEV-SAFETY-35 – EPISODIC NATURE OF INFILTRATION FLUXES IN NET INFILTRATION ANALYSIS 115

REPLY – NEV-SAFETY-36 – CORROBORATION OF MODEL RESULTS IN POST-MODEL VALIDATION OF NET INFILTRATION SIMULATIONS 118

REPLY – NEV-SAFETY-37 – NET INFILTRATION MODEL METHODOLOGY 120

REPLY – NEV-SAFETY-38 – PARAMETER CORRELATIONS IN NET INFILTRATION MODEL 122

REPLY – NEV-SAFETY-39 – TEMPERATURE LAPSE RATE VERIFICATION 125

REPLY – NEV-SAFETY-40 – PARAMETER UNCERTAINTY TREATMENT IN NET INFILTRATION MODEL 127

REPLY – NEV-SAFETY-41 – EROSION FEP SCREENING 128

REPLY – NEV-SAFETY-42 – VALIDATION OF UNSATURATED ZONE FLOW MODEL BY SIMULATION OF NATURAL CHLORIDE DISTRIBUTION IN PORE WATERS 133

REPLY – NEV-SAFETY-43 – VALIDATION OF UNSATURATED ZONE FLOW MODEL BY CARBON-14 CONTENTS, STRONTIUM ISOTOPE COMPOSITIONS AND CALCITE MINERAL PRECIPITATE ABUNDANCES 135

REPLY – NEV-SAFETY-44 – FLOW IN THE UNSATURATED ZONE FROM EPISODIC INFILTRATION 139

REPLY – NEV-SAFETY-45 – EFFECTS OF EPISODIC FLOW 141

REPLY – NEV-SAFETY-46 – EXTREME EVENTS UNDEFINED 143

REPLY – NEV-SAFETY-47 – PHYSICAL BASIS OF SITE SCALE UNSATURATED ZONE FLOW 145

REPLY – NEV-SAFETY-48 – MULTI-SCALE THERMAL-HYDROLOGIC MODEL 147

REPLY – NEV-SAFETY-49 – MODELS OF FLUID MOVEMENT IN THE UNSATURATED ZONE 149

REPLY – NEV-SAFETY-50 – ALTERNATIVE DISCRETE FRACTURE FLOW MODELS 152

REPLY – NEV-SAFETY-51 – POTENTIAL CONVECTIVE SELF ORGANIZATION OF 2-PHASE FLOW 155

REPLY – NEV-SAFETY-52 – EBS AND NEAR-FIELD MODELING APPROACH 158

REPLY – NEV-SAFETY-53 – APPLICATION OF THE FRACTURE MATRIX DUAL CONTINUUM MODEL TO ALL UNSATURATED ZONE FLOW PROCESSES 160

REPLY – NEV-SAFETY-54 – CONSTITUTIVE RELATIONSHIPS IN THE YUCCA MOUNTAIN INFILTRATION, THERMO-HYDROLOGIC, AND TSPA MODELS 162

REPLY – NEV-SAFETY-55 – DATA FOR THE CHEMISTRY OF PORE WATERS IN THE TOPOPAH SPRINGS (TSw) FORMATION 164

REPLY – NEV-SAFETY-56 – GEOCHEMICAL INTERACTIONS AND EVOLUTION IN THE UNSATURATED ZONE, INCLUDING THERMO-CHEMICAL ALTERATION OF TSw HOST ROCK 167

REPLY – NEV-SAFETY-57 – DATA FOR NEAR-FIELD CHEMISTRY MODELS 169

REPLY – NEV-SAFETY-58 – GROUNDWATER SAMPLES IN THE UNSATURATED ZONE SORPTION TESTS 171

REPLY – NEV-SAFETY-59 – GROUNDWATER COMPOSITIONS ASSUMED 173

REPLY – NEV-SAFETY-60 – EMPIRICAL SITE-SPECIFIC DATA AND THE NEAR-FIELD CHEMISTRY MODEL 176

REPLY – NEV-SAFETY-61 – AMBIENT SEEPAGE INTO EMPLACEMENT DRIFTS 178

REPLY – NEV-SAFETY-62 – THERMAL SEEPAGE INTO EMPLACEMENT DRIFTS 181

REPLY – NEV-SAFETY-63 – EFFECT OF ROCK BOLTS ON AMBIENT SEEPAGE 183

REPLY – NEV-SAFETY-64 – EFFECT OF ROCK BOLTS ON THERMAL SEEPAGE 186

REPLY – NEV-SAFETY-65 – STRUCTURAL CONTROL OF SEEPAGE IN THE EMPLACEMENT DRIFT 188

REPLY – NEV-SAFETY-66 – ATTENUATION OF SEEPAGE INTO NATURALLY FRACTURED DRIFT WALLS 191

REPLY – NEV-SAFETY-67 – EVALUATION OF UNCERTAINTIES IN ESTIMATED CHEMICAL PROPERTIES, ESPECIALLY pH VALUES, OF EVAPORATED DRIFT BRINES 193

REPLY – NEV-SAFETY-68 – IN-DRIFT CONDENSATION ON MINERAL DUST 196

REPLY – NEV-SAFETY-69 – COUPLED SEEPAGE AND DUST DELIQUESCENCE 199

REPLY – NEV-SAFETY-70 – THC EVOLUTION OF NEAR-FIELD PRE-SEEPAGE UNSATURATED ZONE WATER 202

REPLY – NEV-SAFETY-71 – MICROBIALLY INDUCED WATER CHEMISTRY CHANGES IN THE INCUBATOR ZONE 205

REPLY – NEV-SAFETY-72 – CHARACTERIZATION OF DUST SOURCES 207

REPLY – NEV-SAFETY-73 – IN-DRIFT ORGANIC CONTRIBUTION BY VENTILATION OR UNSATURATED ZONE WATER 209

REPLY – NEV-SAFETY-74 – IMPACT OF MICROBIAL ACTIVITY 211

REPLY – NEV-SAFETY-75 – MICROBIALLY INFLUENCED CORROSION MODEL 216

REPLY – NEV-SAFETY-76 – MICROBIAL DENITRIFICATION 218

REPLY – NEV-SAFETY-77 – CORROSION FROM ROCK BOLT SEEPAGE 224

REPLY – NEV-SAFETY-78 – STATIC CORROSION TESTS ON ALLOY 22 230

REPLY – NEV-SAFETY-79 – STATIC GENERAL CORROSION TEST SOLUTIONS 235

REPLY – NEV-SAFETY-80 – LOCALIZED CORROSION, CHLORIDE BEARING MINERAL DEPOSITS AND HOT WALL EFFECTS 240

REPLY – NEV-SAFETY-81 – HYDROGEN UPTAKE RESULTING FROM GENERAL CORROSION 247

REPLY – NEV-SAFETY-82 – CORROSION OF THERMALLY OXIDIZED TITANIUM 252

REPLY – NEV-SAFETY-83 – ADEQUACY OF METHODS OF GENERAL AND LOCALIZED CORROSION TESTING OF THE DRIP SHIELD 257

REPLY – NEV-SAFETY-84 – USE OF DIFFERENTIAL WEIGHT LOSS TO ESTIMATE VERY LOW CORROSION RATES 262

REPLY – NEV-SAFETY-85 – DECLINING CORROSION RATE OVER TIME 267

REPLY – NEV-SAFETY-86 – ROLE OF ROCK DUST ON CANISTER SURFACES IN LOCALIZED CORROSION 272

REPLY – NEV-SAFETY-87 – INTERGRANULAR SCC CORROSION DURING DRY-WET CYCLE 277

REPLY – NEV-SAFETY-88 – THERMODYNAMICS OF COMPLEX DELIQUESCENT SALT REACTIONS DURING C-22 CORROSION 282

REPLY – NEV-SAFETY-89 – INHIBITION OF C-22 CORROSION BY HIGH NITRATE TO CHLORIDE RATIO 285

REPLY – NEV-SAFETY-90 – EFFECTS OF ROCK BOLT ON C-22 AND Ti-7 CORROSION REACTIONS 290

REPLY – NEV-SAFETY-91 – REPRESENTATIVENESS OF C-22 AND Ti-7 CORROSION TESTING METHODS 295

REPLY – NEV-SAFETY-92 – IMPACTS OF FLUORIDE DUE TO BREACH OF HLW CONTAINERS 300

REPLY – NEV-SAFETY-93 – NATURAL LEAD REACTIONS ON C-22 305

REPLY – NEV-SAFETY-94 – SIGNIFICANCE OF MINERAL CRUSTS IN C-22 CORROSION 310

REPLY – NEV-SAFETY-95 – PEAK THERMAL PERIOD SEEPAGE AND CORROSION 315

REPLY – NEV-SAFETY-96 – SALT PRODUCTION AND C-22 CORROSION DUE TO HEAT-PIPE CONDITIONS 319

REPLY – NEV-SAFETY-97 – CREVICE CORROSION ON C-22 DUE TO DRIP SHIELD CORROSION DEBRIS 324

REPLY – NEV-SAFETY-98 – RATE OF DRIP SHIELD INTERCONNECTION CORROSION 329

REPLY – NEV-SAFETY-99 – BORIC ACID PRODUCTION FROM HLW DISSOLUTION 334

REPLY – NEV-SAFETY-100 – GROUND SUPPORT COMPONENTS AND IN-DRIFT MODELING 339

REPLY – NEV-SAFETY-101 – SULFUR ACCUMULATION AT THE METAL-PASSIVE FILM INTERFACE 344

REPLY – NEV-SAFETY-102 – SULFUR ACCUMULATION AND LOCALIZED CORROSION 347

REPLY – NEV-SAFETY-103 – SULFUR ACCUMULATION AND STRESS CORROSION INITIATION 351

REPLY – NEV-SAFETY-104 – SULFUR ACCUMULATION AND STRESS CORROSION PROPAGATION 355

REPLY – NEV-SAFETY-105 – DRIP SHIELD CORROSION ENVIRONMENT 359

REPLY – NEV-SAFETY-106 – WASTE CONTAINER CORROSION ENVIRONMENT 364

REPLY – NEV-SAFETY-107 – ELECTROCHEMICAL REDUCTION OF NITRATE 369

REPLY – NEV-SAFETY-108 – MOLTEN SALT CORROSION OF THE CANISTER 374

REPLY – NEV-SAFETY-109 – MOLTEN SALT CORROSION OF THE DRIP SHIELD 379

REPLY – NEV-SAFETY-110 – ROCK BOLT CORROSION 384

REPLY – NEV-SAFETY-111 – HLW WASTE GLASS DISSOLUTION 389

REPLY – NEV-SAFETY-112 – HLW WASTE GLASS DEGRADATION 393

REPLY – NEV-SAFETY-113 – COMPETITIVE SORPTION IN THE UNSATURATED ZONE 397

REPLY – NEV-SAFETY-114 – APPLICABILITY OF SORPTION DATA 401

REPLY – NEV-SAFETY-115 – MATRIX DIFFUSION 403

REPLY – NEV-SAFETY-116 – SATURATED ZONE REDOX CONDITIONS 407

REPLY – NEV-SAFETY-117 – RADIONUCLIDE SORPTION IN THE SATURATED ZONE 409

REPLY – NEV-SAFETY-118 – ESTIMATION OF UNCERTAINTIES IN SOIL-TO-PLANT TRANSFER FACTORS 411

REPLY – NEV-SAFETY-119 – ESTIMATION OF UNCERTAINTIES IN ANIMAL PRODUCT TRANSFER COEFFICIENTS 417

REPLY – NEV-SAFETY-120 – RMEI DIET 424

REPLY – NEV-SAFETY-121 – HOST ROCK GEOMECHANICAL PROPERTIES 429

REPLY – NEV-SAFETY-122 – SCREENING OF DRIFT DEGRADATION FEPs 432

REPLY – NEV-SAFETY-123 – DURABILITY OF GROUND SUPPORT 435

REPLY – NEV-SAFETY-124 – WELDING OF ALPHA BETA TITANIUM ALLOY TO UNALLOYED TITANIUM 437

REPLY – NEV-SAFETY-125 – EFFECTIVENESS OF STRESS RELIEF TO ELIMINATE SCC OR HYDROGEN EFFECTS 439

REPLY – NEV-SAFETY-126 – PROPERTIES OF DISSIMILAR METAL WELD JOINTS BETWEEN GRADE 29 AND GRADE 7 TITANIUM 441

REPLY – NEV-SAFETY-127 – HYDROGEN AND ERTI-28 FILLER METAL FOR WELDED JOINTS BETWEEN GRADE 29 AND GRADE 7 TITANIUM 444

REPLY – NEV-SAFETY-128 – NUCLEAR CODE AND FABRICATION QUALITY ASSURANCE STANDARDS 447

REPLY – NEV-SAFETY-129 – EARLY FAILURE MECHANISMS ASSOCIATED WITH TITANIUM FABRICATION 449

REPLY – NEV-SAFETY-130 – DRIP SHIELD EMPLACEMENT PLAN, EQUIPMENT, AND SCHEDULE 451

REPLY – NEV-SAFETY-131 – ROCK DEBRIS REMOVAL 454

REPLY – NEV-SAFETY-132 – TEV DESCRIPTION 456

REPLY – NEV-SAFETY-133 – DRIP SHIELD GANTRY DESCRIPTION 458

REPLY – NEV-SAFETY-134 – RETRIEVAL OR ALTERNATE STORAGE DESCRIPTION 460

REPLY – NEV-SAFETY-135 – THE VENTILATION DOORS AT THE ENTRY TO THE EMPLACEMENT DRIFTS 462

REPLY – NEV-SAFETY-136 – PHASED GROUND SUPPORT INSTALLATION 464

REPLY – NEV-SAFETY-137 – CONSTRUCTION OF THE EMPLACEMENT DRIFTS 466

REPLY – NEV-SAFETY-138 – DESCRIPTION OF THE VENTILATION SYSTEM FOR THE REPOSITORY OPTIONS MADE IN THE TSPA-LA REGARDING WASTE ISOLATION 468

REPLY – NEV-SAFETY-139 – DESCRIPTION OF REASONABLE EMERGENCIES 470

REPLY – NEV-SAFETY-140 – ENGINEERED BARRIER SYSTEM DESIGN BASIS 472

REPLY – NEV-SAFETY-141 – GROUND SUPPORT DESCRIPTIONS..... 474

REPLY – NEV-SAFETY-142 – STANDARD TITANIUM GRADES CONSIDERED..... 475

REPLY – NEV-SAFETY-143 – AVAILABLE DRIP SHIELD DESIGN INFORMATION..... 477

REPLY – NEV-SAFETY-144 – DRIP SHIELD FAILURE MECHANISMS..... 479

REPLY – NEV-SAFETY-145 – DRIP SHIELD SPECIFICATIONS 481

REPLY – NEV-SAFETY-146 – RELIANCE ON PRELIMINARY OR CONCEPTUAL DESIGN INFORMATION..... 483

REPLY – NEV-SAFETY-147 – EVALUATION OF DATA USED IN DRIP SHIELD FAILURE PROBABILITY 486

REPLY – NEV-SAFETY-148 – EVALUATION OF COMPUTATIONAL PROCEDURE USED IN DRIP SHIELD FAILURE PROBABILITY..... 489

REPLY – NEV-SAFETY-149 – DEVIATIONS IN DESIGN AND WASTE EMPLACEMENT..... 491

REPLY – NEV-SAFETY-150 – BASALTIC MAGMA MELTING DEPTH 493

REPLY – NEV-SAFETY-151 – TIME SPAN OF BASALTIC VOLCANISM..... 495

REPLY – NEV-SAFETY-152 – FOCUS ON UPPER CRUSTAL EXTENSION PATTERNS..... 497

REPLY – NEV-SAFETY-153 – EXCLUSION OF DEATH VALLEY FROM VOLCANISM CALCULATIONS 499

REPLY – NEV-SAFETY-154 – IGNEOUS EVENT PROBABILITY FOR 10,000 YEARS AND 1,000,000 YEARS..... 502

REPLY – NEV-SAFETY-155 – 11-MILLION YEAR VS. 5-MILLION YEAR VOLCANISM DATA..... 505

REPLY – NEV-SAFETY-156 – ALTERNATIVE IGNEOUS EVENT CONCEPTUAL MODELS..... 507

REPLY – NEV-SAFETY-157 – IGNEOUS EVENT DATA IN THE TSPA..... 509

REPLY – NEV-SAFETY-158 – GEOPHYSICAL DATA IN DOE'S VOLCANIC MODEL..... 511

REPLY – NEV-SAFETY-159 – PROPAGATION OF CONCEPTUAL AND PARAMETRIC UNCERTAINTIES THROUGH THE SAFETY ASSESSMENT 513

REPLY – NEV-SAFETY-160 – PROBABILITY DENSITY FUNCTIONS USED IN THE TSPA 517

REPLY – NEV-SAFETY-161 – CRITICAL ROLE OF DRIP SHIELD 521

REPLY – NEV-SAFETY-162 – DRIP SHIELD INSTALLATION SCHEDULE 524

REPLY – NEV-SAFETY-163 – SCREENING OF NEAR-FIELD CRITICALITY 528

REPLY – NEV-SAFETY-164 – AGGREGATION OF PROBABILITY DISTRIBUTIONS 530

REPLY – NEV-SAFETY-165 – SATURATED ZONE EXPERT ELICITATION 535

REPLY – NEV-SAFETY-166 – PROBABILISTIC SEISMIC HAZARD ANALYSIS EXPERT ELICITATION 539

REPLY – NEV-SAFETY-167 – PROBABILISTIC VOLCANIC HAZARD ANALYSIS EXPERT ELICITATION 544

REPLY – NEV-SAFETY-168 – RETRIEVAL PRACTICALITY 549

REPLY – NEV-SAFETY-169 – DEFERRED RETRIEVAL PLANS 550

REPLY – NEV-SAFETY-170 – CONSERVATISMS AND THE PMA 552

REPLY – NEV-SAFETY-171 – PMA AND QA 554

REPLY – NEV-SAFETY-172 – INSPECTION AND VERIFICATION OF TAD 555

REPLY – NEV-SAFETY-173 – EMPLACEMENT DRIFT MONITORING 557

REPLY – NEV-SAFETY-174 – CONTROLS AND RESTRICTIONS 558

REPLY – NEV-SAFETY-175 – CONTROLS ON PILOT RELIEF 561

REPLY – NEV-SAFETY-176 – CONTROLS ON PILOT MANEUVERING 564

REPLY – NEV-SAFETY-177 – CONTROLS ON HELICOPTERS 567

REPLY – NEV-SAFETY-178 – BASIS FOR AIRCRAFT EXCLUSIONS 570

REPLY – NEV-SAFETY-179 – CONTROLS ON AIRCRAFT OPERATIONS (MID-AIR) 574

REPLY – NEV-SAFETY-180 – CRASH FREQUENCY OF FIXED-WING AIRCRAFT 577

REPLY – NEV-SAFETY-181 – BASIS FOR CRASH DENSITY CALCULATIONS 580

REPLY – NEV-SAFETY-182 – GLIDE DISTANCE 582

REPLY – NEV-SAFETY-183 – CRASH RATES 585

REPLY – NEV-SAFETY-184 – RIGHT-OF-WAY N-48602 588

REPLY – NEV-SAFETY-185 – RIGHT-OF-WAY N-47748 592

REPLY – NEV-SAFETY-186 – "RANCH BOUNDARY" LAND 596

REPLY – NEV-SAFETY-187 – PUBLIC LAND ORDER 7653 600

REPLY – NEV-SAFETY-188 – PUBLIC LAND ORDER 6802/7534 604

REPLY – NEV-SAFETY-189 – PATENT 27-83-002 608

REPLY – NEV-SAFETY-190 – UNPATENTED LODE AND PLACER MINING CLAIMS 612

REPLY – NEV-SAFETY-191 – NYE COUNTY MONITORING WELLS 616

REPLY – NEV-SAFETY-192 – LAND OUTSIDE DOE'S RIGHTS-OF-WAY 620

REPLY – NEV-SAFETY-193 – LAND WITHDRAWAL 624

REPLY – NEV-SAFETY-194 – VH-1 WATER RIGHTS 627

REPLY – NEV-SAFETY-195 – 9/11 TERRORIST ATTACK 630

REPLY – NEV-SAFETY-196 – DESCRIPTION OF SECURITY MEASURES 633

REPLY – NEV-SAFETY-197 – PHYSICAL PROTECTION STANDARD 634

REPLY – NEV-SAFETY-198 – MATERIAL CONTROL AND ACCOUNTING PLAN 635

REPLY – NEV-SAFETY-199 – PERFORMANCE CONFIRMATION AND AVAILABLE TECHNOLOGY 636

REPLY – NEV-SAFETY-200 – PERFORMANCE CONFIRMATION PROGRAM LEVEL OF INFORMATION 638

REPLY – NEV-SAFETY-201 – RELIANCE ON PRELIMINARY OR CONCEPTUAL DESIGN INFORMATION 641

B. NEPA Contentions 642

REPLY – NEV-NEPA-01 – TRANSPORTATION SABOTAGE SCENARIOS 643

REPLY – NEV-NEPA-02 – TRANSPORTATION SABOTAGE CLEANUP COSTS 648

REPLY – NEV-NEPA-03 – TRANSPORTATION ACCIDENT CLEANUP COSTS 653

REPLY – NEV-NEPA-04 – SHARED USE OPTION 659

REPLY – NEV-NEPA-05 – RADIOLOGICAL REGIONS OF INFLUENCE FOR TRANSPORTATION 666

REPLY – NEV-NEPA-06 – CALIENTE RAIL ALIGNMENT PLAN AND PROFILE INFORMATION 673

REPLY – NEV-NEPA-07 – OVERWEIGHT TRUCKS 680

REPLY – NEV-NEPA-08 – IMPACTS ON AESTHETIC RESOURCES 686

REPLY – NEV-NEPA-09 – TRANSPORTATION SABOTAGE RISK VS. AT-REACTOR STORAGE 693

REPLY – NEV-NEPA-10 – LONG-TERM RADIATION EXPOSURE FOLLOWING SABOTAGE 697

REPLY – NEV-NEPA-11 – SABOTAGE RISK, PRESSURIZED CASK 704

REPLY – NEV-NEPA-12 – TRANSPORTATION RISK ASSUMPTIONS 709

REPLY – NEV-NEPA-13 – GRAZING IMPACTS 714

REPLY – NEV-NEPA-14 – DEFERRED ASSESSMENT OF RAILROAD CONSTRUCTION IMPACTS ON GRAZING 723

REPLY – NEV-NEPA-15 – TAD SHIPMENT ESTIMATES 730

REPLY – NEV-NEPA-16 – REPRESENTATIVE ROUTES 736

REPLY – NEV-NEPA-17 – NRC STAFF'S NEPA REVIEW 744

REPLY – NEV-NEPA-18 – OVERLAP BETWEEN NEPA AND AEA 746

REPLY – NEV-NEPA-19 – PEAK DOSE IDENTIFICATION 751

REPLY – NEV-NEPA-20 – RADIONUCLIDE CONTAMINATION OF AQUIFER..... 756

REPLY – NEV-NEPA-21 – CONTAMINATED AQUIFER DISCHARGES 761

REPLY – NEV-NEPA-22 – NO-ACTION ALTERNATIVE 766

REPLY – NEV-NEPA-23 – AIRCRAFT CRASH SCENARIOS – AGING FACILITY..... 770

C. Miscellaneous Contentions..... 777

REPLY – NEV-MISC-01 – EROSION AND GEOLOGIC DISPOSAL 778

REPLY – NEV-MISC-02 – ALTERNATE WASTE STORAGE PLANS 779

REPLY – NEV-MISC-03 – LA REFERENCES 780

REPLY – NEV-MISC-04 – AGING FACILITY ROLE UNDER NWPA..... 782

REPLY – NEV-MISC-05 – ROLE OF AGING FACILITY 784

IV. CONCLUSION AND PRAYER FOR RELIEF..... 785

ATTACHMENTS:

1 Excerpt from NIRS/PC's Petition to Intervene (4/6/2004) in *Louisiana Energy Services (National Enrichment Facility)*, CLI-04-25, 60 NRC 223 at 226-27 (2004), *reconsideration denied*, CLI-04-35, 60 NRC 619 (2004), *affirming* LBP-04-14, 60 NRC 40, 67 (2004) ML041110645

I. INTRODUCTION

NRC Staff filed its Answer to Nevada's "Petition to Intervene as a Full Party" on February 9, 2009. NRC Staff, importantly, found no noncompliance with NRC regulations in regard to Nevada's LSN. Staff first considered the NRC requirements (Answer at 33), "Pursuant to 10 C.F.R. § 2.1012(b)(1), a petitioner . . . may not be granted party status . . . if it cannot demonstrate substantial and timely compliance with the requirements of Section 2.1003 at the time it requests participation in the HLW proceeding." NRC Staff then found a "failure to comply with LSN obligations" (Answer at 10) in the case of only 2 of the 14 Petitioners – Caliente Hot Springs Resort and Timbisha Shoshone Tribe. Unlike DOE, NRC Staff found no deficiency in regard to Nevada's LSN compliance.

Staff agreed that Nevada was entitled to intervene and to participate as a full party in the NRC hearing on all of its admitted contentions, but then proceeded to object to virtually all of them. Nevada replies to Staff's objections below, first by addressing (in II below) some "generic" legal propositions advanced by Staff in many of its objections to individual contentions, and then by addressing (in III below) Staff's objections to individual contentions.

As explained more fully in II below, a pervasive defect in Staff's Answer is its insistence on depths of expert analyses and levels of documentary support for contentions that are not necessary at the contention stage and that are sometimes preposterous. For example, when Nevada's highly distinguished expert for NEV-SAFETY-27 explained that DOE "did not evaluate uncertainty in rock type in areas sufficiently north, east, and west," Staff insisted that his opinion must be disregarded because he "provide[d] no discussion regarding how far north, east or west would be sufficient," as if Nevada's expert had that burden (Answer at 263).

After reviewing Staff's Answer, a disinterested observer would conclude that the NRC Staff was hell-bent to limit Nevada's ability to participate in the licensing hearing to a few narrow issues, regardless of the importance of the hearing to Nevada and its citizens, and notwithstanding that this crabbed approach to public participation will profoundly detract from the credibility of the NRC's overall licensing review. Nevada submits that its contentions are vastly superior, in specificity, substance and support, to the contentions typically admitted in NRC licensing hearings and to many sections of a typical NRC Staff Safety Evaluation Report. If Nevada's contentions are rejected, it will mean that no petitioner, even one with sufficient legal and technical expertise, can meet NRC's hearing requirements, and NRC's Part 2 is now being applied in a manner such that hearing rights granted by the Atomic Energy Act are being illegally nullified.

In its Petition (at 3) Nevada asked to participate in the resolution of uncontested issues to the same extent, and in the same manner, as DOE or any other party may be allowed to participate. Nevada was referring here to the hearing on uncontested environmental issues required by the Notice of Hearing (at 9). The NRC's review of a license application is, by the definitions in 5 U.S.C. §551 (6) and (7), an "adjudication." It is legally impossible to conduct any part of a licensing review outside of the adjudicatory process, and a hearing on uncontested environmental issues is necessarily a part of the adjudicatory process. Nevada does not here presume to tell the Commission or the Licensing Board what adjudication procedures it must adopt for this uncontested hearing, but considerations of fundamental fairness would forbid any hearing process which allowed an issue to be taken up and resolved only after hearing the views of a select few parties (such as DOE and NRC Staff), without allowing persons with an affected interest any say in the matter.

II. GENERIC LEGAL ISSUES

A. Nevada's Expert Opinion Affidavits are in Proper Form

NRC Staff argues (Answer at 12) that Section 6 of many of Nevada's contentions lacks any supporting affidavit. First of all, as NRC Staff surely knows, the Commission has made it crystal clear that a petitioner only needs to make "a minimal showing that material facts are in dispute" at the contention stage, and that the support offered for a contention "need not be in affidavit or formal evidentiary form and need not be of the quality necessary to withstand a summary disposition motion." 54 Fed. Reg. 33,168, 33,171 (Aug. 11, 1989). Therefore, no affidavit or other admissible evidence is required to comply with any part of 10 C.F.R. § 2.309(f)(1), and in furnishing affidavits, Nevada added the proverbial unnecessary frosting on the cake. Staff's complaint here is akin to complaining that parts of the cake have some frosting missing.

Second, even if affidavits were required, the contentions without affidavits for Section 6 do not need them. The affidavits for Section 5 (10 C.F.R. § 2.309(f)(1)(v)) are sufficient to support the contention with fact and expert opinion, and the pertinent portions of the application are cited in Section 5 (and almost always in Section 1 as well). All that needs to be added for compliance with Section 6 (10 C.F.R. § 2.309(f)(1)(vi)) is to cite (again) to those DOE positions being challenged so that the existence of a material dispute with DOE would be apparent, an administrative and trivial exercise. Nothing in 10 C.F.R. 10 C.F.R. § 2.309(f)(1) requires a separate statement of supporting facts or opinions when doing so would duplicate text in Section 5. However, some Nevada TSPA contentions do have an affidavit to support Section 6 because Nevada anticipated an argument that a specific calculation of dose consequences would be required to show a material issue, and the affidavit explains why this was not required.

Next NRC Staff argues that affidavits cannot be considered because the affiants did not sign or initial the contention listings, and indicated that counsel would assign unique contention numbers. Nevada adopted the approach of having expert affidavits incorporate multiple contentions to avoid burdening its Petition with hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each draft contention was assigned a unique alphanumeric designation, as in HH-1 for Hugh Horstman's first draft contention. However, as a favor to NRC and DOE, Nevada organized its contentions into logical subject areas, as opposed to sprinkling its contentions about one subject area (e.g., climate) among contentions in other subject areas. This meant that the sequential numbering of the contentions in the Petition had to wait until the very last minute when all contentions had been fully drafted and approved, at which point it was not practical to circulate new affidavits for signature, especially since many of Nevada's experts lived in European countries where affidavit formalities are more complicated. The expert initial designations (e.g., "HH") were retained until the end of the drafting process, as the final contention numbering was completed, but ultimately they were removed because the June 20, 2008 Case Management Order, *U.S. Department of Energy (High-Level Waste Repository: Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (2008), ("LBP-08-10") did not allow for them. Nevada believes that there is no chance that any mistakes were made and that the final drafting of the attachments to the affidavits associates the right experts with the right contentions.

Next NRC Staff complains that when more than one affiant subscribed to a specific Section 5 it cannot tell which parts of the section are associated with which expert. NRC Staff does not explain why a question regarding whether each expert adopted all or only a part of a Section 5 bears on admissibility of the contention., as opposed to admission of expert testimony

at a hearing on the merits. However, the answer to Staff's question is obvious on the face of the affidavits—when multiple experts adopt the same Section 5, all of the section is being adopted as the testimony of each expert. If the case had been otherwise, the affiant would have said so, and there is no violation of the June 6, 2008 Case Management Order (LBP-08-10).

B. Nevada Reference to the Phrase "and Similar Subsections" in Its Contentions is Fully in Accord with the Specificity Requirement of 10 C.F.R. § 2.309(f)(1)(i) and Does Not Undermine Compliance With 10 C.F.R. § 2.309(f)(1)(iv) or (vi)

NRC Staff frequently asserts that reference to the phrase "and similar subsections" found in many of Nevada's contentions does not comply with the pleading requirements set forth in 10 C.F.R. § 2.309(f)(1)(i), (iv) or (vi) because the phrase lacks the required specificity.

Each and every contention proffered by Nevada identifies one or more specific subsections of DOE's 2008 SAR (SAR), DOE's 2004 Environmental Impact Statement (EIS), and/or DOE's 2008 Supplemental Environmental Impact Statement (SEIS). As such, each and every contention proffered by Nevada raises or controverts specific issues of law or fact in accordance with the regulatory requirements contained in 10 C.F.R. § 2.309(f)(1)(i) and LBP-08-10. However, upon review of the SAR, EIS and SEIS, it becomes clear that virtually every subsection has implications on numerous other related or similar subsections. Often within any one particular subsection DOE cross-references numerous other subsections containing related or similar discussions. Rather than attempting to identify, by string citation, each of the related or similar subsections, and then suffering a challenge for failure to identify "all" the related or similar subsections, when drafting its contentions Nevada opted to identify the principle subsection, and often several subsections, and then included the phrase "and similar subsections" to account for such cross-references. Similarly, by specifically including the phrase "and similar subsections" where appropriate, Nevada wanted to ensure that if its contentions were proven any

implications from mere citation to only a single SAR or EIS/SEIS subsection were not ignored. This concern was not ill-founded. For example, when NRC Staff thought Nevada omitted one single relevant citation to the application in NEV-SAFETY-27, it promptly pounced on this omission and argued that "if Nevada's contention is otherwise found to be admissible, it should be limited to disputes to those specific sections of the SAR that were identified" (Answer at 266).

In sum, this is not a circumstance where the Board and the parties have to review the application themselves to discover what is precisely is being placed in controversy. Nevada has satisfied the requirements of 10 C.F.R. § 2.309(f)(1)(i) and LBP-08-10. The cases Staff cites are not to the contrary. The petitioner in *Commonwealth Edison Company (Zion Nuclear Power Station, Units 1 & 2)*, CLI-99-4, 49 NRC 185 (1999), tried unsuccessfully to add an entirely new argument on appeal. The quote from *Duke Energy Company (Oconee Nuclear Station, Units 1, 2, and 3)*, CLI-99-11, 49 NRC 328 (1999), is correct, but Nevada clearly satisfies the requirement that "parties [be] on notice of the petitioners specific grievances."

C. <u>Nevada's Contention Bases Far Exceed NRC Requirements</u>

NRC Staff complains repeatedly about the depths of expert analyses and levels of documentary support Nevada offers in support of its contentions. These complaints insist on depths of expert analyses and levels of documentary support that are not necessary at the contention stage and that are sometimes preposterous. For example, when Nevada's highly distinguished expert for NEV-SAFETY-27 explained that DOE "did not evaluate uncertainty in rock type in areas sufficiently north, east, and west," Staff insists that his opinion must be disregarded because he "provides no discussion regarding how far north, east or west would be sufficient," as if Nevada's expert had that burden (Answer at 263). When this same expert explained that data underlying DOE's estimates of bedrock saturated hydrologic conductivity are

inadequate, Staff insists that this is insufficient "without an opinion as to whether the available data are incorrect or are not representative. *Id*. Does NRC Staff not know the meaning of "inadequate"? And in answering NEV-SAFETY-28, which explains that a specific DOE uncertainty analysis is invalid because it uses an arbitrary criterion to exclude relevant data, NRC Staff argues that the opinion must be disregarded because it "presents no discussion from the SAR or other documents regarding why DOE chose this criterion" (Answer at 270). Staff cites to nothing in the application, and what "other documents" beside the application is NRC Staff holding Nevada accountable for reviewing?

Sometimes, NRC Staff's complaints suggest a lack of understanding of scientific principles. 10 C.F.R. § 63.114(g) requires that DOE provide "the technical basis for models used in the performance assessment." 10 C.F.R. § 63.114(g), considered in relation to 10 C.F.R. § 63.31, must be read to require not only that the basis for models used in the performance assessment be described, but also that, as described, they be adequate to support safety findings. In NEV-SAFETY-31, Nevada's distinguished expert explained that DOE's net infiltration model is empirical and therefore needed detailed calibration that was impossible because of insufficient data (Petition at 196). He concluded that "[t]he model parameterization therefore has no data support." *Id*. NRC Staff argues that the opinion is deficient because "it fails to explain how a lack of detailed calibration data would cause DOE to be in non-compliance with 63.114(g)" (Answer at 287). Does NRC Staff really not understand after reading the contention why the lack of calibration and data support leads to an inadequately supported model?

NRC Staff's complaints grossly exaggerate NRC's contention requirements. The Commission is very clear that, at the contention stage, a petitioner only needs to make "a minimal showing that material facts are in dispute," and that the support offered for a contention

"need not be in affidavit or formal evidentiary form and need not be of the quality necessary to withstand a summary disposition motion." 54 Fed. Reg. 33,168, 33,171 (Aug. 11, 1989). Nevada's contentions meet and in fact, far exceed the "minimal" requirements of 10 C.F.R. § 2.309(f). Nevada's contention bases in fact and opinion are far superior to the vague and general bases frequently rejected by the Commission and its Boards, and they offer more than sufficient detail to enable a Licensing Board to make the necessary judgment about contention admissibility. Nevada submits that its contentions are vastly superior, in both substance and support, to the rather conclusory contentions offered by NIRS/PC in the *National Enrichment Facility* case, whose admission without admissible evidentiary support (on bases B and C) by the Licensing Board was specifically affirmed by the Commission. *Louisiana Energy Services (National Enrichment Facility)*, CLI-04-25, 60 NRC 223 at 226-27 (2004), *reconsideration denied*, CLI-04-35, 60 NRC 619 (2004), *affirming* LBP-04-14, 60 NRC 40, 67 (2004). The admitted contentions are found in NIRS/PC's April 6, 2004 petition to intervene at ML041110645, at 25-27 (Attachment 1 to Nevada's Reply).[1] Nevada submits also that its contentions are superior, in both substance and support, to many sections of a typical NRC Staff Safety Evaluation Report. "[T]he support for a contention may be viewed in a light that is favorable to the petitioner and inferences that can be drawn from evidence may be construed in favor of the petitioner." *Entergy Nuclear Vermont Yankee et al (Vermont Yankee Nuclear Power Station)*, LBP-06-20, 64 NRC 131, 150 (2006), citing *Arizona Public Service Company (Palo Verde Nuclear Station, Units 1, 2, and 3)*, CLI-91-12, 34 NRC at 355 (1991).

If Nevada's contentions are rejected, it will mean that no petitioner, even one with sufficient legal and technical expertise, can meet NRC's hearing requirements and NRC's Part 2

[1] This April 6, 2004 NIRS/PC Contention 2.1 was subsequently redesignated as NIRS/PC-EC-5-9/TC-1-5 in their May 27, 2004 supplement, and then by the Licensing Board as NIRS/PC-EC-3/PC-1 in its decision on admissibility of contentions.

is now being applied in a manner such that hearing rights granted by the Atomic Energy Act are being illegally nullified.

D. Nevada Does Not Need to Demonstrate that TSPA Contentions Would Violate EPA Dose Standards and a Contention Alleging that DOE's TSPA Does Not Comply with One or More of NRC's Requirements for a Performance Assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) is Material *Per Se*

NRC Staff complains about the sufficiency of Dr. Thorne's affidavit in Section 6 of many of Nevada's contentions, and seems to argue that Nevada TSPA contentions do not demonstrate a material issue without a calculation of the effect of adopting the contention on RMEI dose or radionuclide releases to groundwater. These complaints are baseless.

First, NRC Staff misreads Part 63. Part 63 requires that compliance with the dose standards be established by a "performance assessment." 10 C.F.R. §§ 63.102(j) and 63.113. However, to be used for this purpose, a performance assessment must comply with specific and separately articulated requirements, including requirements in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305. 10 C.F.R. § 63.101 provides that "important parameters" must be included in the performance assessment even if "they are difficult to precisely quantify to a degree of confidence," that the performance assessment must focus on "the full range of defensible and reasonable parameter distributions," and that consideration must be given to "the degree of diversity among the multiple barriers as a measure of the resiliency of the geologic repository." 63.102(h) requires, among other things, that the performance assessment be based on "credible models and parameters," and 10 C.F.R. § 63.102(j) requires, among other things, that the performance assessment include "features, events and processes" that "represent a wide range of both beneficial and potentially adverse effects on performance." 10 C.F.R. § 63.114 requires that the performance assessment "account for uncertainties and variabilities in parameter values,"

"provide for the technical basis for parameter ranges, probability distributions, or bounding values," and "consider alternative conceptual models of features and processes that are consistent with available data current scientific understanding." 10 C.F.R. § 63.305 provides instruction for varying factors related to geology, hydrology, and climate.

These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said that "[i]n summary, any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements" and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements, beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). *See also* 73 Fed. Reg. 61,271 (Oct. 15, 2008) (EPA's final dose standard for the post-10,000 year performance assessment period) ("Regardless of whether the mean of projected doses is well below the dose standard or not, NRC will examine the assumptions, data, models, and other aspects of DOE's projections to ensure that it has an understanding of those projections sufficient to reach a 'reasonable expectation' as to their compliance. . . .").

Accordingly, Nevada's contentions to the effect that DOE's TSPA omits "the full range of defensible and reasonable parameter distributions," is not based on "credible models and parameters," omits "features, events and processes" that should have been included, fails to "account for uncertainties and variabilities in parameter values," fails to "provide for the technical basis for parameter ranges, probability distributions, or bounding values," fails to

"consider alternative conceptual models of features and processes that are consistent with available data current scientific understanding," or fails to properly vary factors related to geology, hydrology, and climate, are all material without a separate dose calculation, because they state a separate and specific violation of Part 63. Indeed, any of Nevada's contentions alleging a violation of these requirements in 10 C.F.R. §§ 63.101, 102, 114 and 305, taken as true, would disqualify the performance assessment and obliterate DOE's case for compliance with the dose standards.

Second, NRC Staff's argument relies on the factual premise that it would have been possible, in the time available, for Nevada to provide qualitative **and** quantitative assessments of the effects of its identified errors and deficiencies on DOE's TSPA models, modify those models to include the effects of Nevada's identified errors and deficiencies, and then perform calculations to project the ultimate dose consequences of the errors and deficiencies (Answer at 49-53). There are two fundamental flaws in this premise.

First, many of Nevada's contentions assert that one of the necessary models or sub-models in DOE's TSPA is wrong, invalid, fundamentally flawed, or not adequately supported. The TSPA is like a collection of linked chains, with each chain composed of several model components or sub-models. Taken together, this collection of model components and sub-models is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. However, if one link in the chain (a model component or sub-model) cannot support the necessary weight, the links below it that depend on it will bear no weight, no matter how strong they are, and all of the chains and links must bear weight in order for there to be a valid dose calculation Thus, for example, if DOE's infiltration model is not adequately supported, all of DOE's efforts to model things further down the chain like corrosion, movement in the saturated

zone, and dose to the RMEI cannot compensate for this deficiency. In essence, if a necessary model component or sub-model is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a total system performance assessment.

Thus, contentions asserting that a necessary model component or sub-model in DOE's TSPA is wrong, invalid, fundamentally flawed, or not adequately supported are material *per se* because, if true, they would destroy DOE's case for compliance and require denial of the application. Moreover, for these contentions DOE (and now NRC Staff) asks for the impossible, because a defective model cannot be used, and a TSPA that has been modified to include the contention would have a missing model or sub-model that would prevent a dose calculation from being made.

However, some of Nevada's TSPA contentions would leave a kind of TSPA model still in place. For example, a contention that an alternative conceptual model should have been included in the TSPA in order to accurately capture uncertainty would, if true, still leave an intact TSPA model, albeit a fatally flawed and non-compliant one. The same would be true of a contention that DOE improperly excluded a feature, event or process (FEP). To continue the analogy, the links in the chains would be intact, but the links would be different from the kind NRC requires. These specific TSPA contentions (including FEP contentions) are listed in Nevada's Petition to Intervene in Attachment C to the expert affidavit of Dr. Thorne, included as Attachment 3 of Nevada's Petition. For each these TSPA contentions, Nevada offered the expert opinion of Dr. Thorne as follows:

> Because the TSPA is a complex non-linear model, and changes in the approach adopted are likely to result in changes in the results obtained that vary both as a function of time post-closure and from realization to realization within a modeling case, a determination whether acceptance of this contention would necessarily lead to calculated doses in excess of EPA's dose standards would require DOE to perform a substantial number of additional modeling cases that are not included in the LA and that are beyond the practical ability of anyone else to perform.
>
> Moreover, there are more than 100 Nevada TSPA contentions with characteristics like this one. These relate to a total of 19 different broad aspects of the TSPA. Therefore, there are many thousands of possible changes that would need to be made to DOE's TSPA approach to include the effects of accepting this one contention along with all possible combinations of Nevada's other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases. This vastly increases the burden and complexity of showing the dose effects of acceptance of Nevada's contentions.

This opinion supports the proposition that NRC Staff asks for the impossible. Requiring the impossible would deny Nevada its hearing rights.

It is relevant that DOE did not always perform calculations of RMEI exposure or radionuclide release when screening out FEPs. After citing to all of the NRC regulations relevant to selecting FEPs, the SAR concludes in subsection 2.2.1.2 at 2.2-17 that "[a]ccordingly, to the extent that a particular FEP has no significant effect on radiological exposure, or radionuclide release, *or on an intermediate-performance measure that can be linked to radiological exposure or radionuclide release*, that FEP can be excluded (screened out) from the performance assessment based on low consequence" [emphasis added].

NRC Staff offers no expert affidavit to counter Dr. Thorne's expert opinion, but its counsel complains that Dr. Thorne's opinion is insufficient because it fails to provide a reasoned basis, fails to identify specifically the thousands of possible changes in the TSPA approach that would be needed, and fails to explain why many thousands of changes would be needed. NRC Staff must not have actually read the affidavit carefully. Dr. Thorne carefully explains that "many thousands of possible changes. . . would need to

be made to DOE's TSPA approach" because "there are more than 100 Nevada TSPA contentions. . .relat[ing] to a total of 19 different broad aspects of the TSPA," and because one would need to include the effects of accepting [any]one contention along with all possible combinations of Nevada's other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Further, what good would it do for Nevada to identify the thousands of changes to the TSPA because, as Dr. Thorne states, this would require DOE to perform a substantial number of additional modeling cases that are not included in the LA and that are beyond the practical ability of anyone else to perform. Therefore, if Nevada had identified all the necessary changes, the calculation NRC Staff requests would still be impossible.

In sum, NRC Staff's argument with respect to this subset of Nevada's TSPA contentions is lacking in evidentiary support, while Nevada's argument to the contrary is fully supported. If NRC Staff disagrees with Dr Thorne, this would constitute a dispute over the merits of Nevada's contention that cannot be resolved at the contention admissibility stage. *Duke Energy Corporation (McGuire Nuclear Station, Units 1 and 2, Catawba Nuclear Station, Units 1 and 2)*, CLI-02-17, 56 NRC 1, 9-10 (2002); *Crow Butte Reserves, Inc. (License Renewal for the In Situ Leach Facility, Crawford, Nebraska)*, LBP-08-24 at 63, __ NRC __ (2008); 54 Fed. Reg. 33,170 (Aug. 11, 1989) ("The [contention] requirement does not call upon the intervenor to make his case at this stage of the proceeding. . . .").

E. NRC Staff Does Not Understand the Role and Importance Alternative Conceptual Models

10 C.F.R. § 63.114 (c) requires that the performance assessment include "alternative conceptual models of features and processes that are consistent with available data and scientific

understanding and evaluate the effects that alternative conceptual models have on the performance of the geologic repository." When Nevada contends that an alternative conceptual model meeting these criteria should have been but was not considered, NRC Staff frequently objects because Nevada failed to explain why this failure resulted in an underestimation of uncertainty. This fails to appreciate why Part 63 requires that alternative conceptual models of features and processes be considered.

When NRC promulgated Part 63, it decided not to include the subsystem performance requirements in Part 60, and replaced them with a single total systems performance assessment. In defending its elimination of subsystem performance requirements, and its reliance on a total systems performance assessment, the Commission emphasized again and again the importance of accounting for uncertainty in the assessment on the basis of the full record. Under 10 C.F.R. § 63.114, DOE has the burden to "account for uncertainties and variabilities in parameter values," to "provide for the technical basis for parameter ranges, probability distributions, or bounding values," and to "consider alternative conceptual models of features and processes that are consistent with available data current scientific understanding." As the Commission put it in promulgating Part 63, DOE must show that "uncertainties inherent in any performance assessment are thoroughly articulated and analyzed or addressed." 66 Fed. Reg. 55,747 (Nov. 2, 2001). All of the above requirements, (which include the requirement to consider certain alternative conceptual models) are essential contributors to the assessment of uncertainty. This is clear from the preamble to Part 63, which lists and describes all of them under the heading "Requirements for Addressing Uncertainty in Performance Assessment." 66 Fed. Reg. 55,732, 55,747 (Nov. 2, 2001).

While the Commission is clear that "uncertainties in performance estimates cannot be so large that the Commission cannot find a reasonable expectation that the post-closure assurance performance objectives will be met," 66 Fed. Reg. 55,748 (Nov. 2, 2001), the Commission refused to specify what level of uncertainty would be unacceptable. 66 Fed. Reg. 55,747 (Nov. 2, 2001). Thus, whether a particular level of uncertainty is acceptable or unacceptable is a pure judgment call, to be made on the basis of the full record. This makes a full and accurate description and accounting of uncertainty extremely important by itself, just as 10 C.F.R. § 63.114 suggests, for without any definition of what level of uncertainty is unacceptable, it must be assumed that any DOE mistake in articulating or analyzing uncertainty may be critical to the ultimate licensing decision.

The Commission emphasized that the full record of decision would include "many factors in addition to whether the site and design comply with the performance objectives," 66 Fed. Reg. 55,740 (Nov. 2, 2001), and the Commission focused specifically on the importance to a full record of articulating and analyzing uncertainty when it stated that while Part 63 required a "performance assessment," it would also rely on "other" requirements, including a separate requirement "for consideration and treatment of uncertainty," in making a decision. 66 Fed. Reg. 55,746 (Nov. 2, 2001). *See also* 73 Fed. Reg. 61,271 (Oct. 15, 2008) (EPA's final dose standard for the post-10,000 year performance assessment period) ("Regardless of whether the mean of projected doses is well below the dose standard or not, NRC will examine the assumptions, data, models, and other aspects of DOE's projections to ensure that it has an understanding of those projections sufficient to reach a 'reasonable expectation' as to their compliance. . . .").

Thus, a failure to consider "alternative conceptual models of features and processes that are consistent with available data and scientific understanding and evaluate the effects that

alternative conceptual models have on the performance of the geologic repository" is not only a *per se* material violation of 10 C.F.R. § 63.114(c) but, more fundamentally, it is a *per se* indication that DOE has failed to "show that "uncertainties inherent in any performance assessment are thoroughly articulated and analyzed or addressed." 66 Fed. Reg. 55,747 (Nov. 2, 2001). By insisting that Nevada not only show that an alternative conceptual model of a feature or process be "consistent with available data and scientific understanding," but also show specifically how this failure affected uncertainty, NRC Staff impermissibly challenges its own Part 63, because Part 63 already finds, on a generic basis, that a violation of § 63.114 (c) *always* affects uncertainty in a material way.

F. A Failure to Address a Technical Study That is Not Part of the Application Does Not Violate 10 C.F.R. § 2.309(f)(1)

NRC Staff sometimes complains that a Nevada contention cannot be admitted because an allegedly missing analysis can be found in some supporting reference in the application. However, supporting references are not a part of the application. Section 1.4.1 of the application provides (at 1-21) that no documents referenced in the application are actually part of the application except for the materials specifically incorporated by reference in Table 1-1 (which includes only one document, DOE's quality assurance program description or "QARD"). 10 C.F.R. § 2.309(f)(1)(vi) requires a petitioner to address "specific portions of the application," but there is no requirement to address materials outside of the application, and a contention cannot be faulted for having failed to do so. Nevada's experts made a good faith effort to review the relevant technical references in the application because, as NEV-MISC-03 explains, it was usually impossible to understand the bases for DOE's conclusions without examining them. However, as explained above, Nevada cannot be faulted for occasionally missing one.

G. NRC Staff Improperly Shifts the Burden of Proof to Nevada

In answering various Nevada contentions alleging that a specific component of DOE's TSPA is wrong, fundamentally flawed or not adequately supported, NRC Staff frequently complains that Nevada has failed to show that a different approach would make a difference.

According to 10 C.F.R. § 63.102(j), "compliance with the post-closure performance objectives requires a performance assessment." *See also* 10 C.F.R. § 63.113. DOE endeavors to satisfy this performance assessment requirement through its TSPA. The TSPA is like a collection of linked chains, with each chain composed of several model components or sub-models. Taken together, this collection of model components and sub-models is used to estimate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. However, if one link in the chain (a model component or sub-model) cannot support its own weight, the links below it that depend on it will bear no weight, no matter how strong they are, and all of the chains and links must bear weight in order for there to be a valid dose calculation Thus, for example, if DOE's infiltration model is wrong, fundamentally flawed or not adequately supported, all of DOE's efforts to model things further down the chain like corrosion, movement in the saturated zone, and dose to the RMEI cannot compensate for this deficiency. In essence, if a necessary model component or sub-model is wrong, fundamentally flawed, or not adequately supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. And as noted, without a complete and reliable TSPA, DOE cannot prove compliance with EPA's dose standards.

Accordingly, if Nevada contends (with adequate support) that a DOE TSPA model is wrong, fundamentally flawed or not adequately supported, DOE's application fails. Nevada has no further burden to make some showing that its contention would make a difference. Moreover,

Nevada certainly has no obligation to come up with different model that would make DOE's case—DOE has the burden of proof, not Nevada.

H. NRC Staff Applies the Wrong Standard for the Admission of NEPA Contentions; Nevada has More than Satisfied the Heightened Pleading Requirements for All of Its NEPA Contentions

NRC Staff argues that any environmental contention proffered by Nevada must demonstrate compliance with not only 10 C.F.R. § 2.309(f), but also the requirements contained in 10 C.F.R. §§ 51.109(c)(2), 2.326(a)(2), 2.326(a)(3), and 2.326(c). With regard to § 2.326, NRC Staff would also require Nevada to meet the criteria for requiring supplementation of an FEIS by "present[ing] 'a seriously different picture of the environmental landscape" (*e.g.*, Answer at 135-64 (citing case law on judicial review NEPA statements)).

An analysis regarding the admissibility of environmental contentions in this proceeding begins with the NRC Hearing Notice, which states in relevant part:

> In addition to meeting NRC's regular contention admissibility requirements in 10 C.F.R. 2.309(f), environmental contentions addressing any DOE environmental impact statement or supplement must also conform to the requirements and address the applicable factors outlined in 10 C.F.R. 51.109 governing NRC's adoption of DOE's environmental impact statements. The requirements of section 51.109 should be applied consistent with *Nuclear Energy Institute, Inc. v. EPA,* 373 F.3d 1251, 1313-14 (D.C. Cir. 2004), a court decision discussing section 51.109, and consistent with the Commission's denial of the State of Nevada's petition to amend section 51.109 (73 Fed. Reg. 5,762); January 31, 2008), and the Office of the General Counsel's subsequent letter clarifying the Commission's denial (Letter from Bradley W. Jones, Assistant General Counsel to Martin G. Malsch, dated March 20, 2008, ADAMS accession number ML080810175). Under 10 C.F.R. 51.109(c), the presiding officer should treat as a cognizable "new consideration" an attack on the Yucca Mountain environmental impact statements based on significant and substantial information that, if true, would render the statements inadequate. Under 10 C.F.R. 51.109(a)(2), a presiding officer considering environmental contentions should apply NRC "reopening" procedures and standards in 10 C.F.R. 2.326 "to the extent possible."

73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B.

Therefore, with regard to judging the admissibility of environmental contentions against the requirements of 10 C.F.R. § 51.109, NRC acknowledges that the regulation should be applied consistent with *Nuclear Energy Institute, Inc. v. EPA*, 373 F.3d 1251 (D.C. Cir. 2004), *rehearing and rehearing en banc denied*, 2004 U.S. App. Lexis 18780*, motion to stay mandate denied*, 2004 U.S. App. Lexis 22663, wherein Nevada was promised the right to raise "substantive claims" involving the EIS and/or SEIS.

> [T]he effect of the FEIS will not be felt in a concrete way by Nevada until it is used to support some other final decision of DOE or NRC. Nevada may raise its substantive claims against the FEIS if and when NRC or DOE makes such a final decision. . . . NRC has acknowledged that it would not be practicable to adopt [DOE's] FEIS unless it meets the standards for an 'adequate statement' under the NEPA and the Council for Environmental Quality's NEPA regulations. *See* 53 Fed. Reg. at 16,142. We agree. . . .When questioned at oral argument about the meaning of [10 C.F.R. § 51.109(c)], Government counsel assured the court that NRC will not construe the "new information or new consideration" requirement [of Section 51.109(c)(2)] to preclude Nevada from raising substantive claims against the FEIS in administrative hearings. . . . Government counsel's unequivocal representation to the court during oral argument that Nevada will not be foreclosed from raising substantive claims against the FEIS in administrative proceedings comports with the terms of the regulation and reflects a reasonable and compelling interpretation. Therefore, on the record at hand there is no reason to assume that the regulation will bar consideration of Nevada's substantive claims in the relevant NRC administrative proceedings.

373 F.3d at 1313-14. *See also* 73 Fed. Reg. 5,762, 5,765 (Jan. 31, 2008) ("NRC will treat Nevada's substantive claims against the FEIS as 'new considerations' within the framework of § 51.109(c).").

Accordingly, in ruling on NEPA contentions, the Commission may substitute its judgment for DOE on whether NEPA and CEQ regulations are satisfied, as opposed to functioning like a reviewing court and applying an arbitrary and capricious or similar deferential review standard, or applying the standard for requiring supplementation. Otherwise, the Court's holding that a DOE NEPA statement cannot be adopted "unless it meets the standards for an

'adequate statement' under the NEPA and the Council for Environmental Quality's NEPA regulations" and that "Nevada will not be foreclosed from raising substantive claims against the FEIS in administrative proceedings" will be disregarded. There is no mention here that Nevada's challenges will be limited to defects so serious that supplementation is required.

It is true that, according to the Commission, a NEPA contention must raise a significant and substantial consideration, but this cannot be read in a manner that is inconsistent with the Court's opinion. For each of its environmental contentions Nevada has presented significant and substantial information in sufficient detail to properly frame an appropriate challenge to DOE's EIS and/or SEIS and has made clear that such information if proven true renders DOE's EIS and/or SEIS inadequate. Since an essential purpose of an EIS completed under NEPA is to ensure a full disclosure of environmental impacts, *see Columbia Basin Land Protection Association v. Schlesinger*, 643 F.2d 585, 594 (9th Cir. 1981); *Limerick Ecology Action v. NRC*, 869 F.2d 719, 745 (3rd Cir. 1989), where the disclosure of environmental impacts in DOE's EIS and/or SEIS are significantly incomplete or inaccurate, NRC cannot adopt those analyses even if the outcome of this proceeding would be to grant DOE the requested construction authorization without any NEPA conditions. Therefore, with regard to the admissibility standards for environmental contentions set forth in 10 C.F.R. § 51.109, Nevada has more than met its required burden.

With regard to the requirement in the NRC Hearing Notice that the standards for re-opening proceedings contained in 10 C.F.R. § 2.326 should also be applied to environmental contentions to the extent possible, that regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R.

§§ 2.326(a)(2) and (a)(3) (subsection (a)(1) requires the contention to be timely filed, which is not applicable here). To the degree that Nevada's environmental contentions satisfy the requirement in Section 51.109 to address "significant and substantial information," they would already address the requirement in Section 2.326(a)(2) to address a "significant . . . environmental issue." The "materially different result" requirement in Section 2.326(a)(3) is also addressed in each environmental contention presented in Nevada's Petition. In particular, where DOE has failed to adequately address a significant environmental issue, Nevada has pled that the disclosure of environmental impacts as required under the National Environmental Policy Act (NEPA) is *per se* inadequate. *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the procedure required by law"), and *Oregon Environmental Council v. Kunzman*, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be set aside if undertaken without observation of procedure required by law"). As a result, the impacts would have been materially different and the EIS and SEIS as currently presented by DOE cannot be adopted by NRC.

Furthermore, NRC Staff's argument flies directly in the face of the NRC admonition that 10 C.F.R. § 2.326 should only be applied "to the extent possible." Apparently Staff fails to recognize that the requirements of 10 C.F.R. § 2.326 cannot be applied so strictly or rigorously as to wholly undercut statements made by government counsel to the court in *Nuclear Energy Institute, Inc. v. EPA, i.*e., "that Nevada will not be foreclosed from raising substantive claims against the FEIS in [these] administrative proceedings . . . ." 373 F.3d at 1314.

NRC Staff also claims that "Nevada has not explicitly addressed the § 2.326 criteria" (Answer at 1346). However, nowhere in the Case Management Order of June 20, 2008 is there found any discussion of either 10 C.F.R. § 51.109 or 10 C.F.R. § 2.326 much less a requirement

that a petition in intervention must separately address the particular criteria contained in either regulation. Nevada's Petition clearly articulated in Section 5 of each environmental contention the significant and substantial information that renders DOE's EIS and/or SEIS inadequate, and then identifies the materially different result that would ensue if the contention were proven true. For each such environmental contention, Nevada has also identified an expert witness (or witnesses) that drafted those statements and then adopts them in their respective affidavits, *supra*. Therefore, Nevada has more than satisfied the heightened pleading requirements for all of its environmental contentions.

III. REPLIES TO NRC'S RESPONSES TO NEVADA'S CONTENTIONS

A. Replies Regarding Safety-Related Contentions

REPLY – NEV-SAFETY-01 – DOE INTEGRITY

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

Staff argues that this contention is outside of the scope of the hearing because the NWPA designates DOE as the only applicant. This argument lacks merit.

Designating DOE as the applicant is manifestly not the same as designating DOE as a fully qualified NRC licensee, and nothing in the NWPA supports the proposition that, in designating DOE as the applicant, Congress also concluded that DOE possesses the requisite attributes of an applicant. Staff here ignores section 114(f)((5) of the NWPA, 42 U.S.C. § 10134(f)(5), which provides that "[n]othing in this Act shall be construed to amend or otherwise detract from the licensing requirements of the Nuclear Regulatory Commission," and which was specifically **reenacted** when Congress amended the NWPA in 1987 to designate DOE as the applicant for the Yucca Mountain repository. Section 5011(l) of the Nuclear Waste Policy Amendments Act of 1987. As indicated above, adequate character and safety culture are "licensing requirements of the Nuclear Regulatory Commission," imposed pursuant to section 182a of the AEA, and in enacting the original NWPA in 1982, and in amending it in 1987, Congress specifically preserved NRC's authority under this subsection to impose such character and safety culture requirements on DOE.

Moreover, Congress provided in section 114(d) of the NWPA, 42 U.S.C. § 10134 (d), that the Commission must judge DOE's application "in accordance with the laws applicable to

such applications," thereby sweeping in the full plethora of NRC case law making licensee character an important consideration in reviewing the application and in a licensing hearing. *E.g., Metropolitan Edison Company (There Mile Island Nuclear Station, Unit No. 1),* CLI-85-9, 21 NRC 1118, 1136-37 (1985); *Georgia Power Company (Vogtle Electric Generating Plant, Units 1 and 2)*, CLI-93-16, 38 NRC 25 (1993); *Louisiana Power and Light Company (Waterford Steam Electric Station, Unit 3),* ALAB-812, 22 NRC 5, 48-51 (1985).

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

   No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

   No reply necessary based on NRC Staff's Response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

   No reply necessary based on NRC Staff's Response.

REPLY – NEV-SAFETY-02 – DOE MANAGEMENT

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

NRC Staff's argument that DOE's technical and management competence is beyond the scope of this proceeding is incorrect and confounding. NRC Staff's argument is premised on the content of the Commission's October 22, 2008 Notice of Hearing and the NWPA, as amended, because of Congress' adoption of which NRC Staff incorrectly concludes that because DOE was nominated to be the **applicant** here, it has already been ordained as **competent** by Congress. NRC Staff obliquely suggests (Answer at 144) that its licensing regulations care nothing about the competence of a license applicant. None of these propositions is valid.

NRC Staff asserts that the issue of whether DOE possesses or lacks the requisite management ability to construct and operate a safe repository is outside the scope of this proceeding, and it tries to somehow separate the application from the applicant. By NRC Staff's formulation, an utterly incompetent applicant could nonetheless secure a repository construction license from the NRC as long as it could craft an attractive application. This is like saying a blind man would receive a driver's license, so long as he could hand up the proper paper work to the Department of Motor Vehicles. In so asserting, NRC Staff ignores its burden of proving (before the Commission may authorize construction of a GROA at the Yucca Mountain site) that there is reasonable assurance that the types and amounts of radioactive materials described in the application can be received and possessed in a GROA of the design proposed without

unreasonable risk to the health and safety of the public and that there is a reasonable expectation that the materials can be disposed of without unreasonable risk to the health and safety of the public. 10 C.F.R. §§ 63.31(a)(1) and (2). Incompetent management cannot meet the NRC standard.

The foregoing issues are the essence of the scope of the proceeding. As Nevada has shown, settled NRC case law establishes the proposition that an applicant's management competence is a proper consideration in a licensing proceeding to determine entitlement to an NRC license (Petition at 28). Nevada establishes that the pattern of an applicant's management performance in prior large projects is a cognizant fact to be considered in determining the likelihood of management competence on the project for which an NRC license is sought (Petition at 29). Indeed, the prior pattern of management competence of a license applicant is relevant to its license entitlement in a new unrelated licensing proceeding (Petition at 29). This is a principle which can work both ways, since an excellent record of performance at other facilities also creates a reasonable expectation that good performance will continue (Petition at 30).

NRC Staff argues that, by virtue of its adoption of the NWPA, Congress has already considered and resolved the issue of DOE's management competence (Answer at 144).

NRC Staff also insists that, even if NRC regulations in other contexts may require a showing of technical or management competence, no such requirement exists with respect to nuclear waste repositories. *Id*.

First of all, Congress did **not** preordain DOE as the licensee to build and operate a repository, or else this licensing proceeding would be utterly unnecessary. Rather, the purpose of this proceeding is to test every credential of DOE as a fit licensee to prevent "unreasonable

risk to the health and safety of the public." NRC Staff here ignores Section 114(f)(5) of the NWPA, 42 U.S.C. § 10134(f)(5), which provides: "Nothing in this Act shall be construed to amend or otherwise detract from the licensing requirements of the Nuclear Regulatory Commission" and which was specifically reenacted when Congress amended the NWPA in 1987 to designate DOE as the applicant for the Yucca Mountain repository.

Second, Congress provided in Section 114(d) of the NWPA, 42 U.S.C. § 10134(d), that the Commission must judge DOE's application "in accordance with the laws applicable to such applications," thereby including the full scope of NRC case law making licensee character and competence an important consideration in reviewing the application and in a licensing hearing *See, e.g. Metropolitan Edison Co. (Three-Mile Island Nuclear Sta., Unit 1)*, CLI-85-9, 21 NRC 1118, 1136-37 (1985); *Georgia Power Co. (Vogtle Elec. Generating Plant, Units 1 and 2*, CLI-93-16, 38 NRC 25 (1993); *Louisiana Power & Light Co. (Waterford Steam Elec. Sta., Unit 3)*, ALAB-812, 22 NRC 5, 48-51 (1985).

NRC Staff knows that, under 10 C.F.R. § 63.21(c)(22), the LA must include a description of Yucca Mountain project's organizational structure, and its key positions with responsibility for safety, personnel qualifications, and other programmatic items (10 C.F.R. § 63.21(c)(22)). Yet, NRC Staff would preclude NRC from any inquiry into the technical and management competence of an agency which has not demonstrated management competence as an agency, either in the past or in the present.

NRC Staff's proposition would turn upside down the overriding burden of proof in this proceeding: that which lies with DOE to prove (in order to secure a license) that its licensure would avoid unreasonable risk to the health and safety of the public.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with NRC Staff, along with specific references to the portions of the LA being controverted

No reply necessary based on NRC Staff's response.

REPLY – NEV-SAFETY-03 – QUALITY ASSURANCE IMPLEMENTATION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

It defies reason that the sole objection NRC Staff would register to this contention is the incorrect assertion that it is not material to any finding the Staff must make because its resolution would not make a difference in the outcome of the licensing proceeding (Answer at 146). The contention asserts, as correctly paraphrased by NRC Staff, that "based on alleged past and current practices, DOE has been unable to implement an adequate QA program and that as a result, there is no basis for a reasonable assurance that DOE will do so in the future." *Id*. Connecting the dots, NRC Staff is stating that it simply does not matter, one way or the other, whether DOE will **ever** have an adequate QA program. Whether it is likely to have an adequate QA program or whether it is not makes no different to NRC Staff. Under NRC regulations, that issue **should** make a difference to NRC Staff, and it **should** be material to the findings the NRC must make to grant DOE a license.

The Commission's regulations state that it may only authorize construction (by DOE) of a geologic repository operations area at the Yucca Mountain site if it determines that DOE has shown a reasonable expectation it will protect public health and safety. 10 C.F.R. §§ 63.31(a)(1) and (2). More importantly in the current context, Section 63.31(a)(3)(iii) provides: "In arriving

at these determinations, the Commission shall consider whether DOE's quality assurance program **complies** with the requirements of Subpart G of this Part (i.e., Section 63.141-63.144, mandating quality assurance requirements)." Those are the findings which the **Commission** must find and which are therefore material to the decision the **Commission** must make. The NRC Staff argues (irrelevantly, given the dichotomy between the Staff and the Commission) that this contention "fails to demonstrate that the issue it raises is material to the finding the **Staff** must make." The Staff's Freudian slip can be excused since, presumably, its goal is to implement the same regulations which are ultimately the goal of the Commission as well.

The NRC Staff argues that "nothing in Part 63 indicates that DOE's QA program must be **fully implemented** prior to issuing a construction authorization" (Answer at 147, emphasis added). Nevada never suggested this. What Nevada contends, based on the foregoing cited provisions of 10 C.F.R. § 63.31 is that it is not sufficient for DOE's compliance that it simply cut and paste the requirements of NRC's regulations with respect to quality assurance into its QARD and assert that it will someday in the future implement such a program. Any applicant could say that without any capability, or frankly any intention, of so doing. Nevada draws a clear line connecting DOE's deficient past QA program, its deficient current QA program, and its inability to carry its burden in establishing with any reasonable predictability that its QA implementation will be compliant in the future, thus falling short of the showings required to entitle it to receive a license under 10 C.F.R. § 63.31 and its cited subsections.

NRC Staff makes some future promises of its own, which are equally unavailing with respect to the issue of current compliance, as are DOE's. NRC Staff promises that, **if** the Commission should authorize construction of a repository by DOE, **then** the NRC Staff (at some unspecified future time) "will conduct an ongoing, performance based inspection program to

evaluate DOE's compliance" (Answer at 148). The problem with that promise is that it has nothing to do with DOE's current compliance. It is, however, consistent with the Staff's untenable position that it really does not care **now** whether DOE can or cannot create an adequate QA program in the future. Significantly, among the vast array of negative QA criticisms of DOE articulated in Nevada's contention, a number of these were specifically crafted by NRC Staff. Accordingly, an additional gloss can be placed on the NRC Staff position on this contention: even though the NRC Staff itself has found DOE's QA program inadequate, both in the past and in the present, that will make no difference to the NRC Staff in framing its advice to the Commission with respect to the question whether "DOE's quality assurance program complies with the requirements of Subpart G." 10 C.F.R. § 63.31(a)(3)(iii). If compliance with NRC regulations mean anything, then this contention which challenges DOE's compliance in the present and the likelihood of its compliance in the future should be admitted.

5. <u>A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials</u>

   No reply necessary based on NRC Staff's response.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

   No reply necessary based on NRC Staff's response.

REPLY – NEV-SAFETY-04 – CONTENT OF QUALITY ASSURANCE PROGRAM

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

Nevada has clearly identified the regulations applicable to this contention in Section 4 (Petition at 73-74). Nevada and NRC agree that 10 C.F.R. § 63.142(a) requires DOE to include in the SAR a description of its quality assurance (QA) program including, *inter alia*, a description that addresses facility operation, permanent closure, and decontamination and dismantling of surface facilities (Petition at 74; Answer at 150).

> DOE is required by § 63.21(c)(20) to include in its safety analysis report a description of the quality assurance program. . . . The pertinent requirements of this subpart [i.e., Subpart G (Quality Assurance) of 10 C.F.R. Part 63] apply to all activities that are important to waste isolation and important to safety functions of those structures, systems and components. These activities include designing, purchasing, fabricating, handling, shipping, storing, cleaning, erecting, installing, inspecting, testing, *operating*, maintaining, repairing, modifying, site characterization, performing confirmation, *permanent closure, decontamination, and dismantling of surface facilities*.

10 C.F.R. § 63.142(a) (emphasis added). However, there is nothing in Section 63.142(a) that speaks to timing or permits a delay in submitting certain information or even mentions a staged-based QA program. Therefore, Nevada asserts that DOE's QA program must **now** contain a description of a wide variety of activities including facility operation, permanent closure, and decontamination and dismantling of surface facilities (Petition at 74-75).

Instead of addressing this issue directly, NRC Staff's Answer (at 150) points to another regulatory requirement – 10 C.F.R. § 63.142(c) – that directs DOE to "establish a quality assurance program that complies with the requirements of this subpart at the earliest practicable time, consistent with the schedule for accomplishing the activities." However, Section 63.142(c) and Section 63.142(c) speak to different issues. 10 C.F.R. § 63.142(c) requires DOE to "establish" a QA program and document the same with written policies, procedures or instructions; whereas 10 C.F.R. § 63.142(a) merely requires DOE "to include in its safety analysis report a description" of its QA program.

NRC also relies upon a guidance document (*i.e.,* NUREG-1804 at 2.5-4) to conclude that DOE can "complete its quality assurance program in stages" (Answer at 150). However, in this contention Nevada is not demanding that DOE establish or "complete" or even implement its QA program regarding facility operation, permanent closure, and decontamination and dismantling of surface facilities right now. Rather, in this contention Nevada seeks DOE to include a "description" of its QA activities related to facility operation, permanent closure, and decontamination and dismantling of surface facilities as required by 10 C.F.R. § 63.142(a).

From the foregoing it is apparent that, contrary to NRC Staff's assertion (Answer at 150), Nevada has clearly identified the regulation requiring the SAR to include a description of a QA program to include facility operation, permanent closure, and decontamination and dismantling of surface facilities – *i.e.*, 10 C.F.R. § 63.142(a). While NRC is correct that nothing in that regulation requires these particular activities (or in fact any of the listed activities) to be addressed at the construction authorization stage, it is equally correct to note that nothing within the regulation permits the SAR description of the QA program to be one thing at the time of construction authorization and another thing at some other point in time. If NRC Staff's theory

were correct then there would be no requirement to describe any portion of the QA program at this time since DOE is not now performing or allowed to perform any construction activity at Yucca Mountain.

In sum, by raising an issue that is material to the findings that the NRC must make to license Yucca Mountain, in this contention Nevada has satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(iv). Clearly there is a legal dispute regarding the meaning and interpretation of Section 63.142(a), and that dispute is now properly framed for adjudication. Therefore, this contention cannot be dismissed at the admissibility stage of the proceeding.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

No reply necessary based on NRC Staff's response.

REPLY – NEV-SAFETY-05 – EMERGENCY PLAN

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

Nevada and NRC agree that, pursuant to 10 C.F.R. § 63.21(c)(21), DOE is required to provide "a description" of its Emergency Plan as part of its SAR (Petition at 77; Answer at 152). However, contrary to NRC Staff's assertion (Answer at 153), nowhere in this contention did Nevada assert that DOE was required to provide "a finalized emergency plan with its application" or "a full emergency plan" or even "the plan itself." Thus, none of NRC Staff's asserted reasons for rejecting this contention are an accurate statement of what the contention alleges. Rather, Nevada clearly set forth the factual basis for this contention in Section 5 (Petition at 77-78), accurately identified the regulations applicable to this contention in Section 4 (Petition at 77), and appropriately concluded in Section 6 (Petition at 78-79) that because of the factual allegations DOE cannot comply with the identified regulation. In sum, Nevada has satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(iv) and NRC Staff's effort to dismiss the contention should be rejected.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

NRC asserts that "Nevada does not specify why the information provided in SAR 5.7 is insufficient to satisfy 10 C.F.R. § 63.21(c)(21) other than a conclusory statement that such information is a 'mere commitment' to develop a future emergency plan" (Answer at 153). This contention presents for consideration whether DOE's commitments to develop descriptions of seven items for inclusion in an emergency plan, as contained within the specifically enumerated SAR subsections, complies with the regulatory requirement contained in 10 C.F.R. § 63.21(c)(21) to provide a description of those items. (*Id*. at 77-78). Significantly, in this contention Nevada did not demand that DOE actually produce the aforementioned maps and locations (or any other the seven items listed). Instead, Nevada made clear that for each identified SAR subsection DOE failed to include "even a description" of the particular item (Petition at 78-79). That answer the "why" asked by NRC – specifically, the commitment to provide a description is insufficient because the regulation calls for the description (not a commitment to provide a description). NRC Staff's assertion is clearly in error as much more that a conclusory statement was presented in Section 5 of this contention, and when read in conjunction with the applicable regulatory requirements identified in Section 4 of the contention answers the sufficiency question posed. In sum, Nevada has satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(vi) and NRC Staff's effort to dismiss the contention should be rejected.

REPLY – NEV-SAFETY-06 – PART 21 COMPLIANCE

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

NRC asserts that this contention fails to satisfy the pleading requirements contained in 10 C.F.R. § 2.309(f)(1)(iv) for 3 separate reasons: (1) "[b]ecause DOE is not yet a licensee, 10 C.F.R. § 21.51(a)(2) does not yet apply to any of its procurement contractors"; (2) "Section 63.73 will not apply until, and unless, a construction authorization is granted"; (3) "[n]o other provision of Part 63 indicates that DOE's deficiency reporting procedures must be final prior to issuing a construction authorization." Each reason, addressed separately below, is erroneous.

First, all of the requirements in 10 C.F.R. Part 21 (not just those identified in Section 21.51) apply not only to NRC licensees but also to applicants for an NRC license.

> The regulations in this part apply, except as specifically provided otherwise in Parts . . . 63 . . . of this chapter, to: (1) Each individual, partnership, corporation, or other entity *applying for* or holding a license or permit under the regulations in this chapter to possess, use or transfer within the United States . . . spent fuel and high-level radioactive waste . . . .

10 C.F.R. § 21.2(a)(1) (emphasis added). There are no exceptions to Part 21 enumerated in Part 63. Therefore, as an applicant for a license to construct and operate a geologic repository pursuant to 10 C.F.R. Part 63, DOE is subject to all of the requirements in Part 21, including those enumerated in Section 21.51. While NRC is correct that the definition of "basic

component" in 10 C.F.R. § 21.3 only refers to licensees and does not include applicants for a license, that alone does not mean that Part 21 is not applicable to DOE. Moreover, the requirements in Section 21.51 apply to more than just basic components, *see, e.g.*, 10 C.F.R. §§ 21.51(a)(1) (which requires DOE to "[r]etain evaluations of all deviations and failures to comply for a minimum of five years after the date of the evaluation") and 21.51(b) (requiring DOE "permit the Commission the opportunity to inspect records . . . the reporting of defects and failures to comply").

Second, NRC asserts without any supporting reference or citation that the requirements contained in 10 C.F.R. 63.73 "will not apply until, and unless, a construction authorization is granted." Nowhere in Section 63.73 is there a statement to that effect. In fact, the provisions imply that they are effective now.

> DOE shall promptly notify the Commission of each deficiency found in the characteristics of the Yucca Mountain site, and design . . . that, were it to remain uncorrected, could (1) Adversely affect safety at any future time; (2) Represent a significant deviation from the design criteria and design basis stated in the design application . . . .

10 C.F.R. § 63.73(a)(1) and (2). Moreover, regardless of the current effectiveness of Section 63.73, nothing therein alters the fact that 10 C.F.R. Part 21 is currently effective.

Third, NRC is correct that 10 C.F.R. § 63.31(a)(3)(vi) refers to "proposed" procedures and that Nevada did not so characterize that provision in the contention (Answer at 155-56; Petition at 80). However, that recognition has no bearing on the applicability of Part 21 to DOE right now as discussed above, which mandates that DOE have in place procedures to demonstrate compliance with Part 21. This much is clearly evident by the NRC Inspection Procedure and Manual Chapter governing the applicability of Part 21 to DOE during the period of time that the NRC Staff is reviewing the DOE's LA that is the subject of these proceedings

(Petition at 82). Moreover, contrary to NRC Staff's assertion, nowhere in this contention did Nevada cite to any "other provision of Part 63" to show "that DOE's deficiency reporting procedures must be final prior to issuing a construction authorization" (Answer at 156).

In sum, each of NRC Staff's reasons for challenging this contention are not valid. Thus, Nevada has satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(iv) and any NRC effort to dismiss the contention should be rejected.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

No reply necessary based on NRC Staff's response..

REPLY – NEV-SAFETY-07 – RETRIEVAL PLANS AND QA

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

Nevada concedes that it is immaterial whether an SSC is classified as ITS or ITWI, as long as it is classified as one or the other, and is thereby brought within the ambit of DOE's QA program, as described in its QARD. However, the point of the contention is that by applying narrow criteria for ITS classification to SSCs necessary for retrieval, and not considering SSCs necessary for retrieval as possibly ITWI, important SSCs necessary for retrieval are omitted from the QARD. Specifically, if an SSC necessary for retrieval is only subject to QA if it affects doses to workers or to the public from category 1 or 2 event sequences, as is the case under criteria for classification as ITS, then some SSCs necessary for retrieval that profoundly affect ability to actually retrieve wastes, but do not affect doses to workers or to the public from category 1 or 2 event sequences, are excluded.

DOE believes that "[t]he function of an ITWI/SSC is to assist with isolating waste, whereas the function of retrieval equipment is to remove waste from isolation" (Answer at 144). This crisply defines Nevada's issue—whether equipment necessary for retrieval should be ITWI because waste isolation safety, in its broad and proper sense, depends in important part on a viable and safe retrieval plan, just as safe operation of a nuclear power plant depends in

important part on the ability to safely shut the plant down. If Nevada is correct that waste isolation safety, in its broad and proper sense, depends on a viable and safe retrieval plan, then SSCs necessary for retrieval are within the scope of 10 C.F.R. § 63.142(a) because that subsection includes "all activities that are important to waste isolation."

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's Response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

No reply necessary based on NRC Staff's Response.

REPLY – NEV-SAFETY-08 – ALARA AND THE AGING FACILITY

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's Response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by opinions and references to the application. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

The SAR does not explicitly consider, as required by 10 C.F.R. §§ 63.112(e)(2) and 10 C.F.R. §§ 63.112(e)(5) "means to limit the time required to perform work in the vicinity of radioactive materials" and "means to control access to high radiation areas . . . ." Instead, in the case of worker tasks, it defers any consideration to an unspecified later time. SAR 1.10.2.11.1 at 1.10-20. And in the case of access limitation, no explanation is provided for the considerations

that resulted in the security fence around the aging facility but not surrounding the entire R2 radiation zone associated with the aging facility, as shown in SAR Figure 1.10-16 at 1.10-121. It is the lack of consideration of means to comply with the requirements that results in a defective SAR and an incomplete LA upon which a license decision can not be made. The LA is also incomplete with respect to the aging facility ALARA considerations in the SAR because of the use of simplifying assumptions, which will be revised later, for the modeling of radiation sources and worker exposure pathways to compensate for uncertainties in configuration of facilities and equipment, including TAD canisters. SAR 1.10.2.11.1 at 1.10-20.

The SAR provides information on overpack shielding design, aging facility layout, and loading plans and ALARA. It is this information with its uncertainties that is embedded in the SAR statements about simplifying assumptions and their later revision to allow for more realistic ALARA analyses. While SAR 1.2.7.6.3 at 1.2.7-12 is titled "Shielding Design," is written in a manner that suggests the aging overpack design exists, there is no reference to such a design in the SAR. That is because the aging overpack and the TAD are currently being designed for DOE use by contracted vendors, based on DOE developed performance specifications.

REPLY – NEV-SAFETY-09 – INCREASING CO_2 LEVELS ON FUTURE CLIMATE PROJECTIONS

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

As indicated in II.D. above, a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) is material per se. In this case the proximate requirement being violated is 10 C.F.R. § 63.305(c).

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

The contention obviously addresses the failure of DOE to consider increasing CO_2 concentrations on its technical merits, and to argue that DOE actually considered CO_2 concentrations on its technical merits when it simply excluded then "by regulation" turns the concept of technical merits on its head.

10 C.F.R. § 63.102(j) requires that the TSPA identify FEPs "that might affect performance of the geologic repository" and "examine[s] their effects on performance." 10 C.F.R. § 63.102(j) provides further that (except for low-probability FEPs) "those [FEPs] expected to materially affect compliance with § 63.113(b) *or be potentially adverse to performance* are included" [emphasis added]. NEV-SAFETY-09 alleges, with adequate support, that DOE failed to consider increasing CO_2 concentrations, which obviously affect precipitation, infiltration and seepage fluxes at Yucca Mountain within 10,000 years. If the contention is true,

increasing CO_2 concentrations will be "potentially adverse to performance" within 10,000 years and must be included as a FEP in the 10,000-year TSPA.

The SAR concludes in subsection 2.2.1.2 at 2.2-17 that "[a]ccordingly, to the extent that a particular FEP has no significant effect on radiological exposure, or radionuclide release, *or on an intermediate-performance measure that can be linked to radiological exposure or radionuclide release*, that FEP can be excluded (screened out) from the performance assessment on the basis of low consequence" [emphasis added]. Applying DOE's FEP screening criterion (for low consequence), increasing CO_2 concentrations cannot be screened out for the first 10,000 years because it is linked to precipitation, infiltration and seepage fluxes, which are intermediate-performance measures that can be linked to radiological exposure or radionuclide release.

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE. Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-10 – CONSIDERATION OF FORCING FUNCTIONS ON FUTURE CLIMATE PROJECTIONS

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Staff claims (Answer at 171) that the citation of three references made in the Nevada Petition is vague and not permissible. However, these three references are cited in support of a very specific criticism of the DOE climate-change methodology as being "flawed in that it ignores basic aspects of climate forcing and change relevant to the prediction of climate change over the next 10,000 years." (Petition at 98). The three references are major international and US studies that address these issues throughout and are therefore properly cited in this way. The

specific flaws in the DOE methodology are set out in the Petition (at 99 and 100). Therefore, this is not a case where one has to hunt through a massive document to determine what point a petitioner is trying to make. Staff's argument would, if accepted, produces the absurd result that specific scientific propositions are allowed to be supported only by tiny studies.

Nevada emphasizes that the broad body of scientific opinion, *e.g.*, as recorded in IPCC (2007) cited in the Petition (at 98), is that the future changes in ice sheets and ocean circulation will occur. Evaluating the climatic consequences of those changes at a regional or local scale continues to be explored in climate modeling studies and substantial uncertainties remain (*see* IPCC, 2007). Therefore, Nevada does not contend that future climates will necessarily be more extreme than those addressed by DOE. However, Nevada does contend that by neglecting to consider all the relevant factors, the DOE has misleadingly grossly understated the range of uncertainty in future climatic conditions and that in consequence its "conclusions regarding long-term climate projections are inaccurate and incomplete." (Petition at 100). A contention asserting that DOE's TSPA does not properly account for uncertainty is material *per se* because it asserts a violation of the important but separate requirement in 10 C.F.R. § 63.114 to thoroughly articulate and analyze or address uncertainty, to the end that an ultimate decision on whether the level and types of uncertainty are acceptable can be made on the basis of a full and complete record.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

To argue that DOE actually considered human influences on climate when it simply excluded then "by regulation" turns the concept of technical merits on its head.

10 C.F.R. § 63.102(j) requires that the TSPA identify FEPs "that might affect performance of the geologic repository" and "examine[s] their effect on performance." 10 C.F.R. § 63.102(j) provides further that (except for low-probability FEPs) "those [FEPs] expected to materially affect compliance with § 63.113(b) *or be potentially adverse to performance* are included" [emphasis added]. NEV-SAFETY-10 alleges, with adequate support, that climate forcing functions were ignored. Climate will obviously affect precipitation, infiltration and seepage fluxes at Yucca Mountain within 10,000 years, and precipitation filtration and seepage fluxes will affect performance within 10,000 years, and therefore, if the contention is true, climate forcing functions will be "potentially adverse to performance" within 10,000 years and must be included as a FEP in the 10,000-year TSPA.

The SAR concludes in subsection 2.2.1.2 at 2.2-17 that "[a]ccordingly, to the extent that a particular FEP has no significant effect on radiological exposure, or radionuclide release, *or on an intermediate-performance measure that can be linked to radiological exposure or radionuclide release*, that FEP can be excluded (screened out) from the performance assessment on the basis of low consequence" [emphasis added]. Applying DOE's FEP screening criterion (for low consequence), climate forcing functions will obviously affect precipitation, infiltration and seepage fluxes at Yucca Mountain within 10,000 years. Precipitation, infiltration and seepage fluxes will affect performance within 10,000 years, and therefore, if the contention is true, climate forcing cannot be screened out for the first 10,000 years because it is linked to

precipitation, infiltration and seepage fluxes, which are intermediate-performance measure that can be linked to radiological exposure or radionuclide release.

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE. Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-11 – HUMAN-INDUCED CLIMATE CHANGES ON PREDICTION OF THE NEXT GLACIAL PERIOD

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Staff complains that Nevada fails to raise a genuine dispute with DOE regarding whether a delay in the next full glacial period would lead to greater infiltration than that which is predicted by the present DOE climate forecast. However, the DOE climate model for the next 10,000 years is unrealistic. When greenhouse-gas induced warming is taken into account, the future climate at Yucca Mountain could be considerably wetter than at the present day due to a change in the pattern of storm tracks at a regional scale. This contention argues that greenhouse-

warmed wetter local to regional climatic conditions that are beyond the envelope of conditions adopted by the DOE in its climate model could persist for tens of thousands of years because, at a global scale, the overall effect of greenhouse warming would be to defer the next transition to a glacial state (a state in which continental-scale ice-sheets re-nucleate and expand). Thus, "[t]his difference in the trend in climate characteristics over time has the potential to affect the characteristics of precipitation at Yucca Mountain both within the next 10,000 years and thereafter, with implications for infiltration, EBS performance and radionuclide transport." (Petition at 104).

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

To argue that DOE actually considered human influences on climate when it simply excluded then "by regulation" turns the concept of technical merits on its head.

10 C.F.R. § 63.102(j) requires that the TSPA identify FEPs "that might affect performance of the geologic repository" and "examine[s] their effect on performance." 10 C.F.R. § 63.102(j) provides further that (except for low-probability FEPs) "those [FEPs] expected to materially affect compliance with § 63.113(b) *or be potentially adverse to performance* are included" [emphasis added]. Human induced climate changes will obviously affect precipitation, infiltration and seepage fluxes at Yucca Mountain within 10,000 years, and

precipitation filtration and seepage fluxes will affect performance within 10,000 years, and therefore, if the contention is true, human induced climate changes will be "potentially adverse to performance" within 10,000 years and must be included as a FEP in the 10,000-year TSPA.

The SAR concludes in subsection 2.2.1.2 at 2.2-17 that "[a]ccordingly, to the extent that a particular FEP has no significant effect on radiological exposure, or radionuclide release, *or on an intermediate-performance measure that can be linked to radiological exposure or radionuclide release*, that FEP can be excluded (screened out) from the performance assessment on the basis of low consequence" [emphasis added]. Applying DOE's FEP screening criterion (for low consequence), human induced climate changes will obviously affect precipitation, infiltration and seepage fluxes at Yucca Mountain within 10,000 years. Precipitation, infiltration and seepage fluxes will affect performance within 10,000 years, and therefore, if the contention is true, climate forcing cannot be screened out for the first 10,000 years because it is linked to precipitation, infiltration and seepage fluxes, which are intermediate-performance measure that can be linked to radiological exposure or radionuclide release.

Under 40 C.F.R. § 197.36(c), which the Commission made directly applicable to this proceeding in the Notice of Hearing (CLI-08-25 at 13, __ NRC __ (2008)), DOE "shall project the continued effects of the features, events and processes [FEPs] included in paragraph (a) of this section [pertaining to the 10,000 year assessment] beyond the 10,000 year post-disposal period through the period of geologic stability," with "period of geologic stability" defined in 40 C.F.R. § 197.12 "to end at 1 million years after disposal." Therefore, human induced climate changes should be considered as a FEP both within 10,000 years *and* thereafter, up to 1,000,000 years.

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE. Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-12 – PROJECTIONS OF FUTURE WETTER CLIMATE CONDITIONS

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's Response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

To argue that DOE actually considered human influences on climate and greenhouse gas emissions on their technical merits when it simply excluded then "by regulation" turns the concept of technical merits on its head.

10 C.F.R. § 63.102(j) requires that the TSPA identify FEPs "that might affect performance of the geologic repository" and "examine[s] their effect on performance." 10 C.F.R. § 63.102(j) provides further that (except for low-probability FEPs) "those [FEPs] expected to materially affect compliance with § 63.113(b) *or be potentially adverse to performance* are included" [emphasis added]. Human influences on climate and greenhouse gas emissions will obviously affect precipitation, infiltration and seepage fluxes at Yucca Mountain within 10,000 years, and precipitation filtration and seepage fluxes will affect performance within 10,000 years, and therefore, if the contention is true, human influences on climate and greenhouse gas emissions will be "potentially adverse to performance" within 10,000 years and must be included as FEPs in the 10,000-year TSPA.

The SAR concludes in subsection 2.2.1.2 at 2.2-17 that "[a]ccordingly, to the extent that a particular FEP has no significant effect on radiological exposure, or radionuclide release, *or on an intermediate-performance measure that can be linked to radiological exposure or radionuclide release*, that FEP can be excluded (screened out) from the performance assessment on the basis of low consequence" [emphasis added]. Applying DOE's FEP screening criterion (for low consequence), human influences on climate and greenhouse gas emissions will obviously affect precipitation, infiltration and seepage fluxes at Yucca Mountain within 10,000 years. Precipitation, infiltration and seepage fluxes will affect performance within 10,000 years, and therefore, if the contention is true, human influences on climate and greenhouse gas emissions cannot be screened out for the first 10,000 years because it is linked to precipitation, infiltration and seepage fluxes, which are intermediate-performance measure that can be linked to radiological exposure or radionuclide release.

It is implicit in the Nevada contention – based on both expert opinion and the scientific literature, that it is possible to use "cautious, but reasonable assumptions" to place bounds on future greenhouse-gas (GHG) emissions due to human activities. The peer-reviewed scientific literature, including the IPCC report, make it clear that there are indeed scientific ways to bound possible future GHG emissions due to humans, as well as the climate change that may – depending on the actual trajectory these emissions take – result from the emissions.

Because this contention focuses on the 10,000 year period, references to the EPA rule and NRC conforming rulemaking are irrelevant.

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE.

Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-13 – FUTURE CLIMATE PROJECTIONS NEED TO INCLUDE EXTREME PRECIPITATION EVENTS

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The Petition makes it clear that the assumptions behind the model for projecting future climate are flawed, *i.e.*, that the assumptions made by DOE are not reasonable. Among other things, the contention states (at 115) that "[r]ainfall events lasting up to a week (*e.g.*, when a tropical storm collides with a frontal storm) and exceeding 50 cm are possible. Such events could occur several times per year."

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

To argue that DOE actually considered human influences on climate and greenhouse gas emissions on their technical merits when it simply excluded then "by regulation" turns the concept of technical merits on its head.

10 C.F.R. § 63.102(j) requires that the TSPA identify FEPs "that might affect performance of the geologic repository" and "examine[s] their effect on performance." 10 C.F.R. § 63.102(j) provides further that (except for low-probability FEPs) "those [FEPs] expected to materially affect compliance with § 63.113(b) *or be potentially adverse to performance* are included" [emphasis added]. Continued global warming will obviously affect precipitation, infiltration and seepage fluxes at Yucca Mountain within 10,000 years, and precipitation filtration and seepage fluxes will affect performance within 10,000 years, and therefore, if the contention is true, continued global warming will be "potentially adverse to performance" within 10,000 years and must be included as FEPs in the 10,000-year TSPA.

The SAR concludes in subsection 2.2.1.2 at 2.2-17 that "[a]ccordingly, to the extent that a particular FEP has no significant effect on radiological exposure, or radionuclide release, *or on an intermediate-performance measure that can be linked to radiological exposure or radionuclide release*, that FEP can be excluded (screened out) from the performance assessment on the basis of low consequence" [emphasis added]. Applying DOE's FEP screening criterion (for low consequence), continued global warming will obviously affect precipitation, infiltration and seepage fluxes at Yucca Mountain within 10,000 years. Precipitation, infiltration and seepage fluxes will affect performance within 10,000 years, and therefore, if the contention is true, continued global warming cannot be screened out for the first 10,000 years because it is

linked to precipitation, infiltration and seepage fluxes, which are intermediate-performance measure that can be linked to radiological exposure or radionuclide release.

It is implicit in the Nevada contention – based on both expert opinion and the scientific literature, that it is possible to use "cautious, but reasonable assumptions" to place bounds on future greenhouse-gas (GHG) emissions due to human activities. The peer-reviewed scientific literature, including the IPCC report, make it clear that there are indeed scientific ways to bound possible future GHG emissions due to humans, as well as the climate change that may – depending on the actual trajectory these emissions take – result from the emissions.

Because this contention focuses on the 10,000 year performance assessment, the recent EPA rule and the NRC rulemaking to conform with it are irrelevant.

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE. Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-14 – PRECIPITATION MODEL

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's Response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the application

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE.

Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-15 – ALTERNATIVE PRECIPITATION MODELS AND WEATHER VARIABLES

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

It is true that Nevada does not mention specific alternative models. However, Staff does not contradict the claim that alternatives are available, and the main thrust of the contention is that DOE has not considered alternative conceptual models that are consistent with current scientific understanding. Alternative modeling frameworks that could have been considered include (but are not restricted to) those based on generalized linear models, generalized additive models, re-sampling techniques, and hidden Markov models. More importantly, Staff must not

understand the role and importance of alternative conceptual models when it complains that the Nevada failed to show that other models would have performed better and that no showing was made that uncertainty was underestimated. As indicated in II.E. above, a failure to consider "alternative conceptual models of features and processes that are consistent with available data and current scientific understanding and evaluate the effects that alternative conceptual models have on the performance of the geologic repository" is not only a *per se* material violation of 10 C.F.R. § 63.114(c) but, more fundamentally, it is a *per se* indication that DOE has failed to how that uncertainties inherent in any performance assessment are thoroughly articulated and analyzed or addressed.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

Staff repeats arguments addressed above. In addition, as explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE.

REPLY – NEV-SAFETY-16 – QUALIFICATION OF CLIMATE AND INFILTRATION MODELS

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

The contention raises a material issue because it alleges a violation of cited NRC regulations, most proximately 10 C.F.R. § §63.21(c)(21) and 63.142(a). It may be true that there is no legal requirement for peer reviews, but NUREG-1804 may properly be cited for the proposition that the absence of a peer review affects the weight to be given to the model and data in question.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's Response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

NEV-SAFETY-16 states a material dispute with DOE at least with respect to qualification procedures for data collected before the QARD and DOE's implementation of a compliant quality assurance program. This is because NUREG -1298 offers dramatically different alternative methods to qualify unqualified data and the documents DOE cites provide no information about which method was used to qualify climate and infiltration data.

REPLY – NEV-SAFETY-17 – CALIBRATION AND SIMULATION OF PRECIPITATION MODEL

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

One of the characteristics of "reasonable expectation," as defined in 10 C.F.R. § 63.304(4), is that it "[f]ocuses performance assessments and analyses on the full range of defensible and reasonable parameter distributions." The DOE calibration methodology does not provide any mechanism for the construction of defensible and reasonable parameter distributions, whence DOE cannot demonstrate that there is a reasonable expectation of compliance with the regulatory requirements. Moreover, 10 C.F.R. § 63.21(c)(15) requires that

"[a]nalyses and models that will be used to assess performance of the geologic repository must be supported by using *an appropriate combination* of [methods]" (emphasis added). The Nevada contention asserts that the DOE methodology used here is not appropriate.

The contention indicates (Petition at 134-135) among other things that "more widely accepted superior procedures are available and in common use," "[t]he method [for simulating from a lognormal distribution] is not generally accepted" and that DOE's simulation methodology "*could be relatively inaccurate* (emphasis added)." The first of these statements is neither vague nor subjective: DOE is calibrating a statistical model, and the classical theory of statistical inference (*i.e.*, calibration, in this context) sets out clear criteria for comparing inference methods. The Nevada statement will be understood perfectly by anybody familiar with this theory (which is necessary if one is to choose appropriate methods for the calibration of statistical models): A similar comment applies to the second quote above. The claim that the simulation methodology "could be relatively inaccurate" reflects the fact that each lognormal random number requires the inversion of the lognormal distribution function (*see* "Simulation of Net Infiltration for Present-Day and Potential Future Climates, MDL-NBS-HS-000023 REV01" (05/24/2007), LSN# DN2002482668, at Equation F-50). Numerical methods are required to carry out this inversion, and the accuracy of such methods can be poor, being particularly limited in the tails of the distribution.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

No reply necessary based on NRC Staff's Response.

REPLY – NEV-SAFETY-18 – USE OF CLIMATE DATA FROM THE ANALOG SITES

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Nevada contention relates not to the use of analog sites with different climatologies, but rather to the way in which the information from different analog sites has been combined. According to 10 C.F.R. §63.304(d), a characteristic of reasonable expectation is that it "[f]ocuses performance assessments and analyses on the full range of defensible and reasonable parameter distributions." To demonstrate a reasonable expectation of compliance with the regulatory standard therefore, DOE must use defensible and reasonable parameter distributions.

The Nevada contention asserts (Petition at 138-139) that the parameter distributions arising from the treatment are neither defensible nor reasonable because, for example, the distributions assigned to precipitation parameters under a monsoon climate are such that the expected seasonal cycle is close to zero (because it is an average of seasonal cycles that are out of phase with each other). The net effect in this case is to smooth out seasonality in precipitation under the monsoon climate. As argued elsewhere (*e.g.*, contention NEV-SAFETY-14, Petition at 121), the effect of smoothing out seasonal variation will be to under-represent the types of precipitation event that are likely to result in net infiltration and hence, ultimately, radiological dose.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

See above. As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

The Nevada contention asserts that the climate scenarios derived from the analog sites are not representative of the climate at any individual location. (Petition at 138-139). As noted above, 10 C.F.R. § 63.21(c)(15) requires that methods used by DOE must be "representative of field conditions. . . and natural analog studies." To comply with this requirement, DOE must generate climate sequences that are representative of those to be expected in field conditions *i.e.*, that reflect the process that is expected to occur.

Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-19 – FUTURE INFILTRATION PROJECTIONS NEED TO INCLUDE REDUCED VEGETATION COVER

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

The contention obviously addresses the failure of DOE to consider greenhouse gas effects on their technical merits, and to argue that DOE actually considered greenhouse gas effects on their technical merits when it simply excluded then "by regulation" turns the concept of technical merits on its head.

In the Notice of Hearing (at 13), the Commission stated that petitioners "are also free to file contentions maintaining that DOE's application does not meet EPA's standards." Those standards in 40 C.F.R. Part 197 do not prohibit the admission of this contention. 40 C.F.R. § 197.36(c)(2) requires DOE to assess the "effects" of climate change in the post-10,000 year period, and provides further that this analysis "may be limited to the effects of increased water flow through the repository as a result of climate change." It is clear from the text that consideration of the kinds or causes of climate change is not being limited, but rather that the consideration of possible *effects* of climate changes is being limited to one effect – increased water flow through the repository. Increased water flow through the repository does not appear magically from climate change, but arises from a variety of intermediate causes such as precipitation, and the rule does not limit what those intermediate causes might be as long as they arise from climate change and result, ultimately, in increased water flow through the repository. And while 40 C.F.R. § 197.36 (c)(2) provides that climate change "*may* be represented by constant climate conditions" [emphasis added], no such "constant climate conditions" have been prescribed. A *proposed* NRC rule cannot legally prescribe anything. While implementation of the EPA rule is the subject of rulemaking, the Notice of Hearing provided specifically that this round of contentions may be based on the EPA rule only. Contentions addressing the final NRC rule are due 60 days after that rule is published in the Federal Register.

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE. Finally, s indicated in II.B. above,

Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-20 – NET INFILTRATION ALTERNATIVE CONCEPTUAL MODEL

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's Response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

Staff argues that alternative models were considered so there is no material issue. This argument goes to the merits, not materiality. Moreover, DOE makes no such claim in its response to this contention (DOE Answer at 273-74), and its own views on what models were considered carry more weight. Also *see* NEV-SAFETY-23.

The Staff also notes (Answer at 226-227) that the HYDRUS-1D code was used to build confidence in the MASSIF code. While this is not relevant to the NRC requirement to "evaluate the effects that alternative conceptual models have on the performance of the geologic repository," it should be noted that the comparison between MASSIF and HYDRUS 1-D was flawed, as discussed in NEV-SAFETY-23.

Also, Staff misrepresents Nevada's contention (Answer at 227), claiming that Nevada is simply arguing that alternative model codes be used, and then uses this misrepresentation to suggest that Nevada is seeking to impose additional requirements beyond the applicable NRC regulations. This is incorrect. In fact, the changes in initial conditions were made in an attempt to justify a fundamental flaw in the MASSIF simulations, which re-set the initial conditions at the beginning of each year (this issue is addressed more fully in NEV-SAFETY-32). And the changes in soil saturated hydraulic conductivities were also made in response to model deficiencies ("the MASSIF model likely underestimates the actual spatial variability in net infiltration" (SAR, at 2.3.1-70)), and criticisms of the 1997 Expert Elicitation Panel on Unsaturated Flow Model Issues ("CRWMS Management & Operating Contractor Unsaturated Zone Flow Model Expert Elicitation Project" (05/30/1997), LSN# NRC000010491) that the spatial distribution of response was incorrect (SAR, at 2.3.1-70). These minor sensitivity analyses do not provide an adequate evaluation of alternative conceptual models, when, as Nevada has argued elsewhere (*e.g.* NEV-SAFETY-31), the MASSIF model, with the data available for calibration, is an inappropriate model.

Moreover, as explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE. Finally, s indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-21 – INFILTRATION MODEL AND CHANGES IN SOIL AND ROCK PROPERTIES

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's Response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

When Staff counsel argue that a referenced SAR section or study undercut the contention, they are engaging in a technical dispute with the expert about the meaning of the section or study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument impermissibly addresses the merits.

Staff cites statements in the application (SAR Tables 2.2-1 and 2.2-5) that are incapable of any meaningful evaluation by themselves and that constitute the kind of bare assertions and conclusory statements Staff constantly harps about. Staff refers to application references but, as indicated in II.F. above, a failure to address a technical study that is not part of the application

does not violate 10 C.F.R. § 2.309(f)(1)(vi). However, a discussion of some of these references follows.

DOE documentation, as cited in Petition (at 154), acknowledges that "it is likely that soil erosion and deposition processes will affect soil properties and soil depth patterns over the site." The cited reference by Stuewe, et al. (2008) ("Erosional Decay of the Yucca Mountain Crest," GEOMORPHOLOGY (in press), LSN# NEV000005187) makes conservative assumptions (*i.e.*, underestimates the amount of change) but concludes (at 1) that even under these assumptions, "predictions of our model into the future show that the crest will denude to the level of the proposed site between 500,000 y and 5 my. This prediction is based on conservative estimates for all involved parameters. Erosion may be more rapid if other processes are involved." Nevada notes that DOE wrongly interprets "conservative" to provide the opposite of the correct interpretation (Answer at 279). Conservative assumptions are made in the paper to show a lower bound on erosion, not, as DOE implies, an upper bound. While the paper does not formally address the time period of 10,000 years, it emphasizes (at 7) that effects are linear, and hence the results can be directly related to the 10,000 year period.

The criticism of Nevada's assertion that no consideration is given to changes in soil depth, soil properties or bedrock conductivity is unfounded. The explicit assumption made by DOE is acknowledged in their Answer (at 280), "[f]or its base case, DOE did assume that soil depth and properties are constant for the next 10,000 years." DOE then conducted an uncertainty analysis, as an attempt to represent the spatial uncertainty in those time-invariant values. In no way can this work be taken to represent effects of time-varying properties. For this to have been achieved, formal analysis would have been required of the parameter ranges needed to

characterize temporal variability, superimposed on the effects of spatial variability, and an appropriate sampling strategy devised. Clearly this was not carried out.

Among other things, the contention alleges with support in expert opinion that the introduction of changes in soil depth and rock properties would widen the range of estimates of infiltration, including those associated with episodic events. In consequence, seepage at the repository level would be altered with potentially significant effects on corrosion, radionuclide release and transport, and radiological impacts on the RMEI.

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE. Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-22 – NET INFILTRATION MODEL WATER BALANCE

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Nevada's contention has a detailed basis and the implications for DOE's TSPA are described. As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

Staff argues (Answer at) that Nevada misunderstood DOE's net infiltration model. If there is a misunderstanding, it is fostered by DOE. An important mechanism for runoff generation in arid areas is the generation of overland flow from rainfall intensity in excess of soil infiltration capacity, so called Hortonian rainfall-excess runoff generation, which is, for example,

a dominant process included in the KINEROS model used by NRC at Walnut Gulch (*e.g.*, Woolhiser, D.A. and Fedors, R.W., "Upper Split Wash Modeling in Support of Shallow Infiltration Estimates, CNWRA, Part 1 of 3" (05/10/2000), LSN# NRC000027373, Part 2 of 3 LSN# NRC000027331, Part 3 of 3 LSN# NRC000027267).

In the MASSIF model, however, this process is missing, and overland flow can only occur when the surface layer is saturated. Nevada notes that this surface layer was included in the conceptual model for the purposes of evaporation calculation (SAR, 2.3.1-56, "[t]he topmost soil layer is designated as the evaporation zone"), and we have seen no documentation that demonstrates the model's adequacy to represent infiltration excess overland flow. The use of the word "thin" is misleading. SNL (2007) "Simulation of Net Infiltration for Present-Day and Potential Future Climates, MDL-NBS-HS-000023 REV 01 AD 01, May 2007" (01/28/2008), LSN# DEN001575070, at 6-149, specifies the nominal value (0.15 m) and range (0.1 to 0.2 m) for this evaporation layer depth. So a depth of up to 20 cm of soil must be saturated before overland flow can occur. This would be expected to severely underestimate the occurrence and magnitude of overland flow from many rainfall events.

Turning to lateral subsurface flow, DOE apparently acknowledges in its answer (at 285-287) that two major independent reviews have identified this process as an important deficiency in the modeling. These were the 1997 "CRWMS Management & Operating Contractor Unsaturated Zone Flow Model Expert Elicitation (UZFTEE) Project" (05/30/1997), LSN# NRC000010491) and the recent "ORISE Independent Review of Simulation of Net Infiltration for Present-Day and Potential Future Climates, MDL-NBS-HS-000023 Rev 01, April 2008" (04/01/2008), LSN# DEN001595302), both carried out by panels of distinguished scientists with major international reputations.

DOE apparently acknowledges the need to evaluate the effects of lateral flow and states (Answer at 287) that it "did evaluate the effects of a variation in the location of net infiltration due (to) runoff." This was not by including subsurface lateral flow, however, but rather by adjusting the spatial distribution of soil properties, which is a different effect. Nevada concludes that the effects of lateral subsurface flow are unexplored, despite consistent expert advice over more than a decade.

However, important effects on the spatial distribution of net infiltration arose from the exploration of sensitivity to soil properties. SAR 2.3.1-71 and Table 2.3.1-21, and SAR 2.3.1-81 notes that "there may be considerably more uncertainty as to where net infiltration is occurring than is represented by the 40 realizations used to characterize infiltration uncertainty." DOE thus acknowledges that it has failed to represent the uncertainty in the spatial distribution of net infiltration. In an attempt to justify this, DOE claims that effects on mean net infiltration are small and hence that spatial variability is unimportant. Nevada (NEV-SAFETY-27) argues that the net infiltration modeling is deficient in not representing major fault systems. Some of the major fault systems at Yucca Mountain are illustrated in the LA GI Figure 5-33 at 5-153 and provide potential preferential flow paths from the surface to depth, in some cases extending to more than 3,000 feet below the surface, and passing through the Tuff sequence into the underlying volcanics. Clearly the potential focusing of net infiltration on those faults is potentially important and hence the spatial distribution of net infiltration cannot be summarily dismissed.

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to

support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Further, as explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE. Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-23 – EVALUATION OF ALTERNATIVE NET INFILTRATION MODELS

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Nevada's allegations are quite specific and well supported. Nevada (Petition at 160) states that "[t]he TSPA fails to meet the requirements of 10 C.F.R. § 63.114 because corroboration of the MASSIF net infiltration model through comparison with an alternative model using other data sets is flawed," and then proceeds to list areas where the deficiencies occur. Nevada (Petition at 162) refers to Figures 7.1.2.1-3 and 7.1.2.2-2 (SNL (2007) "Simulation of Net Infiltration for Present-Day and Potential Future Climates, MDL-NBS-HS-

000023 REV 01 AD 01, May 2007" (01/28/2008), LSN# DEN001575070) as specific examples of poor performance, from which it can be seen that the MASSIF simulations have systematic differences from the HYDRUS-1D simulations and the observed data throughout most of the periods of observed records, with a particular problem for the largest event in Fig. 7.1.2.1-3. The ORISE report at D-11 ("ORISE Independent Review of Simulation of Net Infiltration for Present-Day and Potential Future Climates, MDL-NBS-HS-000023 Rev 01, April 2008" (04/01/2008), LSN# DEN001595302) notes several reasons why the "validation" of the MASSIF model against observed data is of limited value. "The lysimeter validations did not use measured soil textural data" has the implication that the comparison is not consistent with what would be expected for the type of application at Yucca Mountain, where soil texture is used to define soil properties. (*Id*.). "The soil depth, which should have been modeled as very deep, was not." (*Id*.). The implication is that the nature of the deep percolation process at the lower boundary of the model was not tested for conditions appropriate to Yucca Mountain. "No testing of the Hanford-derived pedotransfer function was conducted," yet this is a key relationship in the application to Yucca Mountain. (*Id*.). "Three parameters were calculated by using an optimization algorithm to get a good fit to observed storage," so the model was forced to fit the observed data, and the proper testing procedure, which would have used blind tests on the soils, was not carried out. (*Id*.). The overall conclusion from these comments is that this was not an adequate test of the model's capability to provide adequate performance in its application to Yucca Mountain.

Taken with the additional comments of Nevada (Petition at 161-162), that there was no occurrence of overland flow (so this component was not tested), that no data for Reynolds Creek of the wetting phases was available (a critical aspect of hydrological model performance), and

that although storage was evaluated, net infiltration was not, the conclusion is that this exercise does nothing to establish the MASSIF model's credibility in application to Yucca Mountain.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely .inappropriate at the contention stage. The allegations are quite specific ands well supported. Nevada (Petition at 160) states that "[t]he TSPA fails to meet the requirements of 10 C.F.R. § 63.114 because corroboration of the MASSIF net infiltration model through comparison with an alternative model using other data sets is flawed," and then proceeds to list areas where the deficiencies occur.

Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-24 – PRECIPITATION DATA IN NET INFILTRATION MODEL

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

The central point of Nevada's contention is clear. The precipitation data collected by DOE are wholly inadequate to characterize the spatial and temporal distribution of precipitation over the mountain. Nevada (Petition at 165-166) provides two references from USGS which show that an extensive network of gauges (100-150 monitoring sites) would be required to capture the spatial variability of precipitation to support the modeling on net infiltration. This is

in contrast with just five sites on the mountain presented by DOE in SAR at 2.3.1-9 and associated Figure 2.3.1-3.

Two important issues result from this deficiency. First, the available data are inadequate to support any meaningful calibration or validation of the infiltration model for its application to Yucca Mountain. Nevada (Petition at 166) provides the citations to DOE work "Simulation of Net Infiltration for Present-Day and Potential Future Climates" (05/01/2007), LSN# DEN001575070, which demonstrates in Figure 7.1.3-2 at 7-33 that simulated runoff varies greatly depending on which rain gauge is used and that soil parameters cannot be validated with the available data. The absence of snow data also means that the snow component of the infiltration model cannot be validated. Figure 7.1.3-3 at 7-34 presents model simulations of snow level which cannot be checked, since no snow data are available

The second consequent issue is raised in NEV-SAFETY-14 (Petition at 121). The precipitation data are inadequate to define the dependence of precipitation on elevation, and as a result a flawed methodology for the simulation of precipitation, based on regional data, is used. DOE notes that the simulation of future climates relies on analog sites. Inadequacies in the use of these analogs are addressed in NEV-SAFETY-18 (Petition at 137).

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

See above. As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-25 – SITE-SPECIFIC DATA IN NET INFILTRATION MODEL

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's Response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and

cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

Nevada is not claiming DOE must use only site-specific data to validate MASSIF, however, given the empirical structure of the MASSIF model, adequate site-specific data are required to validate model performance and define appropriate ranges of parameter uncertainty to meet the requirements of 10 C.F.R. § 63.114(a) and (b). Nevada is also making the point that the limited data include no major events, so that there are no data on which to base an assessment of the MASSIF model that relate to the infrequent large events that are expected to dominate net infiltration. The NRC contractor report (Woolhiser, D.A. and Fedors, R.W., "Upper Split Wash Modeling in Support of Shallow Infiltration Estimates" (05/01/2000), LSN# NRC000027373 at 2-18), undertaken by a scientist with a distinguished international reputation, was cited to show that the available data are too limited to allow for reasonable validation for any rainfall-runoff model. With respect to MASSIF performance, DOE (Answer at 309) agrees that the cited Figure 7.1.3-15 of DEN001575070 ("Simulation of Net Infiltration for Present-Day and Potential Future Climates" (05/01/2007), LSN# DEN001575070) shows discrepancies in performance.

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE. Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-26 – SOIL PROPERTIES DATA IN NET INFILTRATION MODEL

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits. This contention clearly challenges pertinent portions of the application, and concurs with the ORISE Independent Review Panel ("ORISE Independent Review of

Simulation of Net Infiltration for Present-Day and Potential Future Climates" (04/01/2008), LSN# DEN001595302 at 8): "[t]he review panel is not convinced that the bounds of uncertainty have been fully defined, due to the lack of inclusion or comparison with site-specific data; without sufficient data for validation, there is no assurance that the distributions fully capture the ranges of uncertainty."

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-27 – ROCK PROPERTIES DATA IN NET INFILTRATION MODEL

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

This contention clearly states a material dispute with statements in DOE's application. Table 2.3.1-1 of the SAR states that the infiltration model includes heterogeneities and discrete faults. However, this assertion with respect to faults is not supported by the underlying DOE methodology. The methodology uses the center point of a grid cell to determine lithology, and as explained in Petition (at 180), DOE ("Simulation of Net Infiltration for Present-Day and Potential Future Climates" (05/01/2007), LSN# DEN001575070 at 6-93) acknowledges that thin units are not properly represented. There is no evidence provided by DOE to show that the major faults have been included.

Moreover, as explained in II.D. above, Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE. Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-28 – NET INFILTRATION MODEL ROCK PROPERTIES UNCERTAINTY ANALYSIS

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

DOE (Answer at 327) accepts that the detailed analysis of uncertainty excluded parameters that applied to less than 15% of the area of interest, which, in the case of rock properties, excluded 70% of the modeled area. However, apart from the fact that only 200 samples were used to specify the sensitivity of 42 parameters, and that there was no analysis of the uncertainty of the assumed spatial distribution of properties, this sensitivity analysis fails to represent reasonable uncertainty bounds for the relevant parameters. For example, the upper limit of saturated hydraulic conductivity assumed for IHU401 is 6.5×10^{-6} m/s, which is two orders of magnitude less than the equivalent hydraulic conductivity from air permeability measurements, as shown on Figure 6.5.2.6-2 ("Simulation of Net Infiltration for Present-Day and Potential Future Climates" (05/01/2007), LSN# DEN001575070 at 6-100). This uncertainty analysis is an inadequate basis on which to exclude 70% of the modeled area. This contention clearly states a material dispute with DOE's application.

Moreover, as explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101,

63.102, 63.114 and 63.305(c) raises a material issue with DOE. Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-29 – SPATIAL VARIABILITY OF SOILS AND VEGETATION IN NET INFILTRATION MODEL

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

In Nevada's contention, the ORISE independent review of simulation of net infiltration was cited (Petition at 188) to reinforce the point that important aspects of heterogeneity in soil and vegetation properties have been ignored, "[w]hile the model uses assumptions consistently, such as uniform soil depths and a constant vegetation rooting depth, such assumptions may not be appropriate for this net infiltration simulation because they oversimplify a complex landscape and associated hydrologic processes, especially since the model assumptions have not been adequately corroborated by field and laboratory observations at Yucca Mountain." (*See* "ORISE Independent Review of Simulation of Net Infiltration for Present-Day and Potential Future Climates" (04/01/2008), LSN# DEN001595302 at v).

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, as explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE. Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-30 – TEMPORAL VARIABILITY IN PRECIPITATION IN NET INFILTRATION MODEL

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

The reference to NRC modeling using the KINEROS model is highly relevant, since the model has a stronger physics-base than the MASSIF model, and the principal author has many

decades of experience in modeling rainfall-runoff processes in arid areas. The reference states that "smoothing of rainfall intensities . . . may lead to errors, because infiltration is determined by the soil's capability to take in water at the precipitation rate." (Woolhiser, D.A. and Fedors, R.W., "Part 1 of 3: Upper Split Wash Modeling in Support of Shallow Infiltration Estimates" (05/10/2000), LSN# NRC000027373 at 1-4.) This comment refers not to the specific model used, but to the appropriate representation of the underlying physics.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Nevada is not stating that DOE's infiltration model uses only daily time steps, rather (Petition at 190) that the model "is based on a daily time step with an *ad hoc* adjustment to allow for sub-daily rainfall durations." Nevada argues that this fails to represent adequately the temporal structure of rainfall and hence the dynamics of the physical processes of infiltration. Nevada (Petition at 192) contends that "the use of a daily time step to simulate moisture redistribution is an improper gross aggregation of the soil physical dynamics which have characteristic time scales of minutes to hours." We note that DOE makes no response to that criticism in its Answer (*see* DOE Answer at 340-342).

Moreover, as explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions

would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE. Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-31 – CALIBRATION OF NET INFILTRATION MODEL

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Staff complains about the bullets. The first of these bullets states that "[t]he implications of the use of simplified soil physics for recharge estimation have not been adequately addressed." This statement has ample support. For example, as noted in NEV-SAFETY-33 (Petition at 203), the use of a model for net infiltration based on the concept of field capacity, which is at best a crude approximation to the underlying soil physics, has been severely criticized. A panel member of the "CRWMS Management & Operating Contractor Unsaturated Zone Flow Model

Expert Elicitation Project" ((05/30/1997), LSN# NRC000010491 at DBS-4) concluded that, "regarding water balance modeling for net infiltration, I have low confidence in the Bucket model. It is inadequate for the level of detail being considered in this analysis. The concept of 'field capacity' has no physical significance."

The "ORISE Independent Review of Simulation of Net Infiltration for Present-Day and Potential Future Climates (MDL-NBS-HS-0000023 Rev 01), April 2008" (04/01/2008), LSN# DEN001595302 at D-2 has an extensive discussion of the problems in characterizing field capacity, and notes that the definition used by DOE "will lead to incorrect values for the field capacity, and therefore, water holding capacity of the soil." And DEN001595302 (at 6) notes "[t]he assumption that subsurface lateral flow is unimportant for this modeling effort is not tested nor is it convincingly justified."

The third bullet (Petition at 196) states that "[t]he soil is spatially and temporally aggregated, by using a maximum of just 3 soil layers, spatially lumped on a 30 meter grid, with a 1-day time step." The ORISE Report (DEN001595302 at 6) notes "no scale adjustments are made from the point-scale values to the 30 m x 30 m model grids in the MASSIF application. The effect of upscaling to 30 meters depends strongly on local topography . . ." and goes on to note that the lack of upscaling would be expected to introduce bias. The effects of soil layering are not adequately addressed, as indicated by DEN001595302 (at 10) "[t]he effect of surface soil thickness in the MASSIF model needs to be better evaluated." The issue of temporal aggregation is addressed in NEV-SAFETY-30. The use of a daily time step for net infiltration modeling is inappropriate if physically based parameters are used with no allowance for the effects of temporal aggregation on model parameterization and performance. In an NRC modeling study based on Upper Split Wash (Woolhiser, D.A. and Fedors, R.W., "Part 1 of 3:

Upper Split Wash Modeling in Support of Shallow Infiltration Estimates" (05/10/2000), LSN# NRC000027373 at 1-4), it was noted that "smoothing of rainfall intensities . . . may lead to errors, because infiltration is determined by the soil's capability to take in water at the precipitation rate."

The fourth bullet point (Petition at 196) summarizes the effects of the preceding points, to note that "the simplified physics, combined with the spatial and temporal aggregation, means that model parameters cannot be simply related to soil physical properties, and appropriate analysis of aggregation effects has not been carried out."

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Nevada's contention clearly satisfies this requirement, and much of DOE's argument impermissibly goes to the merits.

Nevada does not argue that no calibration has been done, but rather that the model "has not been and cannot be properly calibrated for present-day conditions." (Petition at 194). NEV-SAFETY-25 addresses calibration in some detail, with fully referenced arguments. The contention (Petition at 168) states that "SAR Subsections 2.3.1.3.2 and 2.3.1.3.3 and similar subsections contain site-specific data at Yucca Mountain that are too limited to allow for validation of the net infiltration model, and those data that are available demonstrate that performance of the model is unacceptably poor for infiltration modeling."

Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-32 – USE OF INITIAL CONDITIONS IN NET INFILTRATION MODEL

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Staff quotes a DOE study to say that its sensitivity analysis of the effects of resetting initial conditions demonstrated that the effects are minor. However, this impermissibly addresses the merits. Moreover, Staff does not take account of the view of the ORISE Independent Review Panel on this issue. The "ORISE Independent Review of Simulation of Net Infiltration for Present-Day and Potential Future Climates (MDL-NBS-HS-0000023 Rev 01), April 2008" (04/01/2008), LSN# DEN001595302 at D-14) concluded that (DEN001595302 at

D-14 and D-15) "[t]he review panel is concerned that sequentially wet climate years may not have been realistically simulated by the approaches of MASSIF and believes that the impact of sequentially wet climate years has not been adequately tested." Also (at D-14), referring to the IC 1 runs in which DOE states that the effect was evaluated, the Report states "the review panel does not believe that these simulations best represent the impact of sequential climate years for which multiple wetter-than-average years are simulated. Section 6.5.7.4 did not provide a clear justification for the values of 'initially higher water contents,' a detailed analysis of how these values were chosen, or if these values were chosen to represent sequentially wet climate years." So DOE's own independent review panel found that the assumption is unjustified and that the supporting analysis that purports to show minor effect has no credibility.

Staff's complaint that Nevada failed to address other aspects of SNL 2008a has no regulatory basis in any event. As indicated in II.F. above, a failure to fully address a technical study that is not part of the application does not violate 10 C.F.R. § 2.309(f)(1).

Finally, as explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, as explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE. Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-33 – APPROACH TO ESTIMATING PERCOLATION

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely

inappropriate at the contention stage. Nevada's quote from LSN# NRC000010491 is especially relevant. This expert was chosen by DOE for his expertise in this area. The fact that noting in Part 63 specifically precludes the "field capacity" modeling concept is irrelevant, because nothing in Part 63 specifically approves of its use either, leaving the use of such a model at Yucca Mountain as a matter of expert opinion.

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE. Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-34 – REPRESENTATION OF STORM DURATION FOR NET INFILTRATION MODELING

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, the implications of the contention are identified (Petition at 209), and as explained in II.D. above, Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE.

NEV-SAFETY-34 (at 208) notes that in the application a simple linear relationship is fitted by regression to relate storm duration to daily rainfall depth. This relationship is then used

to determine the storm durations associated with simulated daily rainfall. Nevada then goes on to illustrate the effect. (Petition at 209). Based on "Simulation of Net Infiltration for Present-Day and Potential Future Climates, MDL-NBS-HS-000023 REV 01 AD 01, May 2007" (01/28/2008), LSN# DEN001575070 at 6-57 and Figure 6.5.1.7-1, a 20mm rainfall can be associated with durations ranging from 1 to 23 hours, whereas the linear fit to the data yields a value of around 10 hours. DOE's approach dramatically under-represents the intensity of some important events.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE. Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-35 – EPISODIC NATURE OF INFILTRATION FLUXES IN NET INFILTRATION ANALYSIS

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Staff, in its response to NEV-SAFETY-35, does not address the technical issues raised and relies instead on assertions that Nevada misread the LA and misunderstands the model. Nevada fully understands that precipitation is input to the MASSIF model as daily amounts. However, as noted by Nevada (Petition at 213), the MASSIF results are temporally aggregated to provide an annual flux as input to the unsaturated zone, and only a mean value of that flux is taken forward for the TSPA (*see e.g.*, "Simulation of Net Infiltration for Present-Day and Potential Future Climates, MDL-NBS-HS-000023 REV 01 AD 01, May 2007" (01/28/2008), LSN# DEN001575070 at 6-169). Thus, although MASSIF may simulate a 1,000 year annual flux, the output will be weighted by a factor of 1/1000 to quantify its contribution to the mean. Hence, as noted by Nevada (Petition at 213), "[t]he consequence of this procedure is that the physics of system response to these dominant extreme events is lost." The conclusion is that this is "incompatible with appropriate representation of the process response of the underlying unsaturated zone," and is likely to under estimate seepage at the repository level. This demonstrates the significance of the contention.

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE. Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity

requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-36 – CORROBORATION OF MODEL RESULTS IN POST-MODEL VALIDATION OF NET INFILTRATION SIMULATIONS

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. *See e.g.*, "Nevada has not made its case" (Answer at 313). Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-37 – NET INFILTRATION MODEL METHODOLOGY

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Nevada's contention asserts that the sampling method used for the estimation of long-term net infiltration is not appropriate. Staff argues that Nevada's assessment of the chosen sampling methodology is not explained. Nevada's contention merely notes a fundamental feature of DOE's sampling method that will be familiar to anybody with a basic knowledge of sampling techniques.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-38 – PARAMETER CORRELATIONS IN NET INFILTRATION MODEL

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

Staff claims that the referenced DOE report does not state what the contention suggests that it states, namely that DOE neglected correlations. The contention does not state that DOE neglected all correlations; it states at Section 2 (Petition at 223) that "with very few exceptions, parameter correlations are not considered in the uncertainty analysis and the issue is not discussed at all in SAR Subsection 2.3.1.3.3." This is true: for example, for the present-day

climate DOE varied 11 parameters independently and considered correlations between just two other parameters (*see* "Simulation of Net Infiltration for Present-Day and Potential Future Climates, MDL-NBS-HS-000023 REV 01 ADD 01" (01/28/2008), LSN# DEN001575070, at 6-153). The statement in DEN001575070 (at 8-19) that "[f]or the physical parameters (parameter related to physical properties of materials), no technical basis justifying imposing correlations between parameters was identified. Therefore, no correlations were applied," was quoted in the Nevada contention (Petition at 224) to support the assertion that correlations had not been considered appropriately. At page 225, the contention also notes that the approach fails to comply with DOE's own statement that "[a]n adequate technical basis or bounding argument [must be] provided for neglected correlations." (citing DEN001575070 at 8-18). 10 C.F.R. §63.114(b) requires that the performance assessment must "provide for the technical basis for parameter ranges, probability distributions, or bounding values used in the performance assessment." DOE does not give any details of the criteria they considered in determining that the remaining parameter correlations did not need to be applied, and hence no technical basis has been provided.

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE. As far as this particular contention is concerned, it is not possible to evaluate the impact on the estimated dose. As explained in the contention (Petition at 224), the main consequence of ignoring parameter correlations is that it leads to biased estimates of long-term net infiltration. Given this, NRC cannot reasonably rule

out the possibility that the impact would be to underestimate net infiltration rates and hence, ultimately, radiological dose.

Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-39 – TEMPERATURE LAPSE RATE VERIFICATION

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

The contention does not allege that DOE's assumption of a 1 degree Celsius decrease per one hundred meter elevation rise is incorrect or unreasonable. (Petition at 401-402). This is irrelevant. The issue is that DOE did not verify the assumed decrease, and that this contravenes the requirement of 10 C.F.R. § 63.21(c)(15) for modeling assumptions to be supported empirically. DOE has the burden of proof here, not Nevada. *See* II.G. above.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

As indicated above, the contention does not allege that DOE's assumption of a 1 degree Celsius decrease per one hundred meter elevation rise is incorrect or unreasonable. (Petition at 401-402). This is irrelevant. The issue is that DOE did not verify the assumed decrease by *any* of the means described in 10 C.F.R. § 63.21(c)(15).

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE.

Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-40 – PARAMETER UNCERTAINTY TREATMENT IN NET INFILTRATION MODEL

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's Response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-41 – EROSION FEP SCREENING

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

10 C.F.R. § 63.102(j) requires that the TSPA identify FEPs "that might affect performance of the geologic repository" and "examine[s] their effect[s] on performance." 10 C.F.R. § 63.102(j) provides further that (except for low-probability FEPs) "those [FEPs] expected to materially affect compliance with § 63.113(b) *or be potentially adverse to performance* are included" [emphasis added]. NEV-SAFETY-41 alleges, with adequate support, that land surface erosion will significantly affect infiltration and seepage fluxes at Yucca

Mountain within 10,000 years. Infiltration and seepage fluxes will affect performance within 10,000 years, and therefore, if the contention is true, land surface erosion will be "potentially adverse to performance" within 10,000 years and must be included as a FEP in the 10,000-year TSPA.

The SAR concludes in subsection 2.2.1.2 at 2.2-17 that "[a]ccordingly, to the extent that a particular FEP has no significant effect on radiological exposure, or radionuclide release, *or on an intermediate-performance measure that can be linked to radiological exposure or radionuclide release*, that FEP can be excluded (screened out) from the performance assessment on the basis of low consequence" [emphasis added]. Applying DOE's FEP screening criterion (for low consequence), land surface erosion cannot be screened out for the first 10,000 years because it is linked to infiltration and seepage fluxes, which are intermediate-performance measures that can be linked to radiological exposure or radionuclide release.

In the Notice of Hearing (CLI-08-25 at 13, __ NRC __ (2008)), the Commission stated that petitioners "are also free to file contentions maintaining that DOE's application does not meet EPA's standards." Under EPA's standard at 10 C.F.R. § 197.36(c), DOE "shall project the continued effects of the features, events and processes [FEPs] included in paragraph (a) of this section [pertaining to the 10,000 year assessment] beyond the 10,000-year post-disposal period through the period of geologic stability," with "period of geologic stability" defined in 40 C.F.R. § 197.12 "to end at 1 million years after disposal." Therefore, once land surface erosion is properly included as a FEP in the 10,000 year performance assessment, it must also be included thereafter, up to 1,000,000 years, in the post-10,000 year assessment.

Those standards in 40 C.F.R. Part 197 do not prohibit the admission of this contention. 40 C.F.R. § 197.36 (c)(2) requires DOE to assess the "effects" of climate change in the post-

10,000 year period, and provides further that "this analysis "may be limited to the effects of increased water flow through the repository as a result of climate change." NEV-SAFETY-41 does not depend on "climate change" after 10,000 years in the sense used by EPA, that is, "speculation regarding the timing and magnitude of climatic cycles (73 Fed. Reg. 61,256, 61,284 (Oct. 15, 2008)). And NEV-SAFETY-41 does not focus proximately on infiltration flux as it may be affected by climate change, but on infiltration flux as it may be affected by erosion.

But even if NEV-SAFETY-41 did so depend, the EPA rule would not require that the contention be dismissed. It is clear from the text that consideration of possible ultimate effects of climate changes is being limited to one ultimate effect--increased water flow through the repository. Increased water flow *through the repository* does not appear magically from climate change, but arises from a variety of intermediate causes such as precipitation, erosion, and infiltration, and the rule itself does not limit what those intermediate causes might be as long as they arise from climate change and result, ultimately, in increased water flow through the repository. Land surface erosion is one of those intermediate causes that result, ultimately, in increased water flow through the repository, by increased infiltration, and eventually, simple precipitation directly on waste packages.

Staff questions whether Stuewe, et al. supports the Nevada contention, but here Staff counsel are engaging in a technical dispute with the experts about the meaning of the study. They are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

In any event Stuewe, et al. predicts significant erosion within 500,000 to 5,000,000 years with conservative estimates of the parameters. This does not mean that the erosion period cannot be shorter than this; Stuewe, et al. mean that the erosion period cannot be *longer* than this

(Petition at 241). Also, the period of 500,000 to 5,000,000 years is stated in the Petition (at 241) to be the time over which "the Yucca Mountain crest will denude to the level of the proposed repository drifts." The Stuewe, et al. model represents erosion as a continuous process, so the effects are ongoing within the first 10,000 year period and beyond. The Petition (at 241) refers to the ongoing erosion process and states that it "will be of significance to safety assessment both in the period before 10,000 years and in the longer term." The Petition states that this will, in part, be because of effects on the infiltration flux. To be explicit, if there is about 300 m of erosion to drift level in 500,000 years, the average erosion to 10,000 years will be about 6 m. However, some areas will be eroded significantly more than this and some less. Changes of this magnitude will be sufficient to very substantially change "the surface morphology and soil thickness" (Petition at 241).

At the time that the Petition was submitted, Stuewe, et al. was not a published document. However, it had been submitted for publication. It has now been accepted for publication, with no changes to the technical substance of the argument.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

While 40 C.F.R. § 197.36(c)(2) provides that climate change "may be represented by constant climate conditions" and that NRC shall specify in regulation the values to be used. . .such as temperature, precipitation, or infiltration rate of water" [emphasis added], no such "constant climate conditions" or "values" have been prescribed. A *proposed* NRC rule cannot legally prescribe anything, and moreover, the NRC proposed rulemaking reflects no consideration of land erosion. Finally, while implementation of the EPA rule is the subject of rulemaking, the Notice of Hearing provided specifically that this round of contentions may be based on the EPA rule only. This provision would be meaningless if all such contentions would

be dismissed because of the pendency of the NRC rule. Contentions addressing the final NRC rule are due 60 days after that rule is published in the Federal Register.

Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-42 – VALIDATION OF UNSATURATED ZONE FLOW MODEL BY SIMULATION OF NATURAL CHLORIDE DISTRIBUTION IN PORE WATERS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-43 – VALIDATION OF UNSATURATED ZONE FLOW MODEL BY CARBON-14 CONTENTS, STRONTIUM ISOTOPE COMPOSITIONS AND CALCITE MINERAL PRECIPITATE ABUNDANCES

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

Travel times obtained from the DOE model simulation of infiltration in borehole UZ-1, using either tenth percentile or thirtieth percentile infiltration rates, are shown in Figure 7.5-1 of "UZ Flow Models and Submodels," LSN# DEN001572665, at 7-16. Both model curves show consistently higher travel times from surface through the PTn, TSw and CHn units than the measured C-14 ages. For borehole SD-12, the comparison is that the tenth percentile infiltration model travel times are higher than C-14 ages, whilst the thirtieth percentile model travel times are similar to the C-14 ages.

In the SAR, DOE is interpreting the C-14 change across the TSw alone whereas in the UZ Flow Models and Submodels report it is interpreting the C-14 values for individual gas samples through both the PTn and the TSw. The first approach is interpreting a relatively small change in C-14 values and assumes that the initial C-14 values for all samples were the same (an assumption that is also a source of uncertainty in the second approach). The first approach also averages the C-14 change by apparently using the C-14 values at the top and base of the TSw – the C-14 value for the deepest sample in the TSw is 14.5 pmC which is less than half the C-14 value for the next lowest sample only 100 feet away (Table 5-8 in Yucca Mountain Site Description 2004; LSN# DN2002481434). If, as stated by DOE, the lower C-14 value was used in the percolation rate estimation, then it biased the result to long travel time (by more than a half-life of C-14, or in the order of 5000 years longer) and slow percolation rate.

Concerning the approach used in the UZ Models and Submodels report of calculating the C-14 age for each sample through the PTn and TSw units (as also reported in Table 5-8 in the Site Description report), the age calculation assumes that initial C-14 activity in all cases was 100 pmC and no correction was made for the dilution of C-14 in pore waters (with which the gas

phase is assumed to equilibrate) due to reaction and isotope exchange with calcite which would make the C-14 ages too high and the estimated percolation rates too low.

DOE uses a model of Sr geochemistry to suggest that the measured Sr data are consistent with an average infiltration rate of 5 mm/yr over 10 million years (*see* Section 7.6.2 in UZ Flow Models and Submodels (LSN# DEN001572665). The model assumes that Sr content of pore waters in the UZ is controlled by evapotranspiration during infiltration at the surface and then remains unaltered by water-rock reactions until the pore water enters perched water in the zeolitized tuffs at the base of the TSw, where strong exchange is assumed to take place depleting dissolved Sr and accumulating Sr in the zeolitized tuff. Figure 7.6-1 in UZ Flow Models and Submodels compares modeled Sr with measured Sr for two boreholes. Six model variants with different precipitation and infiltration parameters have been run to simulate Sr inputs and transport. Because of the assumption that there is no water-rock reaction through the PTn and TSw, the modeled Sr values are determined by the same model processes and parameters that determine the pore water chloride values. This part of the model is identical to the validation test using Cl data and is not an independent validation. The part of the model that simulates the Sr values in the zeolitized layers in the CHn unit is dependent on the assumed distribution coefficient for Sr in that rock, for which a Kd value of 1.0 m^3/kg was assumed, on the basis of a literature range of 0.05 to 2.0 m^3/kg (at 7-24 in UZ Flow Models and Submodels). Modeled Sr values for the CHn can only be compared with measured values in borehole SD-12 (Figure 7.6-1 in UZ Flow Models and Submodels), and here the measured values are about 1 order of magnitude lower than modeled values.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material

dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-44 – FLOW IN THE UNSATURATED ZONE FROM EPISODIC INFILTRATION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-45 – EFFECTS OF EPISODIC FLOW

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-46 – EXTREME EVENTS UNDEFINED

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-47 – PHYSICAL BASIS OF SITE SCALE UNSATURATED ZONE FLOW

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to

support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-48 – MULTI-SCALE THERMAL-HYDROLOGIC MODEL

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-49 – MODELS OF FLUID MOVEMENT IN THE UNSATURATED ZONE

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

The main issue of this contention is the inconsistent use of two different models by DOE to describe the same phenomenon, unsaturated flow. DOE in SAR Subsection 2.3.2 uses the predominance of fracture flow with limited fracture-matrix interaction to describe unsaturated

flow, but in SAR Subsection 2.3.5.3 assumes a plug-flow model where there is total equilibrium between aqueous fluids in the fracture and matrix. DOE offers geochemical (isotopic) evidence and other analogous studies to support the predominance of fracture flow, but assumes a plug-flow model to simplify the situation so that DOE may more easily calculate the chemical composition of seepage water from consideration of the whole rock mineralogy and chemistry, rather than mainly from considerations of fracture-lining minerals. This erroneous basis will give an invalid composition of seepage water that eventually interacts with the EBS and waste. Rather than using one unifying model for unsaturated zone flow, DOE undermines the validity of both models by using two inconsistent ones.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10

C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-50 – ALTERNATIVE DISCRETE FRACTURE FLOW MODELS

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Among other things, the contention provides (Petition at 290) that "DOE's DP abstraction substantially underestimates the degree of flow focusing and the maximum seepage flux through the repository and therefore underestimates the dose to the RMEI." Therefore, contrary to Staff's argument, the contention does in fact explain its effects on post closure performance. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

SAR Subsection 2.3.3.2.3.7.1 states (at 2.3.3-47) that "given the consistency of results, the simplicity of the continuum conceptual model is considered an advantage over the complexity of the discrete-fracture network model." The comparison that gave consistency of results is the study by Finsterle (2000). This is exactly the study that is challenged in the Petition (at 289 and 290) where it is stated that "this study is inconclusive because the so-called DFN is based on a regular 2-D grid with an entirely synthetic, highly unrealistic permeability structure with no resemblance to fractured rock, and the DFN-fracture continuum model matches obtained for selected properties are poor and restricted to a steady-state seepage scenario." Thus, it appears that the DOE has used continuum models for the convenience of simplicity, despite the lack of justification for their application at Yucca Mountain.

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE. Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity

requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-51 – POTENTIAL CONVECTIVE SELF ORGANIZATION OF 2-PHASE FLOW

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Staff claims that Nevada has not demonstrated what effect the inadequacies in DOE modeling would have on performance, but the effect is summarized in the Petition (at 296). Because the simulation grids are too coarse to represent the characteristics of both single- and two-phase flow in the vicinity of the emplacement drifts "the models used do not have an adequate technical basis to simulate the phenomena they purport to represent." This means that DOE can say nothing about the amount and composition of water entering the drifts during the

thermal phase, since the flow pattern will be determined, in part, by self-coarsening instabilities that "can produce highly localized flow and self-organized saturation patterns" (Petition at 294). This undermines all DOE arguments on corrosion of the drip shield and waste containers over this period, and makes it impossible for DOE to determine the amount of water that could be delivered to a single waste package. Nevada does not attempt to assess the quantitative implications of its contention, but this is not necessary, for once DOE's model is rejected, there is no TSPA to establish compliance with dose standards. *See* II.D. above.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Staff claims again that Nevada has not demonstrated what effect the inadequacies in DOE modeling would have on performance, and this is answered above in 5.

Moreover, as explained in II.D. above Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE. Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

Nevada does point to the fact that mesh convergence tests could be used to address the issue (Petition at 295). This is something that DOE should have carried out as part of model verification, so the lack of quantitative comment reflects inadequacies in the DOE modeling program. *See* II.F. above.

DOE correctly points out that it has undertaken thermal-hydrologic modeling at various scales (DOE Answer at 506). Specifically, it notes that "[m]ore efficient two-dimensional models are used to model thermal-hydrologic parameters in detail, up to several grid elements per meter, within the emplacement drifts and adjoining host rock" (DOE Answer at 506). However, the dimensionality of the model is a key consideration in this context and the Petition refers to three-dimensional coarsening instabilities (Petition at 294). A three dimensional structure cannot be developed in a two-dimensional model, no matter how well resolved. Furthermore, the use of a nested set of models at different scales means that unless those models are run in closely coupled mode, there is no possibility of capturing "drift-scale flow instabilities that may originate at the drift scale but can grow in size to the repository scale" (Petition at 294).

REPLY – NEV-SAFETY-52 – EBS AND NEAR-FIELD MODELING APPROACH

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

The contention relates to the inappropriateness of using a sequential and unidirectional modeling approach for seepage and water flow in the whole of the EBS and near field. As water seepage into drifts is the topic of SAR Subsection 2.3.3, the contention could not have reasonably been narrowed further, since it applies to all the fourth-order headings within that subsection.

Nevada states "[t]he current DOE approach to EBS and near-field modeling assumes that the highly coupled, complex phenomena operating at Yucca Mountain can be predicted by decomposition into a collection of component process models which, when coupled sequentially . . . provide a predictive model of near-field behavior . . . However, this logic holds only for weakly coupled relatively simple systems . . . ." (Petition at 298). There is no disagreement as to the fact that DOE uses a family of models. What is at issue is that DOE uses an approach that is only applicable in a weakly coupled system to simulate a strongly coupled system.

If this contention is true, DOE's linked modeling approach is not scientifically supported, and violates 10 C.F.R. § 63.114(g). Without a valid approach here, DOE cannot establish compliance with EPA dose standards.

Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-53 – APPLICATION OF THE FRACTURE MATRIX DUAL CONTINUUM MODEL TO ALL UNSATURATED ZONE FLOW PROCESSES

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Staff's complaint (Answer at 400) that Nevada "does not proffer a reasoned basis that shows the significance of the alleged deficiencies with respect radiological exposures, or radionuclide releases, during post-closure period" demonstrates the extremes Staff will go to oppose a contention. If true, the contention would obliterate all of DOE's conclusions on in-drift seepage and infiltration rates. Does Staff really insist that Nevada must specifically demonstrate a proposition that must be demonstrably obvious to any qualified reviewer – that in-drift seepage and infiltration rates affect radiological exposures and radionuclide releases during the post-closure period?

Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-54 – CONSTITUTIVE RELATIONSHIPS IN THE YUCCA MOUNTAIN INFILTRATION, THERMO-HYDROLOGIC, AND TSPA MODELS

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

REPLY – NEV-SAFETY-55 – DATA FOR THE CHEMISTRY OF PORE WATERS IN THE TOPOPAH SPRINGS (TSw) FORMATION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The thirty-four pore water samples from the TSw unit that were used in the near-field chemistry model came only from boreholes NRG-7 and SD-9 near to the center of the repository layout and from the ESF and ECRB. There is a large area in the northern part of the layout that has not been sampled; borehole UZ-14 is in the center of this area, but samples were not available. Although DOE has previously stated that

> . . . available data can only be assumed to be representative of all water chemistries actually present in the repository units. This is supported by the chemical similarity of the four TSw lithostratigraphic units that will host the repository. Reaction with these rocks should make large variations in the concentrations of *nonconservative* aqueous species from any single unit unlikely.

"EBS: Physical and Chemical Environment," LSN# DN2002452948, Section 5.2.2. However, heterogeneity in the *conservative* parameters chloride (Cl) and nitrate (NO_3) will not be removed by reaction with rock. Therefore, this argument is not a basis for the assumption that available data are representative of all water chemistries present.

Concerning the point that the long storage time prior to extraction and analysis, plus the evidence for microbial activity, casts doubt on the reliability of the chemical data for the selected 34 samples, Figure 6.6-7 in LSN# DN2002452948 shows that virtually all samples with measured pH have calculated $P(CO_2)$ higher than 10^{-3} atm. By DOE's own criterion, this suggests that they all have suffered microbial activity to some degree.

Concerning the likely effect of microbial activity on nitrate concentrations, DOE agrees that it would lower NO_3 concentrations (Section 6.6.3 in LSN# DN2002452948). Therefore, noting the relationship that DOE infers of $P(CO_2)$ higher than 10^{-3} atm correlating with microbial activity, it is reasonable also to infer that NO_3 is likely to have been lowered,, and therefore, that analyzed NO_3 values are too low and Cl/NO_3 ratios are probably higher than *in situ* values.

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

The reasoning that the thirty-four samples are too few to give confidence that they are reliably representative of chemical variability in pore waters in the TSw unit is explained above. Many of those selected samples are closely spaced, for example in the ECRB, the ECF and also in borehole SD-9,, and therefore, their distribution is not representative of the larger area. The northern area of the repository layout is not represented at all. Uniformity of the major element

composition and mineral composition of rock samples does not correlate with uniformity of pore water compositions, and this is certainly the case for conservative ions such as Cl and NO_3 which are controlled by external factors.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-56 – GEOCHEMICAL INTERACTIONS AND EVOLUTION IN THE UNSATURATED ZONE, INCLUDING THERMO-CHEMICAL ALTERATION OF TSw HOST ROCK

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-57 – DATA FOR NEAR-FIELD CHEMISTRY MODELS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-58 – GROUNDWATER SAMPLES IN THE UNSATURATED ZONE SORPTION TESTS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and

cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-59 – GROUNDWATER COMPOSITIONS ASSUMED

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The two well waters (J-13 and UE-25p#1) chosen to bound the impact of all possible compositions are compared with perched and pore waters summarized in Table A-2 (SNL 2007, "Radionuclide Transport Models Under Ambient Conditions," LSN# DN2002466365). The J-13 well water is not as dilute as some of these waters, especially for Ca, Na, SiO_2, SO_4, and HCO_3 (bicarbonate) species; also, the pH is more acidic than for the perched waters. The deep carbonate aquifer water (UE-25p#1) is not as concentrated in some aqueous species (Na, K, SiO_2, Cl, and SO_4) as the perched and pore waters, is also more acidic than the perched waters, and the bicarbonate concentration is almost double the maximum value for pore waters. Furthermore, the two water compositions used for sorption work are sodium-bicarbonate waters (predominant cation and anion species). The pHs are slightly acidic and almost identical. The actinide cations (Th, U, Np, Pu, Am) form their strongest solution complexes with carbonate and hydroxide complexes (DOE Answer at 585). The DOE batch sorption experiments that used the

two natural well waters have only varied the carbonate activity relative to hydroxide; if pH were raised (by, for example, evaporation), hydroxide and carbonate complexes would be more abundant and sorption lower. Also, some of the ambient pore waters and thermally affected pore waters are predominantly divalent cations (Ca+Mg) and non-carbonate anions ($Cl+SO_4$) as compared with the two natural well waters which are predominantly Na-HCO_3 waters. As temperature decreases, the solubility of CO_2 increases, as would the carbonate concentration, decreasing sorption. Thus, apparently not all impacts on water compositions have been bounded.

Nevada is challenging the usage of only 34 pore waters leading to selection of just 4 principal types of seepage waters. Nevada is also contesting the use of two models for seepage: the plug-flow model for the near field chemistry, and the fracture dominant flow for seepage.

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely

inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-60 – EMPIRICAL SITE-SPECIFIC DATA AND THE NEAR-FIELD CHEMISTRY MODEL

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply with regard to Issue 2 (Petition at 335-38) based on NRC Staff's response.

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted.

No reply with regard to Issue 2 (Petition at 335-38) based on NRC Staff's response.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

REPLY – NEV-SAFETY-61 – AMBIENT SEEPAGE INTO EMPLACEMENT DRIFTS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

In its Answer (at 429-30), NRC Staff refers to FEP 2.1.06.04.0A ("Flow Through Rock Reinforcement Materials in EBS, Features, Events, and Processes for the Total System Performance Assessment: Analyses" (03/06/2008), LSN# DEN001584824 at 6-512) and accuses Nevada of failing to recognize that the DOE has considered the impact of the Bernold-type

stainless-steel perforated liners on groundwater flow. However, DOE has misread or misinterpreted this FEP (2.1.06.04.0A) because it only refers to the diversion of seepage away from the waste package and drip shield being of low consequence (and thus ignored), and it says nothing regarding the enhancement of seepage caused by the capillary effects of the Bernold-type perforated liner sheets. Therefore, this FEP does not demonstrate that the liners have no effect on increasing seepage into the emplacement drifts, and indicates that the DOE has not considered the Bernold-type liners as seepage enhancers. DOE's ruling out of this FEP was meant to be conservative. However, any enhancement of seepage by the liners onto the drip shields and waste packages would hasten corrosion, breaches of the waste containers, and release of radionuclides leading to earlier and larger doses to the RMEI.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-62 – THERMAL SEEPAGE INTO EMPLACEMENT DRIFTS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-63 – EFFECT OF ROCK BOLTS ON AMBIENT SEEPAGE

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

In its Answer (at 440-41), NRC Staff refers to FEP 2.1.06.04.0A ("Flow Through Rock Reinforcement Materials in EBS, Features, Events, and Processes for the Total System Performance Assessment: Analyses" (03/06/2008), LSN# DEN001584824 at 6-512) and accuses Nevada of ignoring DOE's analysis of rock bolts. NRC has misread or misinterpreted this FEP

(2.1.06.04.0A) because it only refers to open hole frictional type rock bolts (temporary ones), and not the Swellex inflatable or expandable type. DOE claims that open holes are capillary barriers to seepage, not seepage enhancers, are thus of low consequence, and thereby excluded. However, this FEP (2.1.06.04.0A) says nothing regarding the enhancement of seepage caused by the capillary effects of the Swellex rock bolts. Therefore, this FEP does not demonstrate that the Swellex rock bolts have no effect on increasing seepage into the emplacement drifts, and indicates that the DOE has not considered the Swellex-type rock bolts as seepage enhancers.

Any enhancement of seepage onto the drip shields and waste packages by the Swellex rock bolts would hasten corrosion, breaches of the waste containers, and releases of radionuclides leading to earlier and higher doses to the RMEI.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-64 – EFFECT OF ROCK BOLTS ON THERMAL SEEPAGE

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-65 – STRUCTURAL CONTROL OF SEEPAGE IN THE EMPLACEMENT DRIFT

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

10 C.F.R. § 63.21(c)(14) requires the SAR to evaluate natural features of the geologic setting and to design features of the engineered barrier systems important to waste isolation. Although DOE does acknowledge fracture geometry as an important parameter controlling flow

focusing and seepage percolation, and utilizes limited field data to generate models that simulate emplacement drift seepage, DOE does not plan to use (SAR Subsection 2.3.2 and similar subsections) drift-by-drift in-situ site data to enhance waste distribution in the emplacement drifts. Consequently, DOE fails to utilize emplacement drift site-specific fracture and fault geometry, and thus, the natural host rock structural control of seepage, in providing engineering barrier design to optimize post-closure performance. DOE's recognition that flow focusing exists and the fractures and faults control seepage has not been translated by the DOE into any design criteria or waste loading criteria.

DOE provides in depth discussion and data regarding the structural control of seepage for the development of a seepage model (*see* FEP 2.2.07.04.0A, SAR sections 2.3.3 and 2.3.2). Yet, when it comes to tying this information to waste canister corrosion there is a paucity of information provided. Although, DOE and Nevada agree that old mines and caves provide some basic understanding of the controlling geometries, it appears that DOE does not utilize this information for issues related to corrosion of the waste canister. Nevada utilizes the information provided by DOE but draws very different conclusions.

DOE and the State of Nevada agree, in principle, that fracture and fault geometry, spatial distribution, and aperture spacing control percolation distribution in the emplacement drifts. However, there exists strong disagreement on data collection and how that information is to be utilized for post-closure performance. DOE does not propose to collect site-specific drift-by-drift structural data to be used to minimize the corrosion of individual waste canisters. DOE data goes towards building a variable-scale seepage model, which provides averaged data regarding seepage into the emplacement drifts. Thus, the Nevada claim that the structural control of seepage may have significant effects on the geometry of the emplacement drift wetting, and

consequently on corrosion, is a basic outgrowth of the discussions in SAR Subsection 2.3.3. However, DOE refuses to consider situations where flow-focusing of seepage affects the quantity and possibly the geochemistry of seepage dripping on waste canisters. It is intuitive that during flow focused events larger amounts of vadose water would reach more confined locations. The consequence of such percolation would be that larger quantities of water would be made available to a waste container than for unfocused events. Further, the volume of evaporated salts would therefore be increased, and the potential for significant concentrations of hydroscopic salt formation would be enhanced. The results of flow-focused events therefore, can be increased corrosion of the waste container. In summary, the DOE has not provided an analysis of the role(s) of spatial seepage control on corrosion. This contention challenges that position.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-66 – ATTENUATION OF SEEPAGE INTO NATURALLY FRACTURED DRIFT WALLS

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Staff alleges that this contention is immaterial to the findings that NRC must make. This is wrong and represents a misuse of the Commission's contention pleading requirements. The application itself lays out the arguments why drift seepage fosters the destruction of the waste containers by corrosion, promoting the risk of radionuclide transport away from the repository drifts. As soon as waste packages are corroded so that seepage can contact the waste, drainage of this contaminated water from the drifts into the saturated zone can result in a leaking repository. It is this risk that prompted the DOE to design the drip shields it wants to install before the closure of the repository. Thus, DOE has already indirectly acknowledged that NEV-SAFETY-66 is material to the findings of the proceedings.

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE. Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-67 – EVALUATION OF UNCERTAINTIES IN ESTIMATED CHEMICAL PROPERTIES, ESPECIALLY pH VALUES, OF EVAPORATED DRIFT BRINES

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

First, the absence of citations to support the claim that uncertainties in the pH range in evaporated brines have been underestimated is due to the fact that there is not a background of published research to support the reliability of the specific modeling that has been used here by

DOE. That specific modeling is the evaporation of a solution to produce a brine in conditions analogous to the case here and the simulation of the evolution of pH through that process. Independent research that would support the reliability of DOE's modeling, i.e., measurements that confirm model results, is not cited by DOE and only DOE's limited experimentation is relied upon. This exemplifies the shortcoming of DOE's safety analysis, i.e., that there is an insufficient breadth of science to justify the assumptions and generalization in the model.

The point of this contention is that pH is the unknown of concern here and that assumptions (a) about the value of $P(CO_2)$ and (b) that pH depends directly on $P(CO_2)$, are inherent in modeling of pH values. DOE's pH model has not been misrepresented by Nevada because reactions of evaporating brine with minerals are acknowledged. However, throughout this modeling constant $P(CO_2)$ has been assumed and this is the main constraint on modeled pH (as is acknowledged by DOE using $[C]_{tot}$ uncertainty as a proxy for pH uncertainty). If different $P(CO_2)$ values were to be assumed, then different pH values would be derived from modeling. For example, if higher $P(CO_2)$ values were assumed, then the pH range would go lower than pH 5. If the modeling was done with another constraint on pH, for example that it is controlled by precipitation of $Fe(OH)_3$ (iron hydroxide) rather than by equilibration with the fixed $P(CO_2)$, then modeled pH for the evaporated brine could also be lower than 5.

pH values for evaporated brine that were lower than pH 5 would enhance corrosion rates of drip shields and waste packages. This contention is not about the uncertainty inherent in a long-term projection. It is about the uncertainty in a model for a specific process that is not primarily dependent on long-term projection but rather on the simplifying assumption made in the model for pH. The simplifying assumption, that pH in evaporated brines is primarily controlled by constant $P(CO_2)$, means that the wider range of pH has been excluded from

consideration in the SAR. For example, DOE has not carried out an analysis to show that the impact of pH values outside the 5 to 11 range would *not* have a significant impact on dose.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-68 – IN-DRIFT CONDENSATION ON MINERAL DUST

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

There is a strong disagreement between the DOE and Nevada on the issue of the origin and behavior of brines and salts. DOE's concept that dust capillary induction will reduce the quantity of brines and salts that are made available to the metal barrier surface is a viable concept only if there are small quantities of brine produced from small amounts of hydroscopic dust and

the mineral dust surface formed on the waste form is fine-grained. If the origin of the dust is more varied, i.e. arising from ventilation, rock dust from construction, salt dust from scale and EBS debris, then the capillarity is unlikely to function as envisioned by the DOE. DOE has no experimental data to offer to indicate that capillarity will function as it envisions under repository conditions.

Based upon a narrow concept of brine formation in the waste emplacement drifts, the DOE has provided a skewed and clearly wrong interpretation of the geochemistry and hydrogeochemistry relevant to post-closure performance. To formulate its major premises the DOE has not provided any laboratory or field evidence to show that:

1) Brines only form from ventilation-derived salts;

2) Capillarity of dust and other debris fields will limit brine and salt contact with the waste canister.

DOE contradicts itself with respect to brine formation because it adopts an unsaturated bin-water evolution system that by definition includes evaporation.

Nevada considers that brines will form hydroscopic salts provided by ventilation (in agreement with DOE) and salt scale, and most importantly, from seepage. Accordingly, the contention raises a genuine dispute that is fundamental and critical to the extent and degree of corrosion of the waste container and therefore to the release of radionuclides to the accessible environment.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely

inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-69 – COUPLED SEEPAGE AND DUST DELIQUESCENCE

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

SAR Subsection 2.3.3.3.1 at 2.3.3-58 provides a DOE conceptual description of thermal-hydrologic processes and specifically a scenario in which seepage can occur when wall rock temperatures are over 100˚C. DOE suggests that these processes are unlikely but that they could occur. Nevada agrees that this process could occur and contends that other similar situations

could provide seepage into the drifts during the thermal period. However, for safety assessment purposes, DOE has totally eliminated seepage when the wall rock is over 100˚C, and consequently has limited consideration of hydrogeochemical processes associated with such seepage.

DOE's position is not based upon field observations or laboratory experiments. There are a variety of open literature laboratory experiments showing water fingering through above 100˚C glass fractures so that physical limitations do not exist for this process to occur. These laboratory experiments, although suggestive of what is possible in the temperature elevated Yucca Mountain environment, do not have the same fracture disconformities (surface roughness) as natural rock, and consequently, even though surface roughness would enhance the fingering, and thus seepage, there are no adequate modeling experiments available to quantify this effect. DOE has chosen to eliminate consideration of seepage without laboratory experimentation or field trials and has no scientific basis to make the representation that seepage can only occur when wall rock temperatures are below 100˚C.

Although DOE suggests that both the (hypothetical) capillary and vapor barriers could be compromised during the thermal period, it argues that the drip shield would have to also fail prior to seepage contacting the waste package during the thermal period. Nevada agrees with DOE that the drip shield would have to also fail, but does so because it feels that the protective effects of the drip shield are quite temporary because of its susceptibility to corrosion at elevated temperatures during the thermal period, and because it is unlikely that the drip shield will be constructed without seepage flaws in both design and emplacement. As a point of reference, during the heater experiment there was a rock bolt corrosion event that released a deposit on top

of the heater canister. If both the capillary and vapor barriers were in place and functioning as DOE suggests, then the rock bolt degradation would not have occurred.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

REPLY – NEV-SAFETY-70 – THC EVOLUTION OF NEAR-FIELD PRE-SEEPAGE UNSATURATED ZONE WATER

1. A statement of the contention itself

DOE's Answer (at 690) fails to identify why Nevada's Petition (at 384) does not satisfy the requirements of 10 C.F.R. § 2.309(f)(i). DOE chooses instead to cites to "63.309(f)(v)" – a typographical error that should have been "2.309(f)(v)." Nevada's Petition has properly provided a one-sentence statement of the contention (in Section 1) – failure to recognize the critical significance of mineralization reactions on unsaturated zone seepage water chemistry – and then elaborated in general form in the basis for the contention (in Section 2) and in specific form the facts or expert opinions supporting the contention (in Section 5) with examples of those failures and their critical significance. Nevada has articulated a narrow, single issue contention that is sufficiently specific to identify the relevant issues consistent with the Case Management Order of June 20, 2008.

2. A brief summary of the basis for the contention

No reply necessary based on DOE's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on DOE's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

Whenever Nevada alleges with adequate support in fact or opinion a violation of an applicable NRC regulation, Nevada's contention will always raise a material issue. *See* Section II.K, *supra*. In addition, Nevada does not need to demonstrate that a TSPA contention would prevent a finding of reasonable expectation of safety, *see* Section II.A, *supra*, and Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards, *see* Section

II.D. DOE's argument that this contention must be rejected because its TSPA complies with NRC requirements is a frivolous effort to inject merits considerations into the contentions stage. *See* Section II.G, *supra*. Finally, Nevada has no obligation to identify alternative TSPA models to replaced flawed DOE models. *See* Section II.F, *supra*.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

Nevada strongly stands by the statements in its Petition concerning Yucca Mountain fractures that breathe as a consequence of the geothermal gradient. There is both State of Nevada and extensive DOE literature on the subject that even include thermal night surveys. It is also true that as a function of the increased thermal load, open fractures and faults will not only continue to breathe but new vents will be created. There is absolutely no scientific reason to assume that similar processes do not occur at depth. These evaporative fracture-coating minerals will also precipitate on the walls of other fractures, near the ground surface and at depth, especially under conditions where fractures and faults are breathing. Fracture flow water remaining in transit after evaporative precipitation will have a changed hydrochemical

composition. DOE is remiss by not characterizing the THC evolution of near-field and far-field pre-seepage unsaturated zone fracture flow water. It is this water, not the pore-waters studied by DOE that will become percolation.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-71 – MICROBIALLY INDUCED WATER CHEMISTRY CHANGES IN THE INCUBATOR ZONE

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to

support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-72 – CHARACTERIZATION OF DUST SOURCES

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

Ventilation dust, construction dust, salt dust, and rock fall debris and organics will form coatings on surfaces of critical EBS components such as the C-22 canister surface. In doing so, they will change or modify the service environment. DOE focuses its analysis of dust on ventilation dust deliquescence ("Analysis of Dust Deliquescence for FEP Screening"

(09/05/2007), LSN# DN2002478854 at 6-20) and concludes that since there are only expected small concentrations of hydroscopic salts it is of low consequence (as cited in the contention: FEP 2.1.09.28.0A). Nevada's position is that the amounts of dust and debris available to the waste canisters are much greater than DOE admits to (even with its varied references to different forms of dust or debris it never admits to the implications of combined processes). As a consequence, the hydroscopic salt concentrations are underestimated, and the most important aspects of dust (not its hydroscopic properties, but its physical ability to form crevice and pocket microenvironments) are totally ignored. The more varied the dust sources, the more varied the grain-size distribution and the greater the capacity for the debris field to enhance, support, and promote C-22 corrosion because it is more poorly sorted and forms more varied pockets and crevices which trap chemical reactions to the surface of the C-22.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-73 – IN-DRIFT ORGANIC CONTRIBUTION BY VENTILATION OR UNSATURATED ZONE WATER

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to

support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-74 – IMPACT OF MICROBIAL ACTIVITY

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff's assertion that Nevada's expert opinion in this section "fails to provide sufficient basis and explanation" is meritless (Answer at 494). This section contains a lengthy discussion and analysis, explaining the reasons for the expert opinion. This includes discussion of the appropriate DOE SAR subsection, the data relied upon by DOE found in its LSN, and several articles. NRC Staff acknowledges as much ("Nevada cites an article suggesting . . ." and "while also citing a reference indicating . . ."). *Id*. NRC Staff debates the content of Nevada's references and the conclusions to be drawn therefrom. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements. As NRC Staff surely knows, the Commission has made it clear that Petitioner only needs to make "a minimal showing that material facts are in dispute" at the contention stage and that the support offered for a contention "need not be in affidavit or formal evidentiary form and need not be of the quality necessary to withstand a

summary disposition motion." 54 Fed. Reg. 33,168, 33,171 (Aug. 11, 1989). As indicated in II.G. above, NRC Staff improperly shifts the burden of proof to Nevada.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

NRC Staff here restates the Nevada dispute accurately: "the SAR ignores archaea, the presence of which could impact corrosion of waste packages and drip shields, rendering the SAR's description of the potential impacts of microbial activity on corrosion inaccurate" (Answer at 495). To amplify Nevada's challenge, the contention challenges SAR Subsection 2.3.6.3.3.2 and similar subsections that describe microbial activity in the repository as "limited" and challenges all similar and related sections describing the predicted microbial populations in the closed repository, and the impact of microorganisms on the environment and the integrity of the waste container. SAR Subsection 2.3.6.3.3.2 is incomplete because it ignores the domain of microorganisms that grow optimally in extreme conditions that could develop in the repository. As a result, potential microbial activity and impact in the repository is underestimated.

Nevada specifies a number of NRC regulatory provisions not met by DOE. For example, SAR Subsection 2.3.6.3.3.2 does not comply with 10 C.F.R. § 63.115(f), which requires provision of the technical basis for either inclusion or exclusion of degradation, deterioration, or alteration process of engineered barriers in the performance assessment. NRC Staff attempts to simply avoid the issue raised in this contention by suggesting that DOE has screened out from consideration all microbial activity. This begs the question where, as here, the point of Nevada's contention is DOE's inadequate analysis failing to properly account for archaea in its microbial characterization.

Further explaining the material issue raised: Archaea life forms are unique in two aspects: unique composition of membranes and unique genes and enzymes. Archaeal

membranes are made of molecules that differ from those in other forms of life in several ways. Bacteria and eukaryotes have membranes composed of glycerol-ester lipids, whereas archaeas have membranes that are mainly glycerol-ether lipids. The stereochemistry of the glycerol group is the reverse of that found in other organisms. The lipid tails are different from other from those of other organisms and are based on an isoprenoid side chain. In some archaea the phospholipid bilayer is replaced by a single monolayer. These differences make the membranes more rigid and enable some archaea to survive extremes of temperature, salinity, acidity and alkalinity. Some archaea possess unique genes and enzymes that have not been identified in either bacteria or eukaryotes. For example, Berg described an autotrophic CO_2 fixation pathway found only in archaea.

The term "archaea" is used in the "Evaluation of Potential Impacts of Microbial Activity on Drift Chemistry, ANL-EBS-MD-000038, Rev 01" (11/18/2004), LSN# DN2002308488, in section 6.5.3 "Biotransformation and Biosorption of Radionuclides," and the distinction is made between "halophilic and nonhalophilic bacteria and archaea." That distinction is not made in "Section 6.1.1, "Heterotrophs versus Autotrophs" and Section 6.4 (at 6-19) "Environmental Constraints on Microbial Activity at YMP." In these sections the terms "microbes," "microorganisms," "bacteria," and "fungi" are used. DOE contends, "that the extent of each individual microbial reaction will be limited by environmental constraints, not by the types of microbes present." Response to NEV-SAFETY-74 Subsection e at 740. Section 6.4 "Environmental Constraints on Microbial Activity at YMP" delineates the following factors that will constrain microbial activity at YMP: temperature and pressure, redox conditions, relative humidity and water availability, pH and salinity and input of nutrients and radiation. The

discussion is framed around heterotrophic and autotrophic microorganisms but in many cases refers specifically to bacteria.

TEMPERATURE AND PRESSURE Section 6.4.1 specifically addresses bacteria and sets the "maximum temperature at which known microorganisms can exist in an active state is 110°C." Archaeal strain 121 grows at 121°C and even survives short periods at 130°C.

REDOX CONDITIONS, Section 6.4.2 at 6-24, "This indicates that metal corrosion under Yucca Mountain-relevant conditions will not support any significant autotrophic microbial growth. This may be partly because abiotic Fe^{2+} oxidation is kinetically favored over microbial oxidation." No reference is provided and the statement is only partially correct. At near neutral pH the abiotic oxidation of Fe^{2+} is fast. However Fe^{2+} oxidizing microorganisms can exploit steep redox gradients where low oxygen concentration slows the abiotic oxidation and they can compete kinetically. In acidic environments the chemical oxidation of Fe^{2+} is slow and microorganisms can accelerate the reaction rate by orders of magnitude.

pH AND SALINITY, Section 6.4.4. This section makes reference to bacteria exclusively and put the lower limit for bacterial growth at 1.0. An archaean acidophile, *Picrophilus torridus*, grows at pH 0, the equivalent of 1.2 M sulfuric acid. The pH scale is a logarithmic one so that the difference of a pH unit is an order of magnitude concentration.

NUTRIENTS. The following quote is taken from page 6-32: "In summary, organic carbon is an important limiting factor for Yucca Mountain microbial growth. The extremely low organic-carbon (sic) supply in the repository will limit heterotrophic microbial activity." Under Section 5 Assumptions, LSN# DN2002308488, "the concentrations of organic carbon in groundwater at Yucca Mountain will remain at a current level (<1.1 mg/L) over the whole regulatory time period." However, on page 6-25 there is a reference to Horn, et al. (2004), who

conducted experiments using crushed rock samples from "relevant repository stratigraphic unit(s)." Three experimental conditions were tested: 1xJ13 with an added carbon source (glucose), J13 without an added carbon source and a sterile control. Without the glucose amendment maximal planktonic cell densities were approximately $4x10^6$ cells per mL and with the added glucose cell densities were $2\ x10^7$ cells/mL. They report (page 6-26) that the source of the carbon for the growth of the detected heterotrophs in the unamended J13 remains "speculative**."** On page 6-30, "Only trace concentrations of organic carbon (up to 1.1 mg/L) have been reported in qualified measurements of Yucca Mountain groundwater . . . Even without the addition of glucose to experimental growth media, however, significant heterotrophic microbial growth was observed (Figure 6.4-4), and few isolates that were enumerated and identified from unconcentrated simulated groundwater without glucose had autotrophic capabilities (Table 6.3-1); the source of cellular carbon for growth of detected heterotrophs is, therefore, unknown."

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-75 – MICROBIALLY INFLUENCED CORROSION MODEL

NRC Staff places its response to NEV-SAFETY-75 in the category: "Not Opposed or Opposed in Part Contentions. The Staff does not oppose the admissibility of the following contentions" (Answer at 1571).

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related

subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-76 – MICROBIAL DENITRIFICATION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

Nevada agrees with NRC Staff's statement (Answer at 498) that "Nevada must demonstrate that the issue raised is material to findings the NRC must make regarding the action involved in the proceeding." The Staff attempts to forego any consideration of the issue raised in this contention by simply arguing that, no matter its outcome, it would not "make a difference" with regard to the NRC's findings because of DOE's screen-out of FEP 2.1.10.01.0A involving "microbial activity in EBS." *Id*. at 499. Such a simplistic argument does not conclude the matter. If it did, DOE would have probably raised that defense (which it did not) in its Answer to this contention and would not have sent some seven pages of text debating the merits of the analysis and conclusion of Nevada's experts (DOE Answer at 759-65). The fact is that DOE, and accordingly NRC and NRC Staff, must consider the issue of DOE's compliance with the component portions of 10 C.F.R. 63, compliance with which are prerequisite to the determination by NRC that DOE deserves a license. Significantly, NRC Staff itself acknowledges its responsibility to address DOE's compliance the very subsections of 10 C.F.R. 63 which are cited by Nevada in its contention, where it also cites the specific SAR subsections which do not meet these requirements. Thus, the Staff concedes:

> In this proceeding, the finding the Staff must make is of whether "there is reasonable assurance that . . . radioactive materials . . . can be received and possessed in a geologic repository operations area of the design proposed without unreasonable risk to the health and safety of the public; and . . . there is reasonable expectation that [radioactive] materials can be disposed of without unreasonable risk to the health and safety of the public" as required by 10 C.F.R. § 63.31(a). In particular, with respect to this contention, whether sections 63.31(a)(3)(i) and (ii), and accordingly, the performance assessment requirements of sections 63.114(b) and (c) have been met.

Id. at 498-99.

Not by coincidence, the precise subsections raised as matters of noncompliance by Nevada are 10 C.F.R. §§ 63.114(b) and (c). This contention alleges noncompliance with these regulatory provisions and therefore raises material issue within the scope of the licensing proceeding.

5. <u>A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials</u>

No reply necessary based on NRC Staff's response.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

NRC Staff here asserts its familiar charge that Nevada's submittal is merely "conclusory" and does not demonstrate that a genuine dispute exists with DOE (Answer at 499). On the contrary, while a debate on the facts pro and con the merit of this contention is premature, as stated, DOE spent seven pages arguing its side of the dispute. Nevada provided a partial response, observing that the maintenance of a high nitrate:chloride ratio in the post-closure repository is central to the DOE argument that there will be little corrosion in the post closure YM repository. "Evaluation of Potential Impacts of Microbial Activity on Drift Chemistry, ANL-EBS-MD-000038, Rev 01" (11/18/2004), LSN# DN2002308488 at 6-22: "The ratio of NO_3^-/Cl^- is an important parameter in the control of the longevity of the waste package and drip shield as engineered barriers. In principle, microorganisms could consume nitrate through

denitrification, either heterotrophically or autotrophically, under anaerobic conditions . . . This, however, will be unlikely in the repository because the overall environment will be oxic, which, together with low organic-carbon (sic) concentrations, will prevent significant anaerobic microbial reactions, including denitrification, as shown by the field observation that a significant amount of NO_3^- is currently present in groundwaters. Even if some anaerobic microenvironments may exist in rock matrix, their impact on nitrate concentration has already been captured by the current water analysis."

In the preceding quote DOE cites two conditions that "will prevent significant anaerobic microbial reactions, including denitrification," *i.e.*, oxic conditions and low organic carbon. DOE states (DN2002308488 at 6-21) that "Wang and Van Cappellen (1996 [DIRS 171057]) have shown that a typical limiting concentration of O_2 for aquatic sediments is 1 to 30 μM (approximately 0.4 to 10 percent atmospheric oxygen), above which anaerobic microbial reactions are completely inhibited." Wang, Y. and Van Cappellen, P. (1996) in their paper, "A Multicomponent Reactive Transport Model of Early Diagenesis: Application to Redox Cycling in Coastal Marine Sediments" (GEOCHEMICA ET COSMOCHIMICA ACTA, 60 (16), at 2993-3014) tested the performance of a model (STEADYSED 1) by comparing its output data to data collected by Canfield, *et al*. (1993) ("The Anaerobic Degradation of Organic Matter in Danish Coastal Sediments," GEOCHEMICA ET COSMOCHIMICA ACTA, 57, at 3867-3883 **OR** "Pathways of Organic Carbon Oxidation in Three Coastal Sediments, MAR. GEOL. 113 at 27-40) at three marine depositional sites off the coast of Denmark. Their paper was published in GEOCHIMICA ET COSMOCHEMICA ACTA, a peer-reviewed journal indicated on page 4-3 of DN2002308488 as a factor to be considered in evaluating the reliability of the data. However, the paper did not model data from Yucca Mountain. Wang and Van Cappellen (1996) state,

"The lateral heterogeneity of sediment structure and microbial populations also affects the numerical values of the limiting concentrations of electron acceptors derived from the model fits. For example, the limiting concentration of O_2 for aerobic respiration measured in biofilms is on the order of a few μM (Nielsen, et al., 1990) The model-derived value for sediments however is higher (20 μM). The discrepancy may partly reflect the fact that STEADYSED 1 horizontally averages the dissolved O_2 concentration. The oxygen concentration inside a local microenvironment must be lower than the true, physiological limiting O_2 concentration for anaerobic respiration to occur, however, the O_2 levels may be higher. Consequently, apparent limiting electron acceptor concentrations derived from measured depth profiles in a sediment are higher than the intrinsic, physiological values. It also means that the apparent limiting concentrations are, to a degree, site-dependent because the deviation between apparent and physiological limiting concentrations depend(s) on the intensities of irrigation and bioturbation." Irrigation and bioturbation are important process in marine sediments. The limiting concentrations of O_2 derived from the Wang and Van Cappellen (1996) model do not indicate values that will "completely inhibit" anaerobic reactions in sediments. Instead the limiting concentration of oxygen is that value above and below which aerobic and anaerobic reactions, respectively, will dominate. Wang and Van Cappellen (1996) use the word "inhibited" (at 2995) to refer to energetically less favorable pathways. The phrase "completely inhibited" is not used.

The reference to Nielsen, et al. (1990) by Wang and Van Cappellen (1996) is interesting because they acknowledged nitrification in the presence of oxygen. They state, " The inhibitory level of O_2 may be <1μM for some strains of denitrifying bacteria. However, a bacterium abundant in some water purification systems, *Thiosphera pantotropha,* has recently been shown

to perform both O_2 respiration and denitrification in O_2 concentrations near saturation and pure culture studies showed that the growth rate was highest when both O_2 and NO_3^- were present."

DOE has not demonstrated that organic carbon will be limiting, just that the source of organic carbon is unknown. DN2002308488 at 6-30, "Only trace concentrations of organic carbon (up to 1.1 mg/L) have been reported in qualified measurements of Yucca Mountain groundwater . . . Even without the addition of glucose to experimental growth media, however, significant heterotrophic microbial growth was observed (Figure 6.4-4) and few isolates that were enumerated and identified from unconcentrated simulated groundwater without glucose had autotrophic capabilities (Tale 6.3-1); the source of cellular carbon for growth of detected heterotrophs is, therefore, unknown."

Nevada's contention (and indeed NRC Staff's response) focused on the particular portions of the SAR whose compliance by DOE is in dispute and the particular sections of 10 C.F.R. 63 with respect to which Nevada asserts that DOE's compliance is inadequate. Nevada's contention bases far exceed NRC requirements. Moreover, a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. § 63.114 is material *per se*, and as explained in II.D. above, Nevada does not need to demonstrate that TSPA contentions (including contentions alleging that a FEP was improperly screened out) would violate EPA dose standards. As indicated in II.G. above, NRC Staff improperly shifts the burden of proof to Nevada.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes.

NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-77 – CORROSION FROM ROCK BOLT SEEPAGE

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

NRC Staff feigns not understanding why a criticism by Nevada of DOE's **preclosure analyses** can be presented as an issue impacting DOE's TSPA **post-closure**. Nevada makes clear that the initial focus of its criticism is SAR Subsection 1.3.4.4 discussing permanent ground support systems. DOE's presentation does not mention potential issues due to seepage **prior to the installation of the drip shields**. Apparently, DOE believes there is no need to address seepage prior to that time (installation of the drip shields) since there is no discussion of any calculations or modeling being performed in this regard. Nevada makes clear the relevance of its contention regarding rock-bolt seepage (and corrosion resulting therefrom) where the seepage occurs in the period before the installation of drip shields (which DOE believes would protect the waste packages from such seepage). Whatever seepage took place prior to installation of the drip shields would be available for corrosion of the waste container, even after the drip shields are installed. Accordingly, that is why the Nevada contention makes the point that 10 C.F.R. § 63.21(c)(9) requires an assessment to determine the degree to which those features, events, and processes of the site that are expected to materially affect compliance with Section 63.113 have been characterized, and paragraph (c)(15) requires an explanation of measures used to support

the models used to provide the information required in (c)(9) (Petition at 421-22). Nevada goes on to explain that DOE's failure to analyze rock-bolt seepage which might occur in preclosure would have the impact of defeating DOE's TSPA analysis for compliance with 10 C.F.R. §§ 63.113 and 63.114. This contention alleges noncompliance with these regulatory provisions and therefore raises material issue within the scope of the licensing proceeding.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff's criticism of the paucity of references by Nevada in this section is unfounded. Nevada's whole point here is an analysis which should have been made but was not made by DOE. Accordingly, since DOE is the applicant and has the burden of proving compliance with every aspect of 10 C.F.R. 63, it is not surprising that the focus of Nevada's alleged facts and opinions expressed in this section is the sections of the SAR which ought to have, but did not, contain the appropriate analysis of rock-bolt seepage by DOE. As indicated in II.G. above, NRC Staff improperly attempts to shift the burden of proof to Nevada to quantify the exact effect of an obvious phenomenon omitted by DOE in its consideration. It is DOE who has the burden of acknowledging and quantifying the impact on its TSPA resulting from rock-bolt seepage occurring prior to the time the drip shields are installed (if they ever are installed). As indicated in II.D. above, Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards, and a contention alleging that DOE’s TSPA does not comply with one or more of NRC’s requirements for a performance assessment is material *per se*.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

NRC Staff again raises its so-called "confusion" regarding whether this contention relates to inadequate performance by DOE with respect to preclosure or post-closure. Claiming that this

confusion stems from the absence of a genuine dispute, NRC Staff ignores the lengthy disputation of the issue represented by the facts and opinions argued by Nevada (Petition at 421-24) and DOE's counterarguments (DOE Answer at 770-73). Nevada's contention clearly identified its dispute as DOE's failure to consider that its super Swellex would act as a conduit into the emplacement drifts; and NRC Staff's responsive argument attempts to change the burden by requiring production of the correct model or a correct calculation of seepage by Nevada instead of DOE, the party which bears the burden of proof with respect to compliance with every aspect of 10 C.F.R. 63. DOE, and now NRC Staff, accordingly ignore the facts that Nevada has no obligation to identify alternative TSPA models to replace flawed DOE models, and as indicated in II.D. above, Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards.

DOE's summary dismissal in SAR Subsection 2.3.3 and in the references supplemental document (LSN# DEN001584824) of the potential for seepage during the post-closure period means that the discussion of the features, events, and processes that are expected to materially address compliance with the performance objectives for the post-closure period is incomplete and does not meet the requirements of 10 C.F.R. 63. Nevada's contention bases far exceed NRC requirements.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions

relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot

bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its

complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-78 – STATIC CORROSION TESTS ON ALLOY 22

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

This section contains the supporting facts and opinions of Nevada's experts. NRC Staff acknowledges that the contention is supported by affidavits of Drs. Shettel, Bath, Morgenstein, and Thorne. NRC Staff's brief criticism in this section is that one of many conclusions stated by the authors was that DOE's test conditions (for its corrosion tests on Alloy-22) were "non-conservative" (Answer at 509). NRC Staff asserts that the experts failed to cite a "reference" to prove that DOE's test conditions were non-conservative, ignoring the fact that this was an expert conclusion which they reached after citing and considering the relevant facts regarding the way the tests were conducted. Thus, Nevada's experts explained (Petition at 426-27) the reasons for their conclusions regarding the inadequacy of DOE's corrosion tests:

> These experiments were conducted in large vats at two different temperatures (60° and 90°C), but the coupons were situated below the water line, that is, under static saturated aqueous conditions (except for those coupons right at and above the water line). This is not the environment that the waste canister at Yucca Mountain will be situated; waste canisters will be placed in the mined geologic repository hundreds of meters above the water table in the vadose or unsaturated

> zone. Under realistic conditions in the unsaturated zone, the outer canister material, C-22, will be subjected to a changing temperature (up to 200°C), high humidity conditions, with dripping seepage water (once-through flow) of possibly varying chemical compositions (due to fractionation on the canisters' surface). Between drips the aqueous solutions may dry out leaving behind salt deposits that may interact with accumulated dust deposits on the canister surface. Rock fall and drip shield material may also be in contact with the outer canister material. Thus, the actual physico-chemical surface environment of the waste canisters will most likely differ significantly from the static saturated test conditions, with the result that the test conditions are therefore unrealistic, non-site specific, and non-conservative.

Nevada's contention bases and the alleged facts and expert opinions articulating them far exceed NRC requirements. As indicated in II.G. above, NRC Staff improperly shifts the burden of proof to Nevada.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

In this section, NRC Staff selects one of the numerous realistic conditions of the environment in which waste containers will be placed in the repository (which Nevada explained differed from DOE's test conditions) and attempts to claim that DOE did not fail to so test. The particular condition is temperature. Nevada had pointed out that DOE experiments were conducted at 60° and 90°C and explained why they should have been conducted at a greater variety of temperatures to mimic drift conditions at a repository. In an effort to undermine just this one out of many conditions (differing in reality in the repository from DOE's test conditions), NRC Staff focuses on temperature, claiming that DOE had "extrapolated" corrosion rates which might be experienced at temperatures other than the test conditions of 60° and 90°C. whether DOE's extrapolation is credible a separate issue: Nevada's point remains unchanged that the actual test conditions were limited to 60° and 90°C – and not realistic.

Significantly, unlike NRC Staff, DOE (DOE Answer at 781-82) did not challenge Nevada's conclusion regarding the temperatures at which tests were conducted, but rather tried to

change the burden of proof arguing that "Nevada has not attempted to determine what effect, if any, acceptance of this contention would have on doses" (DOE Answer at 782). Nevada's contention demonstrates that DOE's corrosion test methodology is inadequate to demonstrate DOE's TSPA compliance with NRC requirements for performance assessment, and this contention is material *per se*.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with

EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA,

even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-79 – STATIC GENERAL CORROSION TEST SOLUTIONS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff complains that the alleged facts and opinions offered by four Nevada experts are lacking in "outside" references, i.e., beyond their expert opinions based on a combined 100 years or more experience. Nevada experts site to the appropriate SAR subsections and are not required to do more. Their opinions are stated. As noted by NRC Staff, Nevada indeed asserts "that the water used for the corrosion test was inappropriate" (Answer at 514) and that "the use of alternate water samples would have been more appropriate." More specifically, Nevada's experts point to DOE's use of J-13 well water located far from the repository tunnel and explained that J-13 well water is a groundwater (from the saturated zone) and is therefore a non-conservative, unrealistic, and non-site-specific choice on which to base a series of test solutions. NRC Staff complains that Nevada has not **proven** the test water used by DOE was insufficient, as it apparently would have if DOE had chosen to use New York City tap water – an equally inapposite choice.

As explained by Nevada, the burden is on DOE to justify its use of a particular test solution and "there is no justification given [by DOE] that similar general corrosion rates for alloy C22 would have been obtained with the use of more conservative, realistic, and site-specific test solutions, such as pore waters or thermally evolved seepage evaporation waters" (Petition at 431). As explained in II.G. above, NRC Staff apparently wants to shift the burden of proof to Nevada inappropriately: it is DOE's burden of proof to prove that the water used in its tests is sufficiently similar to that to be found in the repository tunnel as to make the outcome relevant to its TSPA calculations. It is not up to Nevada to concoct an alternative conceptual model and measure TSPA doses using the correct information.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

Nevada's contention, alleging that DOE's TSPA does not comply with NRC's requirements for a performance assessment (due to its use of irrelevant test solutions) constitutes a clear and genuine dispute with DOE. Thus, as Nevada explains in its Section 6, DOE's experiments are not an appropriate basis on which to assess the degradation of the engineered barrier system and do not comply with 10 C.F.R. § 63.114(f) which requires that degradation, deterioration, or alteration processes of engineered barriers must be evaluated in detail if the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment would be significantly changed by their omission. This contention alleges noncompliance with these regulatory provisions and therefore raises a material issue within the scope of the licensing proceeding.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in

this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model

components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is

quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi). As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

REPLY – NEV-SAFETY-80 – LOCALIZED CORROSION, CHLORIDE BEARING MINERAL DEPOSITS AND HOT WALL EFFECTS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

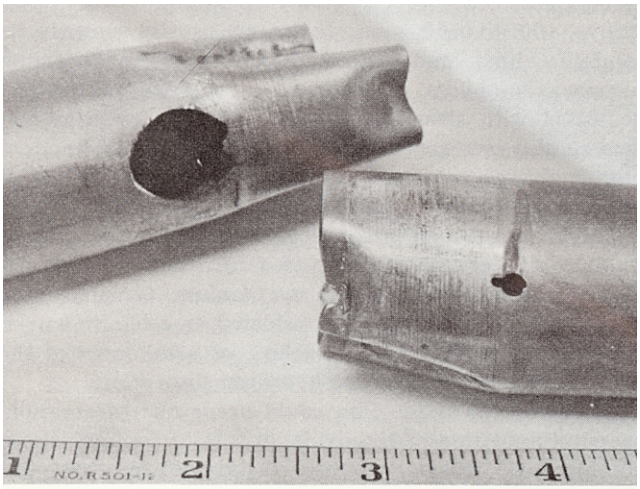
4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Contrary to NRC Staff's suggestion that this contention merely states a conclusion "without providing a reasoned basis or explanation" (Answer at 519), Nevada actually provides a detailed explanation of its rationale supported by the affidavits of three experts, Cottis, Thorne, and McMaster. As they explained, DOE has excluded localized corrosion of titanium from its TSPA, incorrectly so because the conditions likely to exist in a Yucca Mountain repository will likely result in localized corrosion of the titanium and concomitant early failure of the drip shield, relied upon by DOE in its TSPA. NRC Staff also inappropriately suggest that Nevada relies on certain publications of NACE (National Association of Corrosion Engineers) without identifying them. In actuality, the contention referred to information "**reported in**" NACE publications. This was information generated by the contention author McMaster, and it is his work that was relied on in the contention rather than the specific NACE journal articles.

A fuller explanation of McMaster's work involving titanium corrosion is appropriate: Pitting type corrosion including crevice and under-deposit corrosion are the most commonly encountered forms of titanium failures in industrial exposures.



The photograph at the left, reproduced from a magazine article but originally taken by the Nevada expert J McMaster following inspection of the equipment after the reported failure, shows tubing from a brine heat exchanger that failed a few weeks after installation. In this case the brine (nominally 130°C) was on the inside of the tube and steam on the outside, creating the same hot wall effect that will occur due to the higher temperature of the decaying material in the waste package. The tube material was unalloyed titanium Grade 2 and the tubesheet 70-30 copper nickel. The corrosion is believed to have initiated at localized iron deposits on the inside surface of the tube that resulted from tube rolling and also from iron at the tube ends that resulted from striking the end of each tube with a ball peen hammer to create a small protrusion keep the tubes from falling through the top tubesheet during installation. The term "believed" is used because the original iron deposit would have been in the now absent material that corroded, and because similar corrosion occurred on the tube ends where the only cause that could reasonably be postulated was iron from the poor installation practice. As the iron corroded, the resulting iron corrosion product created a deposit on the surface of the material, resulting in under-deposit corrosion conditions with some hot wall effect (metal temperature would have been above the temperature of a clean surface in the absence of the insulating deposit). A field repair was affected by

plugging and abandoning those tubes that had through wall pitting and carefully rotary filing the corrosion product on the tube ends, exercising care to avoid further iron contamination or burrs on the surface that might generate small crevices to again initiate corrosion.

Note that there was no general corrosion observed on the tube inside surface, and none in the short exposed end of the tube. Note also that there is no corrosion in the creviced area where the tube was rolled into the tubesheet (the outside surface that has the surface marking). This illustrates the effect that some positive metal ions (in this case Cu^{++} and Ni^{++}) can have in suppressing corrosion of titanium in a crevice that otherwise would have been expected to corrode. Crevices that cannot provide those ions, such as Teflon washers in test spools or some mineral deposits from seepage waters on a surface are far more likely to corrode.

Of the roughly 1000 tubes in the evaporator, only about 25% suffered the failures on the tube ends from the ball peen hammer. Less than 20 tubes exhibited the kind of through wall failure shown in the photograph. The total surface area of the 1 1/4" diameter x 360" long tubes is roughly 1,413,000 square inches. Assuming as a basis corrosion of 20 tubes with holes say 1/2" diameter, i.e. an area of about 2 square inches, or 0.0000028 of the total area, this is equivalent to the weight loss in a corrosion test where weight loss is used as a means to estimate the corrosion rate. If it is assumed that the failure occurred within 3 months, this translates to something like 0.00007 mm per year general corrosion rate.

Under these specific corrosion conditions, it is considered that Grade 7 titanium would not have corroded, even with the iron deposits that are believed to have initiated the corrosion. However, failure of Grade 7 could have occurred if the temperature been somewhat higher, e.g. in excess of 260°C.

This is hardly an isolated case. The Nevada expert J. McMaster worked with several petroleum refineries that had titanium failures under salt deposits that formed on the outside of crude overhead exchangers when the units were drained and dried for maintenance. On restarting, when the tubes were exposed to higher temperature from steam on the inside surfaces, the same type of rapid, scattered, random through-wall penetration failures were observed.

In testing, this type of failure would not occur on bulk clean surfaces. It might have been indicated in Teflon crevices if the test media temperature were adjusted for the hot wall effect. The term "might" is used because at a temperature of, say 120°C, no crevice corrosion would be expected in such a crevice, but, at 130°C, crevice corrosion almost certainly would have occurred.

The purpose of the photograph and this example is to show that:

1. Pitting (of which under-deposit corrosion is a sub-set) can produce very rapid rates of penetration in titanium.
2. Pitting has no correlation to general corrosion rates measured on the basis of weight loss of the material.
3. Pitting is random.
4. General corrosion rates used to predict pitting are a poor measure of the potential for or damage from pitting corrosion, particularly when the results are to be extrapolated for thousands of years.

DOE should ascertain by actual tests of deposits formed (from real or realistically simulated seepage waters) on hot wall titanium Grade 7 surfaces (simulating a heat source like the decaying nuclear residue) what temperature will cause a failure, and to what temperature titanium is immune to this type of attack.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

NRC Staff's criticisms in this section are unavailing. Nevada's partial response to the disputed issues discussed in Section 5 above should be considered replicated in this Section 6. A

contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.113 and 63.114 is material *per se*. The partial debate framed by DOE's answer to this contention and the above discussion in Section 5 make clear the depth of the genuine dispute Nevada has with DOE on this issue.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these

requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in

defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi). As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

REPLY – NEV-SAFETY-81 – HYDROGEN UPTAKE RESULTING FROM GENERAL CORROSION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Evidence that NRC Staff fully understands the alleged facts and expert opinion provided by Nevada in this section is evident from its ability to paraphrase the issue raised by Nevada: DOE failed to consider the effects of localized embrittlement, and DOE consequently fails to consider the increased risk for brittle fracture of the drip shield. Nevada's experts explain the embrittlement phenomenon, but NRC Staff, acknowledging it may show DOE's analysis is flawed, points out that Nevada has not calculated the effect of DOE's mistake with respect to the TSPA. Nevada would show that it is not required to demonstrate that TSPA contentions would result in a violation of the EPA dose standards. Likewise, when Nevada alleges with factual and expert support that a TSPA contention would preclude a finding of reasonable expectation of safety, it is DOE's burden and not Nevada's to calculate the effect of the scientific phenomenon established by the contention. As indicated in II.G. above, NRC Staff improperly shifts the burden of proof to Nevada.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

Seeking to avoid the focus of Nevada's contention, NRC Staff argues in this section that the very DOE document relied upon by Nevada to show DOE failed to consider the effects of localized embrittlement in fact "does address the issue of absorption of hydrogen" (Answer at 526). NRC Staff misses the point. As a matter of fact, Nevada itself specifically recognized (Petition at 440) that in the document cited "the absorption of hydrogen accompanying corrosion is described on page 4-1." Ignored by NRC Staff is the remainder of Nevada's point: "DOE has allowed 1 or 2 mm corrosion allowance, which as it is "consumed" will cause hydrogen concentrations to increase in the titanium. However, DOE fails to demonstrate that the hydrogen absorbed during general corrosion (of the corrosion allowance) will not result in hydride formation, with its consequent effects on component integrity." *Id*. NRC Staff accordingly tries to make a point already acknowledged by Nevada and fails to address the corollary problem issue identified in the same document by DOE and in the same section of its contention by Nevada. The issue in dispute in this contention relates directly to DOE's ability to show its compliance with 10 C.F.R. §§ 63.113 and 63.114 (Petition at 439) prerequisite to an adequate TSPA and to licensure of DOE.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that

Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all.

Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information

provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-82 – CORROSION OF THERMALLY OXIDIZED TITANIUM

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff cannot seriously assert a challenge in this section because Nevada's contention is amply supported by alleged facts and expert opinions. Instead, NRC Staff attempts to change the burden of proof, as explained in II.G. above, in full recognition of the issue raised by Nevada. Thus, NRC Staff acknowledges the point of the contention as "the fact that the corrosion tests [by DOE] were not done on the thermally thickened oxidized titanium under long-term conditions involved in the repository" (Answer at 530). Then, NRC Staff observes that, other than Nevada concluding "there will be decreased corrosion performance," "Nevada does not itself make an assessment" (*id.*) quantifying the impact on corrosion. For the reasons given by Dr. Thorne, it is not possible for Nevada to do that; but more importantly, it is DOE's role and DOE's burden to establish the types and rates of corrosion impacting its engineered barrier system at a proposed repository.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverter</u>

Nevada's "genuine dispute" is clearly stated, and its clarity is confirmed by NRC Staff's restatement of the issue in this section: "Nevada's basis for the contention appears to be that because actual drip shield corrosion (of thermally oxidized titanium) under repository conditions is "unknown" that the application is deficient" (Answer at 531).

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that

Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all.

Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information

provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-83 – ADEQUACY OF METHODS OF GENERAL AND LOCALIZED CORROSION TESTING OF THE DRIP SHIELD

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Nevada provides substantial facts and expert opinion supporting its challenge to the corrosion testing methods used by DOE for general and localized corrosion of the drip shields. NRC Staff itself acknowledges Nevada's issue as "a lack of description of replenishment of solutions or of tests of alternate aeration conditions leads one to believe this important practice in titanium corrosion testing was not considered in the DOE tests described" (Answer at 536). NRC Staff chides Nevada for not providing "research data" to fill in the gaps left by DOE, but this is not Nevada's responsibility since DOE bears the burden of proof. As indicated in II.G. above, NRC Staff improperly shifts the burden of proof to Nevada.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should

have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

Nevada's "genuine dispute" with DOE is recognized and paraphrased by NRC Staff in this section as a challenge to "various aspects of the corrosion testing methods used by DOE for general and localized corrosion of the drip shield as described in SAR Subsection 2.3.6 and similar subsections" (Answer at 537).

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail

in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-84 – USE OF DIFFERENTIAL WEIGHT LOSS TO ESTIMATE VERY LOW CORROSION RATES

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

The dispute articulated by Nevada and acknowledged by NRC Staff in this section is a challenge to the use of differential weight loss measurements by DOE to project general and localized corrosion. Specifically, those test methods are not accurate enough to provide the basis for extrapolation to predict drip shield performance over thousands and thousands of years. While NRC Staff does not disagree with Nevada that "alternative testing methods will yield more accurate results" (*id*. at 542), NRC Staff criticizes Nevada for not employing such alternative methods and reciting its results. This is another effort by NRC Staff to change the burden of proof away from DOE who has the obligation to establish its compliance with every aspect of 10 C.F.R. 63, including specifically those aspects of 10 C.F.R. 63 which feed into

DOE's TSPA and to the ultimate determination to be made by NRC as to whether unreasonable risk to the health and safety of the public is avoided. It is not the burden of Nevada to adopt, implement, and prove alternative conceptual models – this is DOE's burden of proof. *See* II.G., above.

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff

recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose

standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes.

NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-85 – DECLINING CORROSION RATE OVER TIME

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

The only way in which NRC Staff concludes that the issue raised by Nevada is not material to the findings the Commission must make is by missing the point of the issue entirely. As pointed out by Nevada, SAR Subsection 2.3.6 asserts that the general corrosion rate of metals and alloys is known to **decrease with time**. On this basis, DOE concludes that its corrosion model is conservative. Nevada, for its part, in this contention challenges the validity of the DOE tests relied upon. As a consequence of DOE's tests showing corrosion rates to decline over time being **invalid**, Nevada remarks that since the basis of DOE's conclusion of conservatism is wrong, DOE's conservative assertion is wrong. But the focus of the contention, obviously, is on the invalidity of DOE's test methods regarding corrosion rates, which are not credible. NRC Staff somehow misses that point and focuses only on conservatism, claiming that DOE is not required to prove conservatism. Nevada's contention asserts that DOE's corrosion tests and therefore its TSPA do not comply with NRC's requirements for a performance assessment, and this contention is material *per se*.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff does not challenge in this section the fact that Nevada has provided alleged facts and expert opinion supporting its contention. Instead, NRC Staff first correctly states the focus of Nevada's challenge ("DOE's determination that corrosion rates decrease over time") (Answer at 546); but then suggests that Nevada did not use "alternative testing methods" to provide different data. *Id*. at 547. If Nevada demonstrates the invalidity of DOE data used in the TSPA, it does not have the further burden to concoct alternative conceptual models to provide substitute results. As explained in II.G. above, Nevada does not have the burden of proof here, but DOE does.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

The genuine dispute raised by Nevada in this contention has been stated by **both** Nevada in the preceding two sections and by NRC Staff itself in the preceding two sections of its response to this contention as well as in this section. NRC Staff provides a slightly different but adequate paraphrase of the genuine dispute in this section: "NEV-SAFETY-85 challenges the validity of DOE corrosion test results reported in SAR Subsection 2.3.6 and similar subsections, because Nevada claims that the testing methods are invalid.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by

DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and

because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

REPLY – NEV-SAFETY-86 – ROLE OF ROCK DUST ON CANISTER SURFACES IN LOCALIZED CORROSION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff criticizes the conclusions reached by Nevada's experts (after its discussion of alleged facts, analysis, and conclusion), which fails to recognize the details stated in Nevada's opinion. Specifically, the issue raised by Nevada is a challenge to DOE's SAR model for localized corrosion based on the contention that "rock dust can form crevices on C-22 and Ti-7 surfaces that are favorable environments for localized corrosion" (Petition at 464). DOE's model for localized corrosion is inadequate because it does not account for dust that can form crevices favorable for corrosion. *Id*. Nevada addresses this matter in detail (*id*. at 466), pointing out that "nowhere within the SAR does DOE actually state that dust can form crevices." The contention explains that the State of Nevada has laboratory evidence (citations omitted) demonstrating that crevices may form on the waste package below mineral scales, corrosion products, and rocks. *Id*. Accordingly, Nevada has provided alleged facts, opinions, and the rationale for those opinions in its contention.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

NRC Staff tries to deny the existence of a genuine dispute by asserting that Nevada's statements regarding the alleged inadequacy of DOE's analysis are simply "conclusory" (Answer at 553). On the contrary, as indicated in Section 5 above, Nevada has explained its precise rationale for its contention and for the inadequacy of DOE's model for localized corrosion. It is DOE's responsibility and not Nevada's to ensure the correctness and completeness of its corrosion testing models. As indicated in II.G. above, NRC Staff improperly shifts the burden of proof to Nevada.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA

would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-

526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-87 – INTERGRANULAR SCC CORROSION DURING DRY-WET CYCLE

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Not only did Nevada provide alleged facts, analysis, and expert conclusions in this section supporting its contention, but it conducted laboratory experiments on the subject which more closely simulated actual repository conditions that did DOE's. As recognized by NRC Staff, the issue raised by Nevada is its challenge to "the validity of DOE's treatment of SCC of C-22 because DOE has failed to consider the effect of dry-wet drip cycling in the SCC model abstraction" (Answer at 556). The Staff accurately went on to explain that Nevada based its conclusion on its own experiments in cyclic dripping and dry out (citation omitted). NRC Staff complains nonetheless that "the underlying basis for the contention rests solely upon the assertion that Nevada's experiments approximate the drift environment better than those done by DOE." *Id*. at 557. It is difficult to think what more Nevada could have done to comply with the requirements of Section 5 in providing the expert basis supporting its contention. As indicated in II.G. above, NRC Staff improperly shifts the burden of proof to Nevada.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

Nevada's statement of its genuine dispute is clear. NRC Staff's statement of the dispute raised by Nevada is likewise clear in this section. Specifically, Nevada challenges the validity of DOE's SCC findings as described in SAR Subsection 2.3.6.5 and similar subsections because DOE failed to consider wet-dry drip cycling inter-granular corrosion "thereby underestimating the environmental for C-22 stress-corrosion cracking." (Petition at 472; Answer at 557-58). NRC Staff accurately observes that Nevada claims "its experiments more closely approximate the emplacement drift conditions," and this is the core of the genuine dispute.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA

would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-

526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-88 – THERMODYNAMICS OF COMPLEX DELIQUESCENT SALT REACTIONS DURING C-22 CORROSION

NRC Staff places its response to NEV-SAFETY- in the category: "Not Opposed or Opposed in Part Contentions. The Staff does not oppose the admissibility of the following contentions" (Answer at 1571).

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions

relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot

bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately.

Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

REPLY – NEV-SAFETY-89 – INHIBITION OF C-22 CORROSION BY HIGH NITRATE TO CHLORIDE RATIO

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff here does not contest the fact that Nevada has not provided alleged facts, analysis, and expert opinions to support its contention. This is what 10 C.F.R. § 2.309(f)(1)(v) expects. Nonetheless, NRC Staff goes on, recognizing the focus of Nevada's criticism of DOE's corrosion experiments that they do not replicate waste emplacement drift conditions (Answer at 562). Nevada explains the tests which it conducted replicating waste emplacement drift conditions, and NRC Staff concedes that the contention "is partially supported by the corrosion test results under evaporation/dripping conditions of pore water sponsored by the State of Nevada" (*id.*), but then suggests that Nevada does not explain why its test conditions more closely approximated the waste emplacement drift conditions. This is simply not true. In Nevada's Petition (at 480), Nevada pointed out that DOE's simulated C-22 test waters are:

> not representative of Yucca Mountain unsaturated zone fracture flow groundwater in either chemical composition or mode of delivery (which will be drip or flow) to the C-22 waste package; consequently, DOE nitrate-to-chloride ratio corrosion

> inhibition data have not addressed the environmental conditions to which C-22 will be exposed and the results obtained from those experiments are not supported by State of Nevada unsaturated zone drip experiments (*see* "Experiments Devised to Study Temperature and Geometry Effects of Corrosion of C-22 Alloy" (04/23/2008), LSN# NEV000005235 at 1-17) that do represent the appropriate environment.

Nevada has fully provided its rationale and its contrary test results conducted under realistic drift conditions.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

The genuine dispute existing with the applicant regarding the inapplicability of DOE's experiments to actual repository conditions and the comparative realistic Nevada experiments is discussed in Section 5 above and in Nevada's contention (Petition at 480-85).

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. §

2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain

composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is

quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

REPLY – NEV-SAFETY-90 – EFFECTS OF ROCK BOLT ON C-22 AND Ti-7 CORROSION REACTIONS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff makes the observation that it can distinguish two issues raised by Nevada which could have been raised in separate contentions. Nevada believes that the two are so related as to be appropriately considered in a single contention. Nevada has also amply supported its alleged facts and analyses with expert opinions. NRC Staff persists in arguing on the merits, contending that, even though there will be deterioration of rock bolts and crevices formed are acknowledged to promote corrosion (Answer at 567), nevertheless, Nevada does not provide calculations of "how extensive the rock-bolt deterioration will be or how quickly it will occur." That is not Nevada's burden to calculate, but DOE's. As indicated in II.G. above, NRC Staff improperly shifts the burden of proof to Nevada. As Nevada demonstrates, DOE failed to consider that debris from rock-bolt corrosion will accumulate on the drip shield and on the C-22 canister and will be deleterious to both. This is something DOE ought to have calculated, not Nevada, for it is DOE which bears the burden of proving its compliance with every aspect of 10

C.F.R. 63, including the provisions cited by Nevada (10 C.F.R. §§ 63.113, 63.114, and 63.115) relating to its TSPA demonstration of compliance.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

The genuine dispute raised by Nevada is clear and simple: DOE has failed to consider the effects of rock-bolt corrosion on the engineered barrier system. The NRC Staff insists that Nevada should have calculated the precise impact on the TSPA resulting from the deleterious effects of rock-bolt corrosion and its consequent debris. This was a responsibility which DOE had, but failed to acquit.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA

would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-

526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-91 – REPRESENTATIVENESS OF C-22 AND Ti-7 CORROSION TESTING METHODS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff does not deny that, as required by 10 C.F.R. § 2.309(f)(1)(v), Nevada has provided alleged facts, analyses, and expert opinion supporting its contention. Rather, as discussed in II.G. above, NRC Staff attempts to change the burden of proof, removing it from DOE and placing it upon Nevada to calculate the TSPA consequence of the acceptance of the contention. A contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, and Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards, as indicated in II.D. above. NRC Staff recognizes the point of the contention: that DOE's corrosion test environments fail to use test methods and hydrogeochemical compositions that capture the conditions and chemistries to which C-22 and Ti-7 are expected to be exposed in the emplacement drifts in the proposed repository. (NRC Staff suggests that the contention deals with multiple issues, because it enumerates several physical or chemical aspects, but Nevada's

conclusion was that this contention should encompass the whole of the drift environment and DOE's failure to use it accurately in its corrosion testing.)

Despite recognizing the issue raised by Nevada and acknowledging its expert opinion support, NRC Staff makes the suggestion that Nevada must show that it would be more appropriate for DOE to replicate repository conditions than use some totally unrelated conditions, i.e., the use of unrelated water, in its corrosion experiments. It is axiomatic that the "laboratory conditions" used in any experiment used to predict results in the field, must replicate the conditions existing in the field, or they are meaningless prognosticators. NRC Staff also attempts to shift the burden to Nevada suggesting that, even though Nevada catalogs numerous alleged deficiencies in the DOE program, Nevada "does not calculate regarding their potential impact on drip shield and waste package lifetime" (Answer at 574). It is DOE, not Nevada, which has this burden.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

The genuine dispute raised by this contention is discussed above in Section 5, as well as in Sections 5 and 6 of the NRC Staff's response. The core of the dispute is DOE's failure to conduct corrosion experiments which replicate the conditions, chemistries, and environment to which C-22 and Ti-7 are expected to be exposed in the emplacement drifts of the repository. While NRC Staff incorrectly asserts that Nevada should have calculated TSPA doses, should alternative conditions, chemistries, and events have been assumed, this is an incorrect shifting of the burden of proof. It is DOE who has the burden to prove its compliance with every aspect of 10 C.F.R. 63, including those specifying the details of its TSPA compliance proofs. This is prerequisite to an NRC determination that DOE is entitled to licensure under 10 C.F.R. §§ 63.31(a) and (b).

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

REPLY – NEV-SAFETY-92 – IMPACTS OF FLUORIDE DUE TO BREACH OF HLW CONTAINERS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff acknowledges that alleged facts, analyses, and opinions have been provided, but disputes their weight or merit. NRC Staff also attempts to shift the burden of proof from DOE to Nevada, as explained in II.G. above. Thus, in response to a Nevada assertion that the failure of one or more HLW waste glass containers can affect the fluoride ion concentration in aqueous and vapor phases within the emplacement drift (Petition at 499-500), NRC reacts by insisting that Nevada should calculate "the magnitude, timing, and mechanism of fluoride release" (Answer at 577). NRC Staff, in other words, does not deny the phenomenon of likelihood of fluoride release and impact therefrom, but tries to place the burden on Nevada rather than DOE to calculate the impact of this phenomenon on DOE's TSPA, something which DOE has the burden to prove.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention

requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

The genuine dispute asserted by Nevada addressed by DOE and NRC Staff in their responses is discussed in Section 5 and in Nevada's Petition (at 498-500). As explained, it is the failure of DOE to account for the release of chemicals in the drift by early degraded EBS components.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention

relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose

standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes.

NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-93 – NATURAL LEAD REACTIONS ON C-22

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff recognizes the issue raised by Nevada and supported by facts, analysis, and expert opinion. The issue in the contention relates to DOE's failure to account for the deleterious effects of remobilized lead impacting the waste container surfaces. Nevada explains three different ways in which lead could be deposited on the C-22 waste containers, only one of which NRC disputes on the basis of a DOE FEP screen-out. The real focus of the Staff's criticism is one which illustrates its effort to turn the burden of proof on Nevada, as explained in II.G. above. Specifically, NRC Staff expects (Answer at 583) Nevada to provide data on the lead concentrations likely to occur and the calculation of their deleterious effect on the waste containers. These are matters which DOE was required to, but failed to, account for in its TSPA analysis.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention

requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

The nature of the genuine dispute is explained by Nevada in this section of its contention, as it had also been in Section 5. NRC Staff incorrectly states that Nevada does not provide any "explanation for how these processes might occur" (Answer at 584-85) referring to the mobilization of lead and its deposit on the C-22 waste containers. This is simply incorrect, as the processes have been described by Nevada in its contention (Petition at 503-05). More to the point, NRC Staff denies that a genuine dispute exists unless Nevada calculates the exact effect on DOE's TSPA results which might be occasioned by the phenomenon addressed in the contention. This represents an unlawful shifting of the burden of proof away the applicant.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the

impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally

flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-94 – SIGNIFICANCE OF MINERAL CRUSTS IN C-22 CORROSION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff does not deny that Nevada has provided facts, analyses, and expert opinion supporting its contention as required by 10 C.F.R. § 2.309(f)(1)(v). Rather, the focus of NRC Staff's criticism is that Nevada's analysis assumes the alternate drying and rewetting of the waste container, while DOE's studies assume "immersion" or a constant flow of water. This is frankly astounding, in view of the fact that DOE's whole premise for repository infiltration and corrosion calculations presumes that water will enter the repository drift in almost *de minimis* quantity. Accordingly, for DOE to conduct corrosion tests under conditions of full immersion in water makes no sense; the analysis of Nevada's experts is consistent with DOE's assumptions of the extremely limited amounts of water available. Significantly, NRC Staff exhibits the degree to which its analysis is not even-handed by arguing that Nevada has not proven the basis for its alternating wet/dry scenario; at the same time, it raises no question whatsoever with DOE's preposterous assumption of full immersion of waste containers. NRC Staff accordingly sets a

higher standard for its consideration of Petitioner than its consideration of the applicant. NRC Staff again attempts to move the burden of proof to Nevada, as explained in II.G. above, criticizing it for not calculating the specific difference which would eventuate in DOE's TSPA, should the contention be accepted. It is DOE, not Nevada which has the burden of proving compliance with every aspect of 10 C.F.R. 63 in order to get a license.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

NRC Staff simply reasserts the same statements it made in its Section 5, and accordingly, Nevada begins by adopting its reply comments from Section 5 above, and would add the following. NRC Staff attempts the burden of proof switch again in this section, but this time under the rubric of "genuine dispute," suggesting that, unless Nevada can calculate how different the results would be from DOE's TSPA submission, it has not demonstrated a "genuine dispute." This burden shifting is unlawful.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing

technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond,

each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-95 – PEAK THERMAL PERIOD SEEPAGE AND CORROSION

NRC Staff places its response to NEV-SAFETY-95 in the category: "Not Opposed or Opposed in Part Contentions. The Staff does not oppose the admissibility of the following contentions" (Answer at 1571).

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions

relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot

bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information

provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi). As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

REPLY – NEV-SAFETY-96 – SALT PRODUCTION AND C-22 CORROSION DUE TO HEAT-PIPE CONDITIONS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff acknowledges Nevada's analysis of this issue contained in its Section 5, and does not even disagree in principal. NRC Staff observed that "Nevada postulates that three processes would be affected by heat pipes: evaporite production, seepage into drift, and redistribution of flow in the rock" (Petition at 520). NRC Staff concedes: "This statement describes a well-known process and as such the Staff does not oppose the contention based on that statement" (Answer at 594). NRC Staff does criticize Nevada for not calculating the impact the phenomenon would have on corrosion and its difference from DOE's estimation of the corrosion effects. The point of the contention is a criticism of DOE's failure to adequately consider a known phenomenon conceded by NRC Staff. To suggest that Nevada must recalculate the corrosion analysis incorrectly made by DOE would shift the burden of proof unlawfully, as explained in II.G. above.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

The genuine dispute raised by Nevada is articulated in Section 5 above. To state it more specifically:

> SAR Subsections 2.3.6, 2.3.2.2.2.6, and similar subsections, which describe the corrosion of C-22 and Ti-7 and the formation of heat-pipes, fail to recognize that convection cells formed during DOE anticipated heat-pipe conditions can produce extensive deposits of evaporites that can affect water delivery to the drip shield and waste package and can provide large quantities of deliquescent salts to the in-drift environment affecting the lifetime calculations of C-22 and Ti-7. These processes are of major potential importance in determining the lifetime of EBS components and are not addressed in the license application.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA

would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-

526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-97 – CREVICE CORROSION ON C-22 DUE TO DRIP SHIELD CORROSION DEBRIS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff begins by suggesting that this a multifarious contention. Nevada disagrees, believing that it has a clear singular focus and that the aspects characterized by NRC Staff as other issues are assumptions made by Nevada's experts supporting the primary issue, to wit: DOE's corrosion models fail to recognize that the degradation of the drip shields will cause a debris field that collects on the surface of the waste containers and this debris field can accelerate C-22 corrosion resulting in degraded performance of the EBS. As Nevada points out, DOE's analysis was based on immersion rather than dripping of unsaturated zone seepage water. There is no analysis or scenario in which the waste packages were completely immersed in water, and yet, this is the scenario DOE employs in its corrosion tests. Nevada's experts assume seepage into the tunnel via drips and a concomitant wet/dry sequence in assessing corrosion of the waste container should apply. As stated by Nevada (Petition at 525), "The drip shield is actually named on the basis that it is designed to divert the dripping of unsaturated zone seepage water. It

was not named 'the immersion shield' for very good reasons. DOE experimentation needed to be performed on the basis of the projected environment in the emplacement drifts. It is anticipated that dripping conditions on the 'drip shield' will result in the following environmental characteristics that are not taken into account in the DOE analysis . . ." NRC Staff (Answer at 600) asserts that Nevada's assertion that DOE's testing methods are inappropriate because they do not mimic in-drift conditions are somehow "unsupported." Nevada and its experts stand by their assumption, which is consistent with every other DOE and NRC Staff prognostication with respect to non-immersion of waste containers in the tunnel. If DOE wants to change its LA to reflect an assumption of total immersion of the repository drifts, it should do so. Absent that, the assumptions and analyses of Nevada's experts are correct.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

The genuine dispute articulated by Nevada and correctly paraphrased by NRC Staff are discussed by NRC Staff and are belabored in Section 5 of both NRC Staff's response and this reply, and need not be repeated, other than to observe that they constitute an obvious genuine dispute concerning the inadequacy of DOE's corrosion test conditions.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with

EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA,

even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-98 – RATE OF DRIP SHIELD INTERCONNECTION CORROSION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff correctly perceives the issue that the crevices formed by the intersection between drip shield plates are situated such that they are likely to intercept drips and have the capability to provide environments in which SCC would occur (Petition at 529; Answer at 605). Nevada takes issue with DOE's exclusion of this phenomenon (FEP) on the basis of immersion experiments, instead of what should have been anticipated to occur at the repository – wet/dry alternating conditions using fracture flow of unsaturated zone water (Petition at 529-30). NRC Staff makes the surprising suggestion that Nevada has not proven that alternating wet/dry conditions are more likely to occur at the repository than total immersion. No analysis of repository conditions by either DOE or NRC Staff has **ever** suggested total immersion in the drift tunnel; accordingly, Nevada's experts are prudent in assuming the wet/dry alternating conditions likely to occur rather than the immersion conditions that even DOE would not claim are realistic, despite its using them. NRC Staff again attempts to change the burden of proof,

arguing that Nevada's experts should justify **their** assumption, but never suggests that DOE should justify its experiments conducted in inconceivable **immersion** conditions. *See* II.G. above.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

Nevada and NRC Staff have both clearly articulated the genuine dispute regarding the methodology of DOE's corrosion tests and the impropriety of its reliance on immersion tests in prior sections of the Nevada contention and the NRC Staff response. These are adopted by reference in this section.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA

would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-

526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-99 – BORIC ACID PRODUCTION FROM HLW DISSOLUTION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff acknowledges the Nevada experts by name and the fact that they have provided alleged facts and their opinions. NRC Staff inappropriately and prematurely debates the conclusions of those experts. Those expert opine that boric acid forms from the dissolution of HLW glass waste and that "dissolved boron will be released into the in-drift environment" (Petition at 533). The issue raised in the contention is DOE's failure to recognize the potential corrosive role such dissolved boron releases will create. NRC Staff again is critical of Nevada's expert opinions because they do not take another step and calculate the specific effect of the dissolved boron or its magnitude or timing. These are matters ignored by DOE which DOE was responsible to address and did not. NRC Staff's effort to change the burden of proof to Nevada, as explained in II.G. above, is unavailing.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention

requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

The genuine dispute raised by this contention (the corrosive role of dissolved boron) is framed by both the NRC Staff response and Nevada's reply as articulated in Section 5 above.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail

in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-100 – GROUND SUPPORT COMPONENTS AND IN-DRIFT MODELING

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff does not deny the presence in this contention of alleged facts, analyses, and expert opinions provided by Nevada. Rather, it debates the conclusions of those opinions. The fact that NRC Staff understands the issue is confirmed by its paraphrase: "NEV-SAFETY-100 asserts that DOE's corrosion analysis and description of the in-drift chemical environment is inadequate because it does not account for potential degradation of the ground support system" (Answer at 618). NRC Staff attempts to transfer the burden of proof, as explained in II.G. above, however, by suggesting that it should provide data including calculation of corrosion results which would illustrate the degree to which DOE's consideration of this issue (which it failed to consider) would change DOE's TSPA results. Nevada does not have the capability or obligation to recalculate DOE's TSPA dose calculations. To require the same would be to require an unlawful shifting of the burden of proof.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

NRC Staff says nothing new in Section 6 which it had not stated in Section 5. The genuine dispute (DOE's failure to consider tunnel debris from ground support components) has been clearly articulated, both by Nevada and by NRC Staff in Section 5 (Answer at 618).

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff

recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose

standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes.

NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-101 – SULFUR ACCUMULATION AT THE METAL-PASSIVE FILM INTERFACE

NRC Staff places its response to NEV-SAFETY-101 in the category: "Not Opposed or Opposed in Part Contentions. The Staff does not oppose the admissibility of the following contentions" (Answer at 1571).

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions

relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot

bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately.

Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

REPLY – NEV-SAFETY-102 – SULFUR ACCUMULATION AND LOCALIZED CORROSION

NRC Staff places its response to NEV-SAFETY-102 in the category: "Not Opposed or Opposed in Part Contentions. The Staff does not oppose the admissibility of the following contentions" (Answer at 1571).

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions

relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot

bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information

provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi). As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

REPLY – NEV-SAFETY-103 – SULFUR ACCUMULATION AND STRESS CORROSION INITIATION

NRC Staff places its response to NEV-SAFETY-103 in the category: "Not Opposed or Opposed in Part Contentions. The Staff does not oppose the admissibility of the following contentions" (Answer at 1571).

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions

relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot

bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information

provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi). As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

REPLY – NEV-SAFETY-104 – SULFUR ACCUMULATION AND STRESS CORROSION PROPAGATION

NRC Staff places its response to NEV-SAFETY-104 in the category: "Not Opposed or Opposed in Part Contentions. The Staff does not oppose the admissibility of the following contentions" (Answer at 1571).

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions

relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot

bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information

provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi). As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

REPLY – NEV-SAFETY-105 – DRIP SHIELD CORROSION ENVIRONMENT

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff acknowledges both the general and the specific issues raised and opinions offered by Nevada's experts. In the general sense, Nevada's experts opined that DOE fails to provide a realistic model of the corrosion behavior of the drip shield because its analyses are based on inappropriate testing conditions. In the more specific sense, Nevada contends that "DOE's reliance on bulk liquid environments under isothermal conditions is not as severe a corrosive condition as would be 'cooler liquids dripping onto a relatively hot metal surface and evaporating'" (Answer at 624). Nevada is critical of DOE's corrosion tests based on immersion instead of dripping. NRC Staff criticizes Nevada for describing the results of alternating wet/dry conditions on corrosion (as opposed to full immersion) because those tests were conducted on Alloy-22. Nevada makes this argument by analogy due to the unavailability of similar test results from Ti-7.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

NRC Staff's arguments under Section 6 are the same as in Section 5, and accordingly, Nevada adopts its Section 5 reply here. The genuine dispute with DOE, as explained, related to its inappropriate corrosion test methods.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff

recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose

standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes.

NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-106 – WASTE CONTAINER CORROSION ENVIRONMENT

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff's criticism here is directed not at the absence of alleged facts, analyses, and expert opinions by Nevada, but rather a debate on their content. As indicated in II.A. above, Nevada's expert opinion affidavits are in proper form. NRC Staff's response acknowledges both the general and specific foci of Nevada's contention. Thus, the general focus is that DOE fails to provide a realistic model of the corrosion behavior of the canister because it is based on inappropriate test conditions. More specifically, DOE's model of waste package corrosion and stress-corrosion cracking is not based on appropriate test conditions because it is based on bulk liquid environments instead of "more aggressive" conditions involving the dripping and evaporation of water and elevated temperatures (Answer at 630). NRC Staff admits that, in support of its position, Nevada "cites a document addressing corrosion by dripping salt solutions, and conclusions of Nevada-sponsored, cyclic unsaturated zone water dripping and dryout experiments." *Id*. Nevertheless, NRC Staff goes on to question Nevada's underlying assumption

of alternating wet/dry conditions as opposed to the total immersion conditions assumed by DOE in its corrosion tests. No model or scenario ever discussed by DOE or NRC Staff has suggested that the waste container and drip shields will ever be fully immersed; rather, the very limited seepage of water into the tunnel, which DOE and NRC Staff envision, will be *de minimis* and result in the wet/dry conditions assumed by Nevada's experts as opposed to the immersion conditions assumed by DOE. Tellingly, NRC Staff never questions the incredible scenario of full immersion within the repository, which DOE makes the basis of its corrosion tests. NRC Staff applies a higher standard to Petitioner than to the applicant.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

NRC Staff and Nevada have both articulated the genuine dispute which exists in Section 5 above, both of which discussions are adopted by reference here. NRC again criticizes Nevada in Section 6 for assuming wet/dry conditions rather than full immersion as does DOE. It should

be noted that NRC Staff never suggests or implies that full immersion is correct – that would not be credible. Rather, it simply questions the Nevada contrary assumption.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance

objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When

one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-107 – ELECTROCHEMICAL REDUCTION OF NITRATE

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

NRC Staff, without explanation, makes the conclusory statement that this contention fails to meet 10 C.F.R. § 2.309(f)(1)(iv). Given the absence of a heading and explanation, as is the format for all of NRC Staff's responses, Nevada believes that this comment was inadvertent. However, Nevada would add that its lengthy explanation under Section 4 demonstrates the specific regulatory provisions not met by DOE's proposed action and the reasons why this contention is material to the findings NRC must make in order to license Yucca Mountain.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff makes a superficial comment about the form of Nevada's affidavits in this section. Nevada's expert opinions affidavits are in proper form, as indicated in II.A. above. NRC Staff goes on to articulate both generally and specifically its understanding of the nature of the issue Nevada raises in this contention. Generally, it is that nitrate is an inhibitor of corrosion, yet DOE fails to take account in its SAR of the loss of nitrate by electrochemical reaction (Petition at 571; Answer at 636). The Staff correctly articulates Nevada's allegation more specifically that "the potential for consumption of nitrate, 'an inhibitor of passive film

breakdown,' by electrochemical reaction and that thin liquid films resulting from seepage or salt deliquescence have less nitrate with long reactions times, and change the chloride to nitrate ratio, allowing for more aggressive solutions to persist in which localized corrosion of C-22 could occur" (Petition at 572-73; Answer at 636-37). While NRC Staff does not deny the phenomenon asserted by Nevada (loss of nitrate by electrochemical reaction), nor the importance of the presence of nitrate relied on by DOE as an inhibitor of corrosion, NRC faults Nevada for not performing calculations to quantify the precise amount of nitrate reduction and impact on nitrate/chloride ratio and on corrosion. This is not Nevada's responsibility, but DOE's; DOE should have done so, but did not. To assert that Nevada should do so would change the burden of proof which is borne by DOE with respect to its compliance with every aspect of 10 C.F.R. 63. *See* II.G. above.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

The discussions in both Nevada's Petition (at 571-74) and reply Section 5 above, and NRC Staff's response in Section 5 discussed above all accept the premises that nitrate inhibits corrosion and that nitrate may be lost by electrochemical reaction. DOE's failure to consider and analyze the extent and impact of this loss is the focus of Nevada's contention and this genuine dispute.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure

requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all

possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-108 – MOLTEN SALT CORROSION OF THE CANISTER

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff makes passing criticism regarding the form of Nevada's expert affidavits in this section. As indicated in II.A. above, Nevada's expert opinion affidavits are in proper form. NRC Staff goes on to take issue with the conclusions of Nevada's experts (contending that DOE failed to consider molten salt corrosion) (Answer at 642-43). NRC Staff questions Nevada's conclusions based upon reference to DOE analyses which are not part of the LA. As indicated in II.F. above, a failure to address a technical study that is not part of the application does not violate 10 C.F.R. § 2.309(f)(1)(v).

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are

completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

While there is no question that NRC Staff acknowledges the disputed issue raised by Nevada (DOE's failure to consider molten salt corrosion), it suggests that the statement of the dispute is not sufficient in that Nevada does not perform a calculation of the quantities of molten salt which will form under repository conditions. This is an analysis that was required to be made by DOE as the applicant, DOE's failure to make which analysis is the subject of this contention. It would be an unlawful shift of the burden of proof to insist that Nevada come up with TSPA calculations when that is DOE's responsibility, in order to show its compliance with every aspect of 10 C.F.R. 63.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff

recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose

standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes.

NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-109 – MOLTEN SALT CORROSION OF THE DRIP SHIELD

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff does not deny in this section that Nevada has provided alleged facts, analyses, and expert opinions to support its contention. NRC Staff does criticize the form of the affidavits, ignoring the fact that, as indicated in II.A. above, Nevada's expert opinion affidavits are in proper form. NRC Staff then quotes and criticizes a statement made by Nevada's experts regarding something that is "well known in the corrosion community" (Answer at 648). This is expert opinion from corrosion experts with decades of experience. It is not necessary for them to provide a reference for every single sentence in their analyses, particularly when the information provided is axiomatic among those expert in their discipline. Finally, NRC Staff criticizes the failure of Nevada's experts to address a DOE analysis which is not even contained in the LA. *See* II.F. above (Answer at 649). Nevada's contention more than adequately complies with the requirements of 10 C.F.R. § 2.309(f)(1)(v).

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

The genuine disputed issue raised by this contention (relating to DOE's failure to consider molten salt corrosion) has been discussed by both Nevada in its contention and in Section 5 of this reply, as well as by NRC Staff in its response. NRC Staff merely reiterates it position from Section 5 here in Section 6, and accordingly, Nevada does the same. Nevada would also note that, again, NRC Staff attempts to shift the burden of proof to Nevada to quantify the amount of molten salts and their impact which would result from the phenomenon whose omission from the LA by DOE is the focus of this contention. The omission lies with the entity responsible for making the calculation in the first place, DOE.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in

this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model

components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is

quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-110 – ROCK BOLT CORROSION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff acknowledges Nevada's expert opinions, but questions their form. As indicated in II.A. above, Nevada's expert opinion affidavits are in proper form. NRC Staff then goes on to debate the content of Nevada's expert opinions. On the one hand, NRC Staff concedes that Nevada cites a study supporting the proposition that the stainless steel rock bolts are likely to corrode under the conditions Nevada contends (Answer at 655). But then, NRC Staff criticizes the fact that "Nevada does not address sections in the Longevity Report" (*id.*) which is a DOE study which is not contained in the LSN. As indicated in II.F. above, a failure to address a technical study that is not part of the application does not violate 10 C.F.R. § 2.309(f)(1)(v).

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are

sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

The genuine dispute between Nevada and DOE raised by this contention (inadequate consideration by DOE of preclosure rock-bolt corrosion) has been discussed by both Nevada and NRC Staff in Section 5 above.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail

in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-111 – HLW WASTE GLASS DISSOLUTION

NRC Staff places its response to NEV-SAFETY-111 in the category: "Not Opposed or Opposed in Part Contentions. The Staff does not oppose the admissibility of the following contentions" (Answer at 1571).

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that

Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all.

Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes.

NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi). As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

REPLY – NEV-SAFETY-112 – HLW WASTE GLASS DEGRADATION

NRC Staff places its response to NEV-SAFETY-112 in the category: "Not Opposed or Opposed in Part Contentions. The Staff does not oppose the admissibility of the following contentions" (Answer at 1571).

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that

Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all.

Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes.

NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi). As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

REPLY – NEV-SAFETY-113 – COMPETITIVE SORPTION IN THE UNSATURATED ZONE

NRC Staff places its response to NEV-SAFETY-113 in the category: "Not Opposed or Opposed in Part Contentions. The Staff does not oppose the admissibility of the following contentions" (Answer at 1571).

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions

relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot

bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information

provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi). As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

REPLY – NEV-SAFETY-114 – APPLICABILITY OF SORPTION DATA

NRC Staff places its response to NEV-SAFETY-114 in the category: "Not Opposed or Opposed in Part Contentions. The Staff does not oppose the admissibility of the following contentions" (Answer at 1571).

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related

subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-115 – MATRIX DIFFUSION

NRC Staff places its response to NEV-SAFETY-115 in the category: "Not Opposed or Opposed in Part Contentions. The Staff does not oppose the admissibility of the following contentions" (Answer at 1571).

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that

Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all.

Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes.

NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi). As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

REPLY – NEV-SAFETY-116 – SATURATED ZONE REDOX CONDITIONS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

Nevada explains why it believes DOE's compliance with 10 C.F.R. 63, and in particular subsections thereof pertaining to TSPA compliance, are implicated in DOE's Performance Margin Analysis ("PMA"), which Nevada asserts is unrealistic and invalid for reasons it explains. For its part, NRC Staff's position with respect to the materiality (with regard to necessary determinations by the NRC) is very simple: "the PMA is not being used by DOE to demonstrate that it meets the requirements of Part 63" (Answer at 661). Assuming NRC Staff is correct and its statement is enforced and given effect, then the PMA and its inadequacies are of less moment. However, Nevada's assertion of this contention is based upon the much less clear cut and more ambiguous statement by DOE as to the PMA and its relationship to DOE's TSPA which it relies on in the LA. Specifically, DOE says that one of these "validation activities is the corroboration of system model results with the results obtained using the PMA. The PMA provides additional confidence in the TSPA model results by examining the effect of conservatisms on the model results." SAR Subsection 2.4.2.3.2.3.2.4 at 2.4-245. Assuming NRC Staff is correct and its statement will be adopted by the Commission, then DOE will be precluded from using the PMA to demonstrate compliance with Part 63.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

No reply necessary based on NRC Staff's response.

REPLY – NEV-SAFETY-117 – RADIONUCLIDE SORPTION IN THE SATURATED ZONE

NRC Staff places its response to NEV-SAFETY-117 in the category: "Not Opposed or Opposed in Part Contentions. The Staff does not oppose the admissibility of the following contentions" (Answer at 1571).

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail

in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-118 – ESTIMATION OF UNCERTAINTIES IN SOIL-TO-PLANT TRANSFER FACTORS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff misses the point of the allegations of fact, analysis, and expert opinion supporting this contention. Nevada observes that DOE's conclusions regarding "soil-to-plant transfer factors" are based on its reliance on secondary documents. NRC Staff immediately misstates "Nevada provides no support for its assertion that DOE must use primary literature" (Answer at 664). Nevada's complaint is not with the fact that DOE relies on secondary material, but with respect to the use which DOE makes of it. In that regard, having stated what literature sources were used, the Petition (at 629) states that "[t]hese documents are all secondary sources and are not independent, as they make use of a common body of knowledge in the primary literature." The Petition makes two challenges to the use of these secondary literature sources, neither of which is addressed in the NRC Staff's Answer. The first of these challenges is that the "various authors of the secondary reviews. . .did not have the specific semi-arid agricultural conditions of Amargosa Valley in mind when they undertook their reviews" (Petition at 630) and

that "[a]lthough the authors made some attempt to correct for this bias, they did so only on the basis of the secondary reviews and not by reference to the primary literature." *Id*. This is a substantial challenge because the secondary reviews generally only contain summary information and do not given details of the experimental and field conditions under which the listed data values were obtained. Furthermore, in the secondary reviews, the data are often only presented as summary statistics over multiple studies, so the details of the individual studies on which they are based are not available without checking the primary literature sources. Thus, there is no way of knowing how the data summarized in the secondary reviews should be modified for application to semi-arid conditions without going back to the primary literature inputs and re-evaluating them. For example, data from plant types or varieties that do not thrive well in semi-arid conditions, even with intensive irrigation, would need to be given low weight, whereas data for plant types adapted to drier climates would be given greater weight.

The second challenge relates to the statistical manipulation of the data from the secondary reviews. As the Petition explains (at 630), the DOE approach of "treatment of the results of the reviews as if they were independent data is not legitimate." Here the challenge is that the probability density functions derived by the DOE for use in the post-closure safety assessment do not have any statistical legitimacy.

The NRC Staff should not have been under any misapprehension that this issue of statistical legitimacy is the main thrust of the contention. The final paragraph of Section 5 (Petition at 630-31) states:

> In summary, the approach to analyzing the data on soil to plant transfer factors provides results that do not have a statistically well-defined interpretation. Characterization of the results obtained by reference to a GM and GSD implies that an underlying lognormal distribution exists and this is the assumption that has been carried forward into performance assessments. Not only is this not the case, but the analysis presented makes no reference to the uncertainty and variability in

the primary data, but only to the variability in some authors' judgments as to the interpretation of those primary data.

The influence of this last point can be shown by reference to an extreme example. Say that for some quantity the primary data have values of 1, 3, 5, 7 and 9. If there are three secondary reviewers who all have access to these primary data and give each data value equal weight, they will all conclude that the arithmetic mean value is 5. In this case, the DOE would take the common mean estimate of 5 and would conclude that this is known without uncertainty, because its distribution is determined by the variabilities in the authors' judgments and not the variability in the underlying data.

If the post-closure performance assessment was deterministic and used only best estimates of parameter values, this statistically inappropriate use of the secondary reviews would matter less. However, the post-closure performance assessment undertaken by the DOE is probabilistic in nature and the results obtained are determined by the probability density distributions of uncertain quantities and not by a point value selected from each probability density distribution. Hence the failure to characterize those probability density distributions correctly will have a direct impact on the results of the assessment.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a

technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

The genuine dispute articulated by Nevada and misunderstood by NRC Staff relates to DOE's reliance on secondary material. For the reasons explained in Section 5 above, Nevada does not criticize DOE's reliance on second materials, but the use DOE makes of those materials.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by

DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and

because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-119 – ESTIMATION OF UNCERTAINTIES IN ANIMAL PRODUCT TRANSFER COEFFICIENTS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff does not take issue with the fact that Section 5 of the contention contains the necessary alleged facts, analyses, and expert opinions to support the contention as required in 10 C.F.R. § 2.309(f)(1)(v). Instead, NRC Staff chooses to debate the merits of those Nevada opinions, but in so doing, misses the point of the contention. NRC Staff is correct that Nevada points out DOE's reliance on secondary documents rather than primary sources. However, Nevada does not contend that "DOE must use primary literature" (Answer at 669) as NRC Staff suggests Nevada does. Rather, Nevada's disagreement is with the way in which the secondary information was analyzed and presented.

Thus, having stated what literature sources were used, the Petition (at 635) states that "[t]hese documents are generally secondary sources and are not independent, as they make use of a common body of knowledge in the primary literature." The Petition makes two challenges to the use of these secondary literature sources, neither of which is addressed in the NRC Staff's

Answer. The first of these challenges is that the "various authors of secondary reviews . . . did not generally have the specific semi-arid agricultural conditions of Amargosa Valley in mind when they undertook their reviews," but recognizes that "some exceptions to this position exist, *e.g.* the discussion of plutonium transfers to the meat of cattle grazing the Nellis Bombing and Gunnery Range" (Petition at 635). This lack of adaptation of the data to semi-arid conditions is a substantial challenge because the secondary reviews generally only contain summary information and do not given details of the experimental and field conditions under which the listed data values were obtained. Furthermore, in the secondary reviews, the data are often only presented as summary statistics over multiple studies, so the details of the individual studies on which they are based are not available without checking the primary literature sources. Thus, there is no way of knowing how the data summarized in the secondary reviews should be modified for application to semi-arid conditions without going back to the primary literature inputs and re-evaluating them. Thus, for example, water and salt intake rates have a considerable effect on the transfer factors obtained for radionuclides such as H-3 and Cl-36, for which considerations of homeostatic regulation apply. However, the overall proposition that it supports by example is that physiological considerations can and should be used to constrain estimates of TC values in specific environmental contexts. Incidentally, the Nevada citation to "Biosphere Modeling and Dose Assessment for Yucca Mountain" is not "simply to note that some of the sources DOE used to determine transfer factors themselves relied in part upon others." (Answer at 1148). Rather, it is to emphasize that the secondary sources used are sometimes very remote from the primary literature and that inspection of them shows through citation that the authors have themselves only inspected secondary sources and not the primary information.

Furthermore, in this case, the secondary source cited is itself "gray literature" and does not constitute a peer-reviewed scientific document.

The second challenge relates to the statistical manipulation of the data from the secondary reviews. As the Petition explains (at 636), the DOE approach of "treatment of the results of the reviews as if they were independent data is not legitimate." Here the challenge is that the probability density functions derived by the DOE for use in the post-closure safety assessment do not have any statistical legitimacy.

The NRC Staff should not have been under any misapprehension that this issue of statistical legitimacy is a main thrust of the contention. The final paragraph of Section 5 (Petition at 636-37) states:

> In summary, the approach to analyzing the data on TCs provides results that do not have a statistically well-defined interpretation, do not adequately reflect the underlying primary literature and do not fully take account of factors controlling the values observed. Characterization of the results obtained by reference to a GM and GSD implies that an underlying lognormal distribution exists and this is the assumption that has been carried forward into performance assessments. Not only is this not the case, but the analysis presented makes no reference to the uncertainty and variability in the primary data, but only to the variability in some authors' judgments as to the interpretation of those primary data.

The influence of this last point can be shown by reference to an extreme example. Say that for some quantity the primary data have values of 1, 3, 5, 7 and 9. If there are three secondary reviewers who all have access to these primary data and give each data value equal weight, they will all conclude that the arithmetic mean value is 5. In this case, the DOE would take the common mean estimate of 5 and would conclude that this is known without uncertainty, because its distribution is determined by the variabilities in the authors' judgments and not the variability in the underlying data. The reasonableness of this example is illustrated by the comment in the Petition (at 636) that in DN2001625960 "multiple instances of the same point estimate of the TC are recorded from different authors."

If the post-closure performance assessment was deterministic and used only best estimates of parameter values, this statistically inappropriate use of the secondary reviews would matter less. However, the post-closure performance assessment undertaken by the DOE is probabilistic in nature and the results obtained are determined by the probability density distributions of uncertain quantities and not by a point value selected from each probability density distribution. Hence the failure to characterize those probability density distributions correctly will have a direct impact on the results of the assessment.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

Nevada's genuine issue with DOE on the issue of animal product transfer coefficients is discussed in Section 5 above, which discussion is adopted in this section. NRC Staff again misses the point of the contention arguing in this section that there is no requirement "that requires the use of primary data sources" (Answer at 670). As stated and explained above,

Nevada's genuine dispute is not with the fact of the use of secondary sources, but the manner of their use by DOE.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance

objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When

one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-120 – RMEI DIET

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff concedes the existence of alleged facts, analyses, and expert opinions by Nevada, but questions their weight and accuracy. While this is premature, Nevada would explain further why its questioning of DOE's survey methodology and its assumptions with respect to the RMEI diet is accurate.

Because liver and other offal was aggregated in the survey with beef, there is now no way of partitioning the beef consumption rates into those of meat, liver, kidney and other products. The radiological assessment uses the aggregate beef consumption rate, as reported, in conjunction with the TC for meat (*sensu strictu*). As liver, kidney and other products are known to have much larger TC values than meat for some key radionuclides (*see* Petition at 643 for a discussion relating to Np-237), this approach underestimates the radiological impact of radionuclide releases to the accessible environment.

The NRC Staff criticizes the use of a UK survey to estimate the potential contribution of offal to the diet (Answer at 674). This was of necessity, as the DOE survey failed to distinguish offal consumption from meat consumption in the Town of Amargosa Valley (see above). A search of various US dietary surveys was made, but these generally failed to distinguish offal from meat. The UK survey was, therefore, used, because it was conducted specifically to support radiological impact assessments, and in consequence, laid appropriate emphasis on recording data for the individual food types of relevance. The DOE rather than Nevada should have carried out a survey that was appropriate to radiological assessment studies. As indicated in II.G. above, NRC Staff improperly shifts the burden of proof to Nevada. DOE seemingly failed to recognize the significance of recording the consumption rates of the relevant food types separately, as was done in the UK survey.

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under Section 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

NRC Staff and Nevada have amply demonstrated the existence of a genuine issue with respect to the accuracy of DOE assumptions regarding the RMEI diet and the accuracy of surveys relied upon by DOE. These need not be reiterated in Section 6 as they are discussed in Section 5 above, which section is adopted by reference herein.

In this section, NRC Staff argues that Nevada has provided an inadequate explanation of its genuine dispute with DOE regarding the LA. As anticipated under 10 C.F.R. § 2.309(f)(1)(vi), Nevada has identified both the SAR and NRC regulatory provisions at issue in this contention. NRC Staff rails at Nevada for its statement that the criticisms of DOE's TSPA would result in the potential for thousands of possible changes to the TSPA to recognize the impact of this contention and all the other possible combinations of Nevada's other contentions relating to different aspects of the inadequacy of DOE's TSPA. NRC Staff incorrectly states that Nevada offers no explanation of why this is the case. Equally inaccurately, NRC Staff recognizes that the Affidavit of Michael C. Thorne is offered in support of this contention relating to the inadequacy of the TSPA, but asserts that Dr. Thorne fails to provide a reasoned basis for his statements.

Having detailed the SAR sections challenged and the NRC regulations not met, Nevada does not need to demonstrate that this contention would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment is material *per se*, as indicated in II.D. above. NRC regulation 10 C.F.R. 63 has numerous individual subsections identifying the specific requirements to be met by DOE's TSPA. These separate requirements cannot be ignored, as if the only post-closure requirement in Part 63 were to perform some kind of calculation to demonstrate compliance with

EPA's dose standard. In promulgating Part 63, the Commission made it very clear that these requirements are separate from, and in addition to, the requirement in 10 C.F.R. § 63.311 to comply with dose standards. It said: "Any determination that the post-closure performance objectives will be met will be based on a comprehensive set of regulatory requirements," and a "range of considerations," including "requirements for addressing uncertainty, providing technical basis for models, and additional requirements beyond expected performance." 66 Fed. Reg. 55,747 (Nov. 2, 2001). The TSPA is like a collection of linked chains, with each chain composed of several model components or submodels. Taken together, this collection of model components and submodels is used to calculate the radiation dose to the RMEI. *See* SAR at 2.4-526, 528-31. If a necessary model component or submodel is wrong, invalid, fundamentally flawed, or not supported, then the calculation of compliance with the EPA dose standards cannot bear any weight and lacks any ultimate probative value, just as if there were no TSPA at all. Without a TSPA with probative value, there is no proof of compliance with EPA's dose standards because 10 C.F.R. §§ 63.102(j) and 63.113 require that such proof be in the form of a TSPA.

Regarding Nevada's suggestion that an inordinately enormous number of possible TSPA changes might need to be made in order to recognize the effects of accepting this one contention along with all possible combinations of Nevada's other contentions, NRC Staff simply states that Nevada offers no explanation or reasoned basis why this is the case. While it is self-evident, Dr. Thorne carefully explains in Section 6 of this contention that "there are more than 100 Nevada TSPA contentions . . . relat[ing] to a total of 19 different broad aspects of the TSPA," and because "one would need to include the effects of accepting [any] one contention along with all possible combinations of Nevada other contentions relating to different aspects of the TSPA,

even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases." Simple arithmetic dictates that if only one contention caused a TSPA change, it might require hundreds of DOE TSPA runs to calculate its impact accurately. When one begins to calculate the number of potential TSPA variations where 10 or 20 or 100 variables are changed, the number of outcomes quickly passes into the millions and billions and beyond, each one them requiring hundreds of runs to test the outcome accurately. Nevada's explanation of the TSPA impact of this contention and its difficulty of calculation in concert with others is quite clear. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-121 – HOST ROCK GEOMECHANICAL PROPERTIES

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As identified in the Petition (at 648-49), the overwhelming majority of the rock testing data presented in the Subsurface Geotechnical Parameters Report (01/01/2007), LSN# DN2002371133, are for the nonlithophysal rock units. However, SAR Subsection 1.3.4.4 states that 80% of the emplacement drifts will be located in the lower lithophysal subunit (Tptpll) of the Topopah Springs tuff, 5% will be located in the upper lithophysal unit (Tptpul), 10% will be located in the middle nonlithophysal unit (Tptpmn) and the remaining 5% will be located in the lower nonlithophysal unit (Tptpln). Consequently, these extensive data apply only to a small portion of the emplacement area of the repository. Conversely, only limited data are presented for the lithophysal rock units in which 80% of the waste packages will be stored.

It was, and remains, Nevada's contention that these testing data presented for the upper and lower lithophysal rock units are completely inadequate to characterize the rock mass sufficiently to provide reasonable assurance that a geologic barrier consisting of lithophysal

Topopah Springs tuff will provide a satisfactory geologic barrier for isolation of the waste. This conclusion is based on the fact that in commercial rock engineering projects, which typically have far smaller budgets and timeframes for rock testing than DOE has had, require a minimum of three to six samples for each stress or temperature condition to be tested for each rock type. Using this criterion and based on DN2002371133, Table 6-62, at 6-192 to 6-197, DOE appears to have tested sufficient samples to characterize the unconfined compressive strength of the two lithophysal units under ambient (20 to 30°C) conditions, but not under elevated temperature conditions whereby only two samples and three samples were tested at a temperature of 200°C for the lower and upper lithophysal units, respectively. Given that the rock temperature in the rooms can be expected to remain at temperatures intermediate between 30°C and 200°C for extended periods, additional testing is required at intermediate temperatures. Further, the triaxial compressive strength testing of the lithophysal tuff units consisted of only single samples tested at each of two or three different stress levels at ambient temperature conditions. No triaxial strength testing was performed at elevated temperature conditions.

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-122 – SCREENING OF DRIFT DEGRADATION FEPs

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

The CNWRA model addresses only drift collapse rather than rockfall. However, a common concern with either rockfall or drift collapse is that the protective capacity of the drip shield will be impaired. In the CNWRA model, drift degradation occurs at a steady rate during thermal loading beginning at the time of closure and superimposed upon this is episodic accumulation of rubble from seismic activity (Petition at 653-54). Furthermore, "the rubble load on the drip shields is computed. If it is found sufficient to collapse the drip shields, it is assumed that some fraction of the seepage may pass through the drip shields and contact the waste packages." *Id*. 654. Thus, the CNWRA model estimates the degree of drip shield collapse due to both continuous and episodic loading.

Although the CNWRA analysis assumes that drift collapse occurs, this is not very different from the DOE assessment of "only partial drift collapse in either lithophysal or nonlithophysal rock masses." The difference is primarily in assessment of the consequences of such drift collapse and this is computed in both the DOE and CNWRA models. DOE concludes that the impact will be limited. The CNWRA concludes that the drip shields may collapse and

that, in consequence seepage may pass through, contact the waste package and result in localized corrosion and that mechanical damage to the waste package may occur (Petition at 654).

Thus, the distinction between the two models focuses on different computations of the degree of drift collapse and its effects. These are geomechanical and engineering issues that should be susceptible of resolution. Therefore, Nevada continues to insist that "[e]valuation of the effects of rockfall and drift degradation on drip shields and waste packages depend on detailed stress and mechanical stability analyses and on interpretation of the effects of mechanical damage on corrosion resistance and water penetration potential" (Petition at 654).

It is noted that the report on the CNWRA model was published on July 31, 2008. Thus, CNWRA clearly considered the model to be valid more recently than submission of the LA. This strongly suggests that any technical discussions of the model prior to the LA had not persuaded CNWRA staff that they were conducting inappropriate calculations. There was, therefore, clearly a technical difference between DOE and CNWRA at the time of LA that was neither recognized nor resolved in the LA.

See also the responses in Sections 5 and 6 below.

5. <u>A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials</u>

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a

referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

REPLY – NEV-SAFETY-123 – DURABILITY OF GROUND SUPPORT

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-124 – WELDING OF ALPHA BETA TITANIUM ALLOY TO UNALLOYED TITANIUM

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

This contention focuses on DOE's failure to actually produce and test sample welds in the material combination that DOE proposes, e.g., Grade 7 welded (using ERTi-28) to Grade 29, to demonstrate the effect on which it is relying. Delayed cracking of the drip shield adjacent to connections between the WDS and the structural components would seriously impair the capability of the WDS to withstand external loads, and result in early drip shield failures that would allow seepage water to impact the underlying waste packages and increase the dose to the RMEI.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material

dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-125 – EFFECTIVENESS OF STRESS RELIEF TO ELIMINATE SCC OR HYDROGEN EFFECTS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

This contention focuses on DOE's failure to actually weld, stress relieve, and test sample welds in the material combination that DOE proposes, e.g. Grade 7 welded (using ERTi-28) to Grade 29, to prove that the desired reduced residual stress can be attained. If the stress relieving is not effective, then the effects of hydrogen in the welds may lead to delayed cracking, and

result in early drip shield failures that would allow seepage water to impact the underlying waste packages and increase the dose to the RMEI.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-126 – PROPERTIES OF DISSIMILAR METAL WELD JOINTS BETWEEN GRADE 29 AND GRADE 7 TITANIUM

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

DOE is relying on a the specific combination of Gr. 7 and Gr. 29 materials welded with ERTi-28 filler metal to provide certain desirable technical results, including strength, ductility, corrosion resistance, hydrogen resistance, and response to thermal stress relief. This specific combination of materials is not commonly used in industry, if it has ever been used at all. Some basic practical demonstrations that the material will behave as anticipated are needed to support DOE's reliance on the specific material combination. While the need for a formal welding qualification to meet the requirements of the construction code is not necessary at this time, a basic demonstration that the materials will behave as anticipated is necessary before proceeding with such reliance on the materials as is represented in the TSPA.

DOE relies on the drip shields as a critical and indispensable part of the engineered barrier system that is in turn critical to mitigating rate and timing of radionuclide releases to the groundwater and the RMEI. The LA is specific with respect to the materials and the drip shield performance relies on the specified materials as proposed in the LA. While DOE states that it has every intention of doing the ASME Code mandated welding qualifications in time to support the proposed drip shield installation, it has proposed a combination of materials that it has not actually welded, stress relieved, nor tested to demonstrate it will provide the properties which are assumed in the TSPA in order to predict the dose to the RMEI.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10

C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-127 – HYDROGEN AND ERTI-28 FILLER METAL FOR WELDED JOINTS BETWEEN GRADE 29 AND GRADE 7 TITANIUM

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

DOE has stated that it is relying on welds made using Grade ERTi-28 filler metal to join Gr. 7 to Gr. 28 to mitigate hydrogen problems associated with welds between alpha and alpha beta titanium alloys. The welded combination of all alpha Gr. 7 and alpha-beta Gr. 29 is acknowledged by DOE to present a risk of cracking related to hydrogen accumulation. DOE has not demonstrated by actually welding and testing that this combination of materials will behave as anticipated.

DOE relies on the drip shields as a critical and indispensable part of the engineered barrier system that is in turn a critical part of the overall approach to mitigating release of radionuclides into the groundwater and doses to the RMEI. The LA is specific with respect to

the materials proposed to be used to fabricate the drip shields and predicted drip shield performance is based on the specified materials. DOE is proposing a combination of materials that it has not actually tested to demonstrate that it will provide the assumed resistance to hydrogen effects.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10

C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-128 – NUCLEAR CODE AND FABRICATION QUALITY ASSURANCE STANDARDS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

The LA asserts that the drip shields will likely remain intact even in the event of structural loading that causes an overall buckling failure, for example, and continue to prevent the transport of radionuclides into the groundwater. With no detail of the construction proposed

by DOE, such an assumption is invalid. At issue is the fact that equipment in service rarely fails by a mechanism of general collapse or buckling, but rather fails first at the intersections of components, coincidentally at welds, and where stiffness of the structure changes. In short, the missing details are necessary to describe how DOE proposes to fabricate these critical details, and without which evaluation of failure mechanisms is not possible.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-129 – EARLY FAILURE MECHANISMS ASSOCIATED WITH TITANIUM FABRICATION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

This contention identifies a deficiency in the area of potential fabrication defects in the drip shield. Failure of drip shields due to any or several of these issues could allow seepage water to impact the waste packages below the drip shields and increase the dose to the RMEI. DOE has failed to adequately consider these typical fabrication issues that will affect the drip shield performance assumed in the TSPA.

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-130 – DRIP SHIELD EMPLACEMENT PLAN, EQUIPMENT, AND SCHEDULE

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

Nevada has clearly set forth the factual basis for this contention in Section 5 of its Petition (at 703-09) and the regulations applicable to this contention in Section 4 of its Petition (at 702). Moreover, Nevada has made clear in Section 6 of its Petition (at 709-10) that due to the factual allegations DOE cannot comply with the identified regulation. Those pleadings are more than adequate to demonstrate that this contention is within the scope of this hearing as required by 10 C.F.R. § 2.309(f)(1)(iii).

Although NRC Staff's Answer (at 729) implies that this contention only addresses "future budget constraints and material resource availability," in fact Nevada has identified numerous other issues within Section 5 of its Petition. Specifically, Nevada's Petition (at 703-709) addresses drip shield design, drip shield fabrication, gantry design, emplacement procedures, drift deterioration/collapse, and other general issues. Those issues clearly address safety and technical issues at the heart of 10 C.F.R. Part 63, and therefore fall within the scope of this hearing. NRC Staff's Answer reaches an unsupported conclusion that discussions within Section 5 of Nevada's Petition regarding material resources, competing uses of materials and funding are outside the scope of this proceeding. However, these issues clearly go to the heart of whether "the drip shields . . . can (or will) emplace . . . over the waste packages," and if they cannot be "placed over any significant number of waste packages, the TSPA model is invalid and the dose

to the RMEI will exceed regulatory standards" (Petition at 709). These issues are therefore also within the scope of this hearing as required by 10 C.F.R. § 2.309(f)(1)(iii).

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

Whenever Nevada alleges with adequate support in fact or opinion a violation of an applicable NRC regulation, Nevada's contention will always raise a material issue. This contention identifies deficiencies in the area of the plan for manufacture and installation of the drip shields. The 10-year schedule proposed for drip shield installation does not account for the resources required to achieve it. DOE has failed to adequately evaluate this requirement. Accordingly, this contention satisfies the pleading requirements of 10 C.F.R. § 2.309(f)(1)(iv). With regard to NRC Staff's assertions (Answer at 729) regarding "the availability of material resources, competing uses of materials, and funding strain for drip shield fabrication," see the response in Section 4 above.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

The drip shields are presented in the LA as critical to the function of the EBS. The various studies presented seek to show that the risk of a failure of even one drip shield due to numerous causes will result in only the equivalent of one or two shields being ineffective. The consequences of not being able to install some finite number of drip shields due to factors that can be readily envisioned (e.g., drift collapse, rail failure, etc.) have not been adequately covered in the LA and SAR.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-131 – ROCK DEBRIS REMOVAL

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

Nor reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

REPLY – NEV-SAFETY-132 – TEV DESCRIPTION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

Nevada correctly identified that the regulations at issue in this contention are 10 C.F.R. §§ 63.21(c)(9), 63.21(c)(15), 63.113, and 63.114(a) – all as they address post-closure requirements (Petition at 716-17). Although the Transport and Emplacement Vehicle (TEV) operates in the pre-closure phase of the project, the contention focuses on the absence of sufficient design detail regarding the TEV and thus the inability to ensure that the TEV will properly locate waste packages in emplacement drifts within specified tolerances and engineering requirements so as to conform with the associated assumptions in the TSPA-LA. *Id.* at 716 and 718. Whenever Nevada alleges with adequate support in fact or opinion a violation of an applicable NRC regulation, Nevada's contention will always raise a material issue.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The TEV is "a first-of-a-kind application of existing technology." The point is that such a machine has not been built before and as such DOE's assumptions that it will function as planned from the first are unwarranted optimism, wholly without foundation, and contrary to the requirements identified in the contention.

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

REPLY – NEV-SAFETY-133 – DRIP SHIELD GANTRY DESCRIPTION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

Nevada correctly identified that the regulations at issue in this contention are 10 C.F.R. §§ 63.21(c)(9), 63.21(c)(15), 63.113, and 63.114(a) – all as they address post-closure requirements (Petition at 720-21). Although the drip shield gantry operates in the pre-closure phase of the project, the contention focuses on the absence of sufficient design detail regarding the drip shield gantry and thus the inability to ensure that it will properly locate the drip shield in emplacement drifts within specified tolerances and engineering requirements so as to conform with the associated assumptions in the TSPA-LA. *Id.* at 720 and 721-22. Whenever Nevada alleges with adequate support in fact or opinion a violation of an applicable NRC regulation, Nevada's contention will always raise a material issue. *See* Section II.K, *supra*.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

SAR Subsection 1.3.4.7.2 9 (at 1.3.4-27 through 1.3.4-290) describes many of the systems and components on the Drip Shield Gantry as being similar to those on the transport and emplacement vehicle (TEV) without providing much additional information (Petition at 721). Therefore, it must be assumed that, as for the TEV, not only is the design incomplete for the Drip

Shield Gantry, but that some of the requirements to be achieved through that design have yet to be defined. This level of design, which can only be classified as pre-conceptual or conceptual, does not provide sufficient detail to demonstrate that the Drip Shield gantry will perform its function satisfactorily.

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

REPLY – NEV-SAFETY-134 – RETRIEVAL OR ALTERNATE STORAGE DESCRIPTION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

Whenever Nevada alleges with adequate support in fact or opinion a violation of an applicable NRC regulation, Nevada's contention will always raise a material issue.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

This contention points out that retrieval does not simply represent a reversal of emplacement. Although the exact opposite approach appears to have been DOE's position for upwards of 25 years, it has never been NRC Staff's position and is not supported by the definition of retrievability in 10 C.F.R. Part 63 (Petition at 725). Moreover, DOE's statements (SAR at 1.11-7) "that lessons learned from addressing similar events during emplacement will be applied during retrieval," does not address the need to demonstrate in the LA that retrieval has been adequately considered, and therefore that there is reasonable assurance that if necessary the requirement for retrievability can be achieved.

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support

the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-135 – THE VENTILATION DOORS AT THE ENTRY TO THE EMPLACEMENT DRIFTS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

Whenever Nevada alleges with adequate support in fact or opinion a violation of an applicable NRC regulation, Nevada's contention will always raise a material issue.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material

dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-136 – PHASED GROUND SUPPORT INSTALLATION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As discussed in the Petition (at 731-32), all the cross-sections shown for the repository openings in the LA and SAR have smooth, regular perimeters; however, it can be expected that significant modification will result from the use of a two-stage rock reinforcement and support system. Some studies such as those for rockfall do show uneven perimeters; however, DOE dismisses the conditions that led to those results as not likely. In rock soft and fractured as the lithophysal Topopah Springs tuff, uniform cross-sections are unlikely, especially if the rock is to be rescaled and rebolted some time after the initial excavation. It is standard practice to scale when rebolting and if a mechanical scaler is used, considerable overbreak may be expected.

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided

go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

REPLY – NEV-SAFETY-137 – CONSTRUCTION OF THE EMPLACEMENT DRIFTS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

Nevada has clearly set forth the factual basis for this contention in Section 5 of its Petition (at 734-35) and the regulations applicable to this contention in Section 4 of its Petition (at 733-34). Moreover, Nevada has made clear in Section 6 of its Petition (at 735) that because of the factual allegations DOE cannot comply with the identified regulation. Whenever Nevada alleges with adequate support in fact or opinion a violation of an applicable NRC regulation, Nevada's contention will always raise a material issue.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

At issue in this contention is that the discussions in the LA and SAR pertaining to the use of a tunnel boring machine (TBM) are overly optimistic and that little consideration was given by DOE to having contingency plans should a number of emplacement drifts encounter difficulties during construction. This contention does not state that a TBM is inappropriate; rather the purpose of the contention was to highlight the fact that DOE's discussion of the TBM in the SAR does not give sufficient consideration to the operating problems that could occur given the nature of Topopah Springs tuff.

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

REPLY – NEV-SAFETY-138 – DESCRIPTION OF THE VENTILATION SYSTEM FOR THE REPOSITORY OPTIONS MADE IN THE TSPA-LA REGARDING WASTE ISOLATION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

Whenever Nevada alleges with adequate support in fact or opinion a violation of an applicable NRC regulation, Nevada's contention will always raise a material issue.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Only three fan manufacturers have ever manufactured mine fans to handle more than 900,000 cfm at static pressures of the order of 15 inches of water. Of these three manufacturers, JOY and Airtec Davidson are no longer in business. The remaining manufacturer has probably only constructed four such fans. The former Denison Mine in Elliot Lake, Ontario, had four such fans from one of these manufacturers and two additional fans from one of the other manufacturers. The only other mine with such large fans was the Jim Walters coal mine in Alabama. Thus, Nevada's assertion in this contention that the number of fans required by DOE may not exist is valid.

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements.

This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

REPLY – NEV-SAFETY-139 – DESCRIPTION OF REASONABLE EMERGENCIES

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

REPLY – NEV-SAFETY-140 – ENGINEERED BARRIER SYSTEM DESIGN BASIS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

REPLY – NEV-SAFETY-141 – GROUND SUPPORT DESCRIPTIONS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

As indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-142 – STANDARD TITANIUM GRADES CONSIDERED

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-143 – AVAILABLE DRIP SHIELD DESIGN INFORMATION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-144 – DRIP SHIELD FAILURE MECHANISMS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Moreover, as explained in II.D above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-145 – DRIP SHIELD SPECIFICATIONS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-146 – RELIANCE ON PRELIMINARY OR CONCEPTUAL DESIGN INFORMATION

1. A statement of the contention itself

NRC Staff seems to complain that the contention is not reasonably specific, although it has no argument under 10 C.F.R. § 2.309(f)(1)(i). The contention raises one very specific legal issue – whether Part 63 requires that the application include final design information. It could only be made more specific by filing hundreds of identical contentions addressed to each design element on the application, which would be unreasonable and burdensome. Moreover, the contention offers a very specific example – the TAD design.

Finally, it is relevant that DOE must know exactly what design information this contention focuses on for DOE argues (Answer at 1351) that the final design information Nevada claims is missing was not available when the application was docketed, and such an argument would have been impossible to make without knowing precisely what Nevada claims was missing.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

Contrary to what Staff seems to argue, a legal contention like this one that raises a question of interpretation of Part 63 necessarily raises a material legal issue. Staff's argument here goes to the merits. Nevada asks for nothing more than what Part 63 requires.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Staff complains that Nevada did not include adequate supporting information. However, Nevada cited to the specific examples of design deficiencies in its July 21, 2008 Supplement to its June 4, 2008 Petition Asking the NRC to Reject DOE's Yucca Mountain License Application as Unauthorized and Substantially Incomplete. In particular, there is no final TAD design, and DOE's own application planning documents call for the application to be based on preliminary design information. *See, e.g.*, "Desk Top Instructions for Preparing Preliminary Design Drawings for License Application" (01/14/2004), LSN# DN2001625181, Section 3.1 at 3. ("Engineering drawings prepared for LA will be preliminary design drawings"). Further, DOE concedes that "[f]inal design of the [TEV] equipment will occur in the future" (DOE Answer at 1355). Nevada's contention, as directed to the TAD and TEV, could hardly be more specific or well supported. Notably, nowhere does Staff actually question the premise of Nevada's legal contention-that the application does not include final design information.

As to the alleged lack of legal support, Nevada cited to 10 C.F.R. §§ 63.21, 63.24, 63.31, 63.101, 63.102, and 63.111. It urged that these regulations be considered in light of their regulatory history and contemporaneous NRC and DOE interpretations, to show that the Commission intended to require an essentially one-step licensing process in which the final design must be submitted and approved before a construction authorization may be issued. Nevada also referred to its earlier petitions, which address and support the precise point of this contention. No more legal argument is required at the contention stage. Nevada is prepared to brief this issue further, consistent with the concept of 10 C.F.R. § 2.309(f) that full briefing of purely legal contentions be allowed, if desired, after the contentions are admitted. *See* 54 Fed. Reg. 33,168, 33,172 (Aug. 11, 1989) ("The intent of the proposed rule. . .was that purely legal

contentions, which occur rarely, may be admitted as issues in the proceeding. However. . .they will be handled on the basis of briefs and oral arguments").

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

Staff here repeats argument rebutted above.

REPLY – NEV-SAFETY-147 – EVALUATION OF DATA USED IN DRIP SHIELD FAILURE PROBABILITY

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Nevada does not dispute that NUREG/CR-1278 ("Human Factors Research and Nuclear Safety with Handbook of Human Reliability Analysis with Emphasis on Nuclear Power Plant Applications (Final Report) Aug 83, SNL" (01/01/1988), LSN# DN2002064865) and the Savannah River Site Study ("Savannah River Site Human Error Data Base Development for Nonreactor Nuclear Facilities" (02/28/1994), LSN# DEN001584210) were developed for reactor and nonreactor nuclear facilities, or that the data from NUREG/CR-1278 have been applied in

evaluating human reliability in other large process plants, *e.g.*, chemical plants, oil refineries, off-shore oil production, and other power-generating plants. However, the Petition (at 775) explicitly states that "neither of these reference documents is relevant to the specific conditions that will apply *in the subsurface* at Yucca Mountain" (emphasis added). It is notable that the DOE Answer (at 1359-1367) provides no suggestion that either of these reference documents has ever been used in the safety assessment of an underground repository or store for any type of waste, or even in the safety assessment of any underground activity such as mining.

Finally Staff argues that Nevada "does not address how human error probabilities should be determined if the nuclear industry studies are not used" (Answer at 810-811). This improperly shifts the burden of proof to Nevada. *See* II.G. above.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE.

Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-148 – EVALUATION OF COMPUTATIONAL PROCEDURE USED IN DRIP SHIELD FAILURE PROBABILITY

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE.

Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-149 – DEVIATIONS IN DESIGN AND WASTE EMPLACEMENT

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's Response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

Nevada satisfied 10 C.F.R. § 2.309(f)(1)(vi) by citing to SAR Subsection 2.2.1.2 at 2.2-17 and "Features, Events and Processes for the Total System Performance Assessment: Analyses" (03/06/2008), LSN# DEN001584824 at 6-39 and 6-40, where it is explained that FEP 1.1.03.01.0A, which includes "deviations from the design and/or errors in waste emplacement" is excluded from the TSPA "on the basis of regulation," notwithstanding that this "would impact repository performance." Nevada can be forgiven for placing no reliance on the statement "excluded low consequence" when the document cited to support this conclusion says excluded on the basis of "regulation." Staff supports Nevada when it states (Answer at 822) that "DOE also discusses in the SAR its basis for determining that FEPs meeting the low-consequence criteria can be excluded *by regulation*" [emphasis added].

Apparently, excluded by "regulation" presumes that errors in repository design and errors in waste emplacement will occur at a frequency of less than one chance in 10,000 in 10,000 years, or one in one-hundred million per year (the exclusion criterion in 10 C.F.R. § 63.102(j)), provided only that NRC quality assurance requirements are satisfied. DOE does not support this proposition and the Commission may take official notice that no human reliability program will reduce human errors to less than one in one hundred million per year.

REPLY – NEV-SAFETY-150 – BASALTIC MAGMA MELTING DEPTH

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Moreover, as explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE.

Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-151 – TIME SPAN OF BASALTIC VOLCANISM

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Staff argues (Answer at 831) that the SAR "appears" to indicate that DOE considered the entire 11 million year history of volcanism. These do not show that DOE actually analytically integrated the concept of the 11 million-year time span into a model or calculation. Nevada accepts that DOE mentioned pre-5 million year volcanism in the SAR, but because this information was not used to determine long-term trends, important data regarding the episodic nature of volcanism were lost.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Furthermore, see above regarding what the SAR "appears" to say.

Moreover, as explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE.

Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-152 – FOCUS ON UPPER CRUSTAL EXTENSION PATTERNS

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Staff argues (Answer at 838) that "it does not appear that DOE limits its focus to upper crustal extension patterns." DOE considered alternative conceptual models, the effects of buried volcanic centers, alternative estimates of probability of intersection and a description of the Crater Flat structural domain. All of these items relate to upper crustal processes and none concern themselves with the depth of melting of basaltic magma. DOE also mentions analog studies, but all of the analog studies relate to the dimensions of dikes in the upper crust and the nature of the volcanoes themselves.

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE.

Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-153 – EXCLUSION OF DEATH VALLEY FROM VOLCANISM CALCULATIONS

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

While several of DOE's PVHA experts did mention the Greenwater Range or include it in their background zone, only one (Crowe) attempted to integrate it into a probability model. Carlson and Walker mention the Greenwater Range but do not include it in their cone count used to calculate probability. Although Crowe considered the Greenwater Range, his analysis was flawed for the following reasons:

1. Crowe did not know the location or number of volcanic centers in the Greenwater Range. He calculated the number of centers by estimating the volume of basalt and then dividing that volume by the basalt volume normally associated with a typical cinder cone. This back of the envelope calculation might be fine for an informal study but not for the important calculation of volcanic hazard at Yucca Mountain.
2. Crowe gave estimated cone counts in the Greenwater Range a low weight in his probability calculation; therefore it had little effect on the overall volcanic hazard calculation.

Moreover, several experts used the concept of the Amargosa Valley Isotope Province (AVIP) to define their background zone for probability calculations. The AVIP was introduced to the PVHA experts by Dr. Gene Yogodzinski and Dr. Eugene Smith (Nevada's expert) during the PVHA proceedings and this concept was accepted by several of the experts. The AVIP is defined by isotopic signature and includes basalt near Yucca Mountain as well as basalt in the Greenwater Range. Although some of the experts used the AVIP concept, the data from the Greenwater Range were not used in probability models (with the exception of Crowe).

Therefore, while it is true that some PVHA experts did mention the Greenwater Range and one used it in a calculation, the Greenwater Range was not properly considered and was essentially ignored by DOE.

Finally, as explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE.

REPLY – NEV-SAFETY-154 – IGNEOUS EVENT PROBABILITY FOR 10,000 YEARS AND 1,000,000 YEARS

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

Staff argues that this contention cannot be admitted because it addresses the subject of NRC's ongoing rulemaking to conform to EPA's rule that addresses the post-10,000 year assessment period. In the Notice of Hearing (CLI-08-25 at 13, __ NRC __ (2008)), the Commission stated that petitioners "are also free to file contentions maintaining that DOE's application does not meet EPA's standards." Under EPA's standard at 10 C.F.R. § 197.36(c), DOE "shall project the continued effects of the features, events and processes [FEPs] included in paragraph (a) of this section [pertaining to the 10,000 year assessment] beyond the 10,000-year post-disposal period through the period of geologic stability," with "period of geologic stability" defined in 40 C.F.R. § 197.12 "to end at 1 million years after disposal." Because DOE includes igneous events in its 10,000 year performance assessment, it follows that igneous events must also be included thereafter, up to 1,000,000 years, in the post-10,000 year assessment.

The NRC's conforming rulemaking does not specifically address igneous events but, in any event, while NRC's implementation of the EPA rule is the subject of rulemaking, the Notice of Hearing provided specifically that this round of contentions may be based on the EPA rule only. This provision would be meaningless if all such contentions would be dismissed because of the pendency of the NRC rule. Contentions addressing the final NRC rule are due 60 days after that rule is published in the Federal Register.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Staff claims (Answer at 851) that DOE did consider deep melting models. In fact the definition of an event clearly states that magma ascends from the "mantle" and does not specify whether it is deep or shallow mantle. Staff argues (Answer at 851) that DOE considered the entire 11 million year history of volcanism. However, Nevada does not consider a simple mention of a term or concept equivalent to analytically integrating it into a model or calculation. Nevada accepts that DOE mentioned pre-5 million year volcanism in the SAR, but because this

information was not used to determine long term trends, important data regarding the episodic nature of volcanism were lost. In summary, there is no evidence provided by DOE to suggest that the PVHA expert panel adequately considered either deep melting models or the entire 11 million year long period of volcanism near Yucca Mountain. Consequently there is a genuine dispute between DOE and Nevada on these issues.

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards or violate "reasonable expectation" and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305 (c) raises a material issue with DOE.

Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-155 – 11-MILLION YEAR VS. 5-MILLION YEAR VOLCANISM DATA

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Nevada's contention specifically deals with the fact that DOE has relied on chemistry of surface basalt over the past 5 million years to predict future trends of volcanism and has not integrated data from basalt core collected from borings in Crater Flat, Amargosa Valley, and Jackass Flat. Although DOE's experts did include events earlier than 5 million years in their probability models, none considered long-term trends or patterns of volcanism.

Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue (Answer at 858) that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-156 – ALTERNATIVE IGNEOUS EVENT CONCEPTUAL MODELS

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Staff's argument that this contention does not include information indicating a difference in the outcome of the proceeding is based on an incorrect understanding of the role and importance of alternative conceptual models in Part 63. As indicated in II.E. above, a failure to consider "alternative conceptual models of features and processes that are consistent with available data and current scientific understanding and evaluate the effects that alternative conceptual models have on the performance of the geologic repository" is not only a *per se* material violation of 10 C.F.R. § 63.114(c) but, more fundamentally, it is a *per se* indication that DOE has failed to follow the Commission's direction that uncertainties inherent in any performance assessment must be thoroughly articulated and analyzed or addressed.

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE. Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-157 – IGNEOUS EVENT DATA IN THE TSPA

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

All of the studies and papers referenced in Nevada's contention (Petition at 832-833) as missing from the application were authored by either DOE or NRC employees or contractors who were doing research to help improve the knowledge base of volcanoes near Crater Flat. Many of these investigations used analog studies to make conclusions about volcanoes near Yucca Mountain. Others discussed volcanoes near Yucca Mountain, and some the interpretation of shallow melting and the crustal control on the timing of volcanism. These articles contain

relevant information and the application is not as complete as possible in light of information available at the time of docketing.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

Staff fails to include the whole of Dr. Smith's conclusion regarding the importance of the PVHA-U. Dr. Smith indicates (Petition at 833) "the *possibility* that changes in hazard assessment models and calculations are modest" [emphasis added]. He also concludes that "[o]mission of all this work [the work referenced in the Petition at 832-833] results in an underestimate of the probability of repository disruption and of the related uncertainties, which in turn leads to an erroneous total systems performance assessment."

REPLY – NEV-SAFETY-158 – GEOPHYSICAL DATA IN DOE'S VOLCANIC MODEL

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been

provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

In this contention, Nevada asserts (Petition at 838-839) that DOE did not provide the PVHA experts *modern high-quality geophysical data* required to test models of magma generation that are a critical component of a probability calculation. Nevada agrees that some geophysical data were provided to both the PVHA and PVHA-U experts. The quality of these data is what is at issue.

Moreover, the contention (Petition at 835) claims specifically that DOE's model lacks "sufficient geophysical data to support [it]." As indicated in II.D. above, Nevada does not need to demonstrate that TSPA contentions would lead to no reasonable expectation of safety or would violate EPA dose standards, and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) is material *per se*. In this case the most proximate TSPA requirement in 10 C.F.R. § 63.114(g), which is reflected in the application requirements in 10 C.F.R. §§ 63.21(c)(9) and 63.21(c)(15).

Finally, as indicated in II.B. above, Nevada's reference to the phrase ""related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-159 – PROPAGATION OF CONCEPTUAL AND PARAMETRIC UNCERTAINTIES THROUGH THE SAFETY ASSESSMENT

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Moreover, as explained in detain below, Staff asks for the impossible when it insists (Answer at 873) that Dr. Thorne must explain how carrying forward a single set of choices at each stage of TSPA development "leads to a reduced consideration of uncertainties in any significant manner."

When NRC promulgated Part 63, it decided not to include the subsystem performance requirements in Part 60, and replaced them with a single total systems performance assessment.

In defending its elimination of subsystem performance requirements, and its reliance on a total systems performance assessment, the Commission emphasized again and again the importance of accounting for uncertainty in the assessment. Under 10 C.F.R. § 63.114, DOE has the burden to "[a]ccount for uncertainties and variabilities in parameter values," to "provide for the technical basis for parameter ranges, probability distributions, or bounding values," and to "consider alternative conceptual models of features and processes that are consistent with available data and current scientific understanding." As the Commission put it in promulgating Part 63, DOE must show that "uncertainties inherent in any performance assessment are thoroughly articulated and analyzed or addressed." 66 Fed. Reg. 55,747 (Nov. 2, 2001).

The Commission stated further that "uncertainty in performance estimates cannot be so large that the Commission cannot find a reasonable expectation that the post-closure performance objectives will be met." 66 Fed. Reg. 55,748 (Nov. 2, 2001). Unfortunately for Staff's contention argument, the Commission specifically refused to specify what level of uncertainty would be unacceptable. 66 Fed. Reg. 55,747 (Nov. 2, 2001). Thus, whether a particular level of reduced uncertainty is significant or not is a pure judgment call, to be made on the basis of the full record of the proceeding. An analogy would be asking Nevada to demonstrate that a difference of one centimeter is "significant" or "too much." This question is impossible to answer. A difference of one centimeter is significant and may be too much if one is measuring the distance between atoms in a molecule, but not at all significant and probably not too much if one is measuring the distance between earth and the nearest star. Until more context or specification is provided, the most one could say is that a difference of one centimeter cannot be dismissed as insignificant and may easily be too much.

This makes a full and accurate description and accounting of uncertainty extremely important by itself, just as 10 C.F.R. § 63.114 suggests, for without any definition of what level of uncertainty is unacceptable, it must be assumed that any DOE mistake in articulating or analyzing uncertainty may be critical to the ultimate licensing decision.

Moreover, Nevada does not simply contend that DOE has limited the range of uncertainty included in the results of the performance assessment. Rather (Petition at 847), Nevada contends that "many of these choices will affect the overall distribution of results" such that "a full appreciation of the potential overall *bias* in the assessment can only be achieved by propagating the alternatives separately . . . and determining their overall effect on the compliance results . . ." (emphasis added). Thus, the contention is not simply that the range of uncertainty is underestimated by DOE, but that the mean results of the analysis are likely to be biased.

DOE has become locked in to a system in which uncertainty can only be represented through uncertainty in parameter values. DOE fails to recognize that scenario and conceptual uncertainties are judgment based and that the weights that will be placed on different scenarios and alternative conceptual models are also strongly dependent on judgment. Neglecting this both narrows the overall range of uncertainty (because different judgmental positions are not represented) and introduces potential bias (because a specific set of weightings is adopted that would not be universally agreed and may not be consistent with the intent of the regulations).

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

Staff has waived any objection to this contention on the ground that it is non-specific by presenting no argument with respect to compliance with 10 C.F.R. § 2.309(f)(1)(i).

In any event, it is simply not possible to list every single SAR subsection affected by this contention because, as Staff admits (Answer at 874), "data and model uncertainties are discussed

throughout the SAR." This is a classic case where the phrase "and similar subsections" was necessary, and Nevada submits that its failure to enumerate every affected subsection does not detract in any way from a full understanding of what the contention is alleging and why, and it is clear that there is a material dispute with DOE.

REPLY – NEV-SAFETY-160 – PROBABILITY DENSITY FUNCTIONS USED IN THE TSPA

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Staff's argues that this contention does not include information indicating a difference in the outcome of the performance assessment. The Petition (at 853) clearly states that "[t]he results obtained from the TSPA will have been *substantially* determined by the shapes that DOE has adopted" (emphasis added), and (at 854) "this failure to have accounted for the uncertainty in parameter value distributions means that the results of the assessment are likely to be biased.

The degree of such bias cannot be determined without running variant TSPA cases using alternative distributions."

Moreover, Staff's argument that this contention does not include information indicating a difference in the outcome of the performance assessment is based on an incorrect understanding of the role and importance of uncertainty in Part 63. When NRC promulgated Part 63, it decided not to include the subsystem performance requirements in Part 60, and replaced them with a single total systems performance assessment. In defending its elimination of subsystem performance requirements, and its reliance on a total systems performance assessment, the Commission emphasized again and again the importance of accounting for uncertainty in the assessment. Under 10 C.F.R. § 63.114, DOE has the burden to "[a]ccount for uncertainties and variabilities in parameter values," to "provide for the technical basis for parameter ranges, probability distributions, or bounding values," and to "consider alternative conceptual models of features and processes that are consistent with available data and current scientific understanding." As the Commission put it in promulgating Part 63, DOE must show that "uncertainties inherent in any performance assessment are thoroughly articulated and analyzed or addressed." 66 Fed. Reg. 55,747 (Nov. 2, 2001).

The Commission stated further that "uncertainties in performance estimates cannot be so large that the Commission cannot find a reasonable expectation that the post-closure performance objectives will be met." 66 Fed. Reg. 55,748 (Nov. 2, 2001). However, the Commission specifically refused to specify what level of uncertainty would be unacceptable. 66 Fed. Reg. 55,747 (Nov. 2, 2001). This makes a full and accurate description and accounting of uncertainty extremely important by itself, just as 10 C.F.R. § 63.114 suggests, for without any

definition of what level of uncertainty is unacceptable, it must be assumed that any DOE mistake in articulating or analyzing uncertainty may be critical to the ultimate licensing decision.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Staff complains that Nevada failed to be more specific in specifying what SAR subsections are being addressed. However, Nevada referenced "TSPA Model Variables (12/01/2008), LSN# NEV000005505, which is a 350-page compilation of screenshots from the TSPA. The reference is not vague in that it comprises "all the sampled variables" in the TSPA and it is cited in full because the "compilation demonstrates the wide variety of distribution types adopted." (Petition at 851). The SAR itself is lacking in detail and does not offer the level of information needed to support this contention, with the result that citing to specific SAR subsections would have useless. As Nevada made clear (Petition at 851), "TSPA Model Sampled Variables" (12/01/2008), LSN# NEV000005505 is based on an examination of DOE's TSPA model on an external hard drive made available to Nevada, and the study identified all of the sampled variables in the model itself. This study supports the contention, and by its nature, raises a very specific and material dispute with DOE. Elsewhere in the Petition, specific variables are identified by name, *e.g.*, HLW glass surface area exposure factor (Petition at 852). These variables and their characteristics can be looked up under these names in the cited

document. In any event, Staff has waived any objection to this contention on the ground that it is non-specific by presenting no argument with respect to compliance with 10 C.F.R. § 2.309(f)(1)(i).

As explained in II.D. above, Dr. Thorne's affidavit is well reasoned and his opinions are fully articulated. Nevada does not need to demonstrate that TSPA contentions would violate EPA dose standards and a contention alleging that DOE's TSPA does not comply with one or more of NRC's requirements for a performance assessment in 10 C.F.R. §§ 63.101, 63.102, 63.114 and 63.305(c) raises a material issue with DOE.

Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-161 – CRITICAL ROLE OF DRIP SHIELD

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

Nevada's contention is that DOE's application violates the requirement that there be "multiple barriers," because its safety depends dispositively upon a single element of the engineered barrier system – the drip shield. Staff argues that Nevada's argument is the same as the one rejected by the Court of Appeals in *NEI v. EPA*, 373 F.3d 1251, 1294-5 (D.C. Cir. 2004). Staff also argues that this misinterprets Part 63 because that Part has no requirement that each barrier provide absolute compliance with EPA dose standards (Answer at 882-883).

Part 63 imposed no pre-application collection of subsystem performance requirements, including quantitative limits on individual barriers, so that "DOE is provided flexibility . . . and . . . may place greater or lesser reliance on individual components of the repository system when deciding how best to achieve the overall safety objective." 66 Fed. Reg. 55,732, 55,758 (Nov. 2, 2001). Nevada's argument that Part 63's failure to include pre-established, quantitative subsystem performance requirements violated section 121(b)(1)(B) of the NWPA, 42 U.S.C. § 10141(b)(1)(B), was rejected in *NEI v. EPA*. However, *NEI v. EPA* says nothing about whether any particular selection of barriers in a license application would be acceptable under Part 63.

Staff's bare assertion that Part 63 does not require each barrier to provide absolute compliance with EPA dose standards is misleading and incomplete, and ignores Part 63 and its regulatory history. In the preamble to the final Part 63, just after stressing the need to give DOE flexibility in deciding how it wants to meet the performance objectives, the Commission stated explicitly that "[t]herefore, the emphasis should not be on the isolated performance of individual barriers, but rather on ensuring the repository system is robust, *and is not wholly dependent on a single barrier*." 66 Fed. Reg. 55,732, 55,758 (Nov. 2, 2001) (emphasis added).

This avoidance of single barrier dependency ties directly to the requirement in 10 C.F.R. § 63.102 (h) that the barriers work in combination "to enhance the resiliency of the geologic repository," and ultimately to the requirement in section 63.113(b) that "[t]he engineered barrier system must be designed so that, working in combination with natural barriers, radiological exposures to the reasonably maximally exposed individual are within the limits specified at § 63.311 of subpart L of this part . . . ."

Nevada's contention is material because it challenges whether, given DOE's reliance on drip shields, the application's attempt to comply with 63.113(b) fails because it does not satisfy the requirement that overall system performance "not [be] wholly dependent on a single barrier" so that the barrier system would exhibit "enhance[ed] resiliency."

5. <u>A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials</u>

As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements. Nevada's arguments are fully supported by facts and opinion. Staff's arguments here impermissibly address the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

Staff repeats its earlier arguments, addressed above.

REPLY – NEV-SAFETY-162 – DRIP SHIELD INSTALLATION SCHEDULE

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

It is not disputed that DOE plans to install the drip shields about one-hundred years from now, after all of the wastes are emplaced in the tunnels and just prior to repository closure. Nevada's contention alleges that this cannot be justified as safe. This challenges DOE's drip shield concept.

10 C.F.R. § 63.31(a)(2) requires a pre-construction finding that there is a "reasonable expectation" that the waste can be disposed of without "unreasonable risk," and 10 C.F.R. § 63.31(a)(3) provides that in arriving at this determination, it must be considered whether the site and design "comply with" Subpart E, which includes 10 C.F.R. § 63.113(b). Disposal "risk" arises only when wastes are being disposed, and therefore "unreasonable" disposal risk is defined generally by the suite of pre-emplacement safety findings required 10 C.F.R. § 63.41. This suite of findings includes the finding required by 10 C.F.R. § 63.41(a)(2), which is that "any underground storage space required for initial operation" *has been* constructed in compliance with the regulations, including 63.113(b). Under DOE's installation plan, drip shields (part of the "space") will not be installed at the time this finding must be made. Because the referenced

Section 5 of NEV-SAFETY-161 demonstrates that installation of the missing drip shields is vital to compliance with § 63.113(b), such a finding will be impossible to make.

Putting the regulations together, NRC must find prior to issuance of the construction authorization that there is a "reasonable expectation" that, before emplacement of wastes, it will be able to find that the drip shields have been constructed in compliance with § 63.113(b). While under 10 C.F.R. § 63.101(a)(2) "reasonable expectation" allows for some uncertainty, an impossibility is not a "reasonable expectation" in any rational sense, and as noted above, the "has been constructed" finding will be impossible to make under DOE's drip shield installation plan.

Therefore, just as the contention says, NRC cannot now find that DOE's plan to delay installation of the drip shields until just before closure is safe or, to be more precise, NRC cannot now find that the plan complies with 10 C.F.R. § 63.31(a)(2), taking into consideration 10 C.F.R. § 63.113(b). This obviously presents a material issue. While the argument to support this legal conclusion has several steps, it makes eminent sense and must be consistent with Part 63 considered as a whole. The Commission cannot allow construction of a geologic repository, or allow the construction of any complex nuclear facility, if it appears that a safety finding required to be made before operation will be impossible to make. The lack of reasonable assurance of retrieval reinforces the safety significance of this consideration.

Section 121(b)(1)(B) of the NWPA is properly cited because it underpins 10 C.F.R. § 63.113(b). Nevada pointed out that there are no retrieval plans, or even retrieval details, and therefore there is no reasonable assurance that retrieval will be feasible as a fall-back to protect safety. The status of DOE's retrieval plans is part of the basis for the contention because the lack of assurance that retrieval can be accomplished highlights the safety importance of DOE's drip shield installation plan.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Subsection 1.11 of the SAR at 1.11-1 through 1.11-16 describes DOE's proposed retrieval plan in a scant sixteen pages, and provides only limited information about basic retrieval concepts. It promises that "[s]pecific plans for retrieval will be developed and defined in detail should the need for retrieval be identified." *Id*. at 1.11-1 and 1.11-2. Even assuming that no full and complete retrieval plan is now required, the "description" must still be sufficient in order for the NRC to find reasonable assurance that retrieval will be feasible as a fall-back to protect safety if installation of the drip shields proves to be defective or impossible, and (as the contention states) the scant details DOE provides fails to comply with any reasonable concept of an adequate description, given the critical safety function retrieval will provide.

Staff complains that the underlying premise for this contention is purely speculative. This impermissibly attacks the merits of the contention, and is not a proper argument at the contention stage. Moreover, Nevada provided adequate support for the contention referencing specific other contentions, especially NEV-SAFETY-130 and 161. This is not a vague reference to other contentions – the contentions were identified and the propositions for which the two contentions were cited were identified. The Advisory PAPO Board's June 20, 2008 Case Management Order, *U.S. Department of Energy (High-Level Waste Repository: Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (2008), ("LBP-08-10"), specifically allows one contention to reference others. LBP-08-10 at 7. Staff's argument that this referencing is impermissible because it requires the Board to make factual inferences is simply a challenge to the LBP-08-10. Obviously, if a necessary premise for this or any other contention is found in another contention, and that other contention fails at the merits stage, the contention relying on it fails as well.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

Staff's arguments are largely addressed above. Staff also complains about the reference to related SAR subsections. This has no bearing on compliance with 10 C.F.R. § 2.309(f)(1)(vi), because specific SAR subsections are referenced, thereby raising a specific material issue, but in any event as indicated in B above, Nevada's reference to the phrase "and similar subsections" in its contentions is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv, (v), or (vi)..

REPLY – NEV-SAFETY-163 – SCREENING OF NEAR-FIELD CRITICALITY

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

See below for a discussion of probability.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

This contention alleges that DOE relied in the LA entirely on an invalid argument concerning the frequency with which drip shields will be improperly placed and totally neglected to develop arguments on the conditional probability of criticality given such improper placement. This effectively invalidates DOE's argument for "FEPing out" near field criticality. Moreover,

the contention (Petition at 869-870) offers ample grounds to believe that near field criticality cannot be screened out on probability grounds. There it is pointed out that DOE estimates the probability that a drip shield will be improperly installed is $4.36\ 10^{-9}$. With 11,600 drip shields to be installed, this results in an overall probability of one or more drip shields being improperly installed of $5.06\ 10^{-5}$, *i.e.,* less than the screening cut-off of one in ten thousand. Nevada argues that the overall probability of one or more drip shields being improperly installed is orders of magnitude higher than this and so DOE is not compliant with the screening threshold. When Staff argues (Answer at 893-894) that "Nevada has not shown or even attempted to demonstrate that . . . the probability of near-field criticality would exceed the probability threshold" it must not have actually read the contention.

10 C.F.R. § 63.342 provides that DOE "need not evaluate the impacts [of FEPS passing the probability threshold] if the results of the performance assessments would not be changed significantly." If a FEP cannot be screened out on low probability grounds, then it is up to DOE, not Nevada, to establish that "the results of the performance assessments would not be changed significantly."

Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-164 – AGGREGATION OF PROBABILITY DISTRIBUTIONS

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

Nevada's contention provides specifically (at 878) that:

> Overall, the approach adopted is non-compliant with 10 C.F.R. § 63.114 (c), which requires consideration to be given to alternative conceptual models of features and processes that are consistent with available data and current scientific understanding, and to evaluate the effects that alternative conceptual models have on the performance of the geologic repository. Specifically, it is contended that alternative conceptual models of aggregation should have been considered, since they can lead to alternative conceptualizations of the processes for which the elicitations were undertaken. Furthermore, the use of alternative approaches to aggregation would have led to different parameter value distributions. Thus, the failure to consider these alternative models is also non-compliant with 10 C.F.R. § 63.114(b), which requires that any performance assessment used to demonstrate compliance with Section 63.113 must account for uncertainties and variabilities in parameter values and provide for the technical basis for parameter ranges, probability distributions, or bounding values used in the performance assessment. Use of a single, disputed method of aggregation is not adequate to provide such a technical basis.

This answers Staff's objections. The contention properly challenges compliance with 10 C.F.R. § 63.114(c) (which requires alternative conceptual models of features and processes, and relates back to 10 C.F.R. § 63.21(c)(19)) because while, in general, an expert elicitation may not always be a "process," if the particular elicitation represents an effort to properly characterize and take account of a process, the choice of aggregation method leads to alternative conceptualizations of the process for which the elicitation was undertaken. The various model

parameters used in the safety assessment of the proposed Yucca Mountain repository are subject to uncertainty. For this reason, a probabilistic safety assessment was required to be undertaken. This required use of probability distributions to represent the uncertainty associated with the values of many parameters and the timing of future events. These uncertain quantities are incorporated in the TSPA models used by DOE as probability density functions (pdfs), and as such, they represent current uncertainty about the parameters in the model. To argue that the method of arriving at pdfs for the parameters of these models is not itself a model of features, events or processes in the TSPA is fatuous; all the methods for arriving at any of the values, certain or uncertain, in probabilistic safety assessment models could then be dismissed, allowing only debate about the structures of the models, but not their inputs. A pdf represents uncertainty about something, and when that something is an uncertain quantity relating to a feature, event or process, then the probability density function is a part of the model of that feature, event or process, and a part of the TSPA.

Furthermore, the process of generating a pdf is a measurement operation, and all measurements used by DOE, certain or uncertain, are open to question, including the models used in the process of measurement. The claim that expert-judgment-derived probability density functions are not models of the features, events or processes in the TSPA for Yucca Mountain is incorrect. It is surely admissible to question any measurement method or technique used to arrive at any number used in the probabilistic safety assessment, or, indeed, in any other model used to characterize Yucca Mountain.

Moreover, as indicated in the above quote, the contention also challenges compliance with 10 C.F.R. § 63.114(b), which relates to accounting for uncertainty and presents a material issue.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Furthermore, see above for a discussion of 10 C.F.R. § 63.114(c).

Staff's complaints that Nevada has not shown that DOE has not satisfied requirements for consideration of uncertainty miss the point of the contention, which is that DOE's approach of using only one method not only skews the end result but also misrepresents the uncertainty associated with the choice of model. A contention asserting that DOE's TSPA does not properly account for uncertainty is material *per se* because it asserts a violation of the important but separate requirement in 10 C.F.R. § 63.114 to thoroughly articulate and analyze or address uncertainty, to the end that an ultimate decision on whether the level and types of uncertainty are acceptable can be made on the basis of a full and complete record.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.C. above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

Staff's claim that Nevada did not show that any alternative method would affect the distributions used in the application is clearly incorrect. Nevada showed, in Figure 4.2-2 (taken from PVHA-U, LSN# DEN001601965 at 4-115), eight cumulative probability distributions, some of which do not even overlap, with the probability-average distribution spanning a little more than five orders of magnitude. Six of the eight individual distributions differ by one to three orders of magnitude, with two showing spreads of five orders of magnitude. The result of the non-overlap of some distributions combined with the narrower individual spreads, produces a probability-average probability density function (pdf) that is considerably more spread out than any of the probability density function for the eight experts.

What this means is that the tails of the probability-average pdf are over-emphasized beyond what the majority of individual experts actually believe. In terms of the consequences for a probabilistic safety assessment, if small values of an uncertain quantity (*e.g.*, the porosity of rocks) were associated with lower doses and the elicitation results in Figure 4.2-2 were obtained, then the results of the probabilistic safety assessment would be strongly biased downward, since the majority of experts assessed little or no probability in the low range. The degree of bias clearly depends on the actual pdfs obtained for all the uncertain quantities included in the probabilistic safety assessment.

Of course, if high rather than low values of uncertain quantities are favorable to the safety case, then a similar argument could be made about the bias introduced by over-emphasizing the right tail of the pdf. With some uncertain quantities in the left tails, and others in the right tail favoring the safety case, then only a simulation can determine the effect of bias in both left and right tails.

Nevada's contention also reports the results of a published experiment showing that the three aggregation methods, probability-averaging, uncertain-quantity-averaging and a consensus distribution, each gives different results from the others, with the probability-average distribution yielding the most spread-out pdf. Thus, probability averaging potentially biases the safety case by giving too much weight to low values of uncertain quantities.

Finally, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-165 – SATURATED ZONE EXPERT ELICITATION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

In challenging the materiality to findings the NRC must make, NRC Staff must take into account the NRC's regulations and DOE's LA. Consideration of both is necessary, because without it, it is obviously impossible for the NRC Staff to measure the success of the LA in meeting NRC's regulatory requirements. However, NRC Staff focuses its entire materiality argument only on NRC regulations and NRC Staff guidance. It quotes NRC regulation 10 C.F.R. § 63.21(c)(19) as merely requiring "an explanation of how expert elicitation was used" (Answer at 902), implying that the "how" issue is merely a checkmark: DOE will be issued a free pass provided it says **anything** about how it used expert elicitation, no matter how inappropriately or inadequately it may have been used. Then, the NRC Staff proceeds to denigrate its own Staff guidance, both NUREG-1563 (the detailed requirements for an appropriate expert elicitation) and NUREG-1804 (its Yucca Mountain Review Plan articulating its specific expectations for compliance in any instance where DOE elects to rely on expert elicitation). NRC Staff makes the point several times that its NUREGs are not regulations and are not requirements, something with which Nevada takes no issue. Nonetheless, NRC Staff argues that "the admissibility of NEV-SAFETY-165 turns on the question of whether DOE is

required to follow NUREG-1563" (*id*. at 902) and concludes that DOE was not so required, because (as Nevada agrees) NUREG-1563 is NRC guidance, rather than NRC regulation. That ends NRC Staff's analysis, but it ignores the most important component of what should have been its analysis of whether DOE's LA and the commitments therein are sufficient in light of the NRC's regulations and regulatory guidance. DOE is free to embrace in its LA a commitment to observe and adhere to any standard that it wishes to set out (so long as it is not violative of NRC regulations) so long as DOE keeps its commitment.

DOE committed in SAR Subsections 5.4 and in QARD 2.2.9 and 2.2.13.B.7 to strictly embrace the guidance contained in NRC's NUREG-1563 as its methodology in meeting the requisites of 10 C.F.R. § 63.21(c)(19) for the use of expert elicitation in support of the LA. In the same two references, DOE committed to explain the justification for any instance in which it departed from the guidance of NUREG-1563. DOE neither followed the guidance of NUREG-1563 nor did it explain the rationale for its departures from doing so. While DOE might have adopted some other methodology for implementing expert elicitation and offered it as compliant with 10 C.F.R. § 63.21(c)(19), DOE instead chose to commit to the implementation of NUREG-1563. It is that commitment which renders relevant NRC Staff's Yucca Mountain Review Plan NUREG-1804. The primary components of NRC's review of DOE's expert elicitation compliance are contained in NUREG-1804 Section 2.5.4.1(2) (providing that Staff will evaluate the extent to which the guidance in NUREG-1563 was used by DOE to perform expert elicitations) and Section 2.5.4.1(9) (the Staff will verify that DOE provided an adequate explanation for any variance from NUREG-1563 guidance).

Having committed to a specific standard to describe its use of expert elicitation and the adequacy thereof, DOE's compliance must be assessed in light of its adherence to or departure

from the standard DOE itself adopted. Accordingly, the assessment of DOE's adherence to or departure from NUREG-1563 – the standard DOE committed to – is material to the findings the NRC must make in this proceeding.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff advances to totally meritless arguments with respect to Nevada's compliance with Section 5. First, it erroneously states that "Petitioner must meet its burden of presenting factual information **and** expert opinion" to support its contention. The fact is, expert opinion is not required. The Case Management Order of June 20, 2008, specifically recognizes that contentions can be filed that raise pure legal issues, and that any contention may cite to facts contained in appropriate portions of the SAR and any applicable DOE reference documents. *See U.S. Dep't of Energy (High-Level Waste Repository: Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (June 20, 2008), slip op. at 6 and 7-8. Nevada has done so in this contention by identifying the appropriate SAR subsections and portions of referenced DOE documents (citing to the LSN) as well as the reasoning for its conclusions. *See* 10 C.F.R. § 2.309(f)(1)(vi) (requiring "references to specific portions of the application (including the applicant's environmental report and safety report) that the petitioner disputes and the supporting reasons for each dispute"). Moreover, Nevada is free to frame its contentions using assertions of counsel, *see Consumers Power Co. (Midland Plant, Units 1 and 2)*, ALAB-691, 16 NRC 897 (1982), 1982 NRC Lexis 92, *43, which must in fact be the case for contentions that raise pure legal issues. This contention is amply supported by many pages of factual information and analysis, and no expert opinion is necessary to support a fact-based challenge.

NRC Staff's second argument in this section is a rehash of its entire argument under Section 4 above. Specifically, NRC Staff reiterates its emphasis from Section 4 that NUREG-1563 is NRC Staff guidance and is not a mandatory regulation. Accordingly, the Staff argues

that all the factual information provided by Nevada in Section 5 is irrelevant due to the Staff's theory that any factual information offered to prove that DOE did not follow the requirements of NUREG-1563 is automatically not relevant, since NUREG-1563 is not a regulatory requirement. In so arguing, NRC Staff makes the same mistake it did in Section 4 above, ignoring the fact that DOE, free to commit to any standard for the implementation of expert elicitation it chose, chose to commit to the full implementation of and adherence to NUREG-1563 as its expert elicitation methodology of choice. Having so committed in its LA and QARD, **that** is the only standard by which DOE's compliance in the area of expert elicitation can reasonably be evaluated.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi). As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements; and as indicated in II.G. above, NRC Staff improperly shifts the burden of proof to Nevada to establish that DOE **failed** to meet the requirements of 10 C.F.R. § 63.21(c)(19), instead of imposing the burden of proof on DOE to establish its compliance with that regulation.

REPLY – NEV-SAFETY-166 – PROBABILISTIC SEISMIC HAZARD ANALYSIS EXPERT ELICITATION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

In challenging the materiality to findings the NRC must make, NRC Staff must take into account the NRC's regulations and DOE's LA. Consideration of both is necessary, because without it, it is obviously impossible for the NRC Staff to measure the success of the LA in meeting NRC's regulatory requirements. However, NRC Staff focuses its entire materiality argument only on NRC regulations and NRC Staff guidance. It quotes NRC regulation 10 C.F.R. § 63.21(c)(19) as merely requiring "an explanation of how expert elicitation was used" (Answer at 902), implying that the "how" issue is merely a checkmark: DOE will be issued a free pass provided it says **anything** about how it used expert elicitation, no matter how inappropriately or inadequately it may have been used. Then, the NRC Staff proceeds to denigrate its own Staff guidance, both NUREG-1563 (the detailed requirements for an appropriate expert elicitation) and NUREG-1804 (its Yucca Mountain Review Plan articulating its specific expectations for compliance in any instance where DOE elects to rely on expert elicitation). NRC Staff makes the point several times that its NUREGs are not regulations and are not requirements, something with which Nevada takes no issue. Nonetheless, NRC Staff

argues that "the admissibility of NEV-SAFETY-165 turns on the question of whether DOE is required to follow NUREG-1563" (*id*. at 902) and concludes that DOE was not so required, because (as Nevada agrees) NUREG-1563 is NRC guidance, rather than NRC regulation. That ends NRC Staff's analysis, but it ignores the most important component of what should have been its analysis of whether DOE's LA and the commitments therein are sufficient in light of the NRC's regulations and regulatory guidance. DOE is free to embrace in its LA a commitment to observe and adhere to any standard that it wishes to set out (so long as it is not violative of NRC regulations) so long as DOE keeps its commitment.

DOE committed in SAR Subsections 5.4 and in QARD 2.2.9 and 2.2.13.B.7 to strictly embrace the guidance contained in NRC's NUREG-1563 as its methodology in meeting the requisites of 10 C.F.R. § 63.21(c)(19) for the use of expert elicitation in support of the LA. In the same two references, DOE committed to explain the justification for any instance in which it departed from the guidance of NUREG-1563. DOE neither followed the guidance of NUREG-1563 nor did it explain the rationale for its departures from doing so. While DOE might have adopted some other methodology for implementing expert elicitation and offered it as compliant with 10 C.F.R. § 63.21(c)(19), DOE instead chose to commit to the implementation of NUREG-1563. It is that commitment which renders relevant NRC Staff's Yucca Mountain Review Plan NUREG-1804. The primary components of NRC's review of DOE's expert elicitation compliance are contained in NUREG-1804 Section 2.5.4.1(2) (providing that Staff will evaluate the extent to which the guidance in NUREG-1563 was used by DOE to perform expert elicitations) and Section 2.5.4.1(9) (the Staff will verify that DOE provided an adequate explanation for any variance from NUREG-1563 guidance).

Having committed to a specific standard to describe its use of expert elicitation and the adequacy thereof, DOE's compliance must be assessed in light of its adherence to or departure from the standard DOE itself adopted. Accordingly, the assessment of DOE's adherence to or departure from NUREG-1563 – the standard DOE committed to – is material to the findings the NRC must make in this proceeding.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff advances to totally meritless arguments with respect to Nevada's compliance with Section 5. First, it erroneously states that "Petitioner must meet its burden of presenting factual information **and** expert opinion" to support its contention. The fact is, expert opinion is not required. The Case Management Order of June 20, 2008, specifically recognizes that contentions can be filed that raise pure legal issues, and that any contention may cite to facts contained in appropriate portions of the SAR and any applicable DOE reference documents. *See U.S. Dep't of Energy (High-Level Waste Repository: Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (June 20, 2008), slip op. at 6 and 7-8. Nevada has done so in this contention by identifying the appropriate SAR subsections and portions of referenced DOE documents (citing to the LSN) as well as the reasoning for its conclusions. *See* 10 C.F.R. § 2.309(f)(1)(vi) (requiring "references to specific portions of the application (including the applicant's environmental report and safety report) that the petitioner disputes and the supporting reasons for each dispute"). Moreover, Nevada is free to frame its contentions using assertions of counsel, *see Consumers Power Co. (Midland Plant, Units 1 and 2)*, ALAB-691, 16 NRC 897 (1982), 1982 NRC Lexis 92, *43, which must in fact be the case for contentions that raise pure legal issues. This contention is amply supported by many pages of factual information and analysis, and no expert opinion is necessary to support a fact-based challenge.

NRC Staff's second argument in this section is a rehash of its entire argument under Section 4 above. Specifically, NRC Staff reiterates its emphasis from Section 4 that NUREG-1563 is NRC Staff guidance and is not a mandatory regulation. Accordingly, the Staff argues that all the factual information provided by Nevada in Section 5 is irrelevant due to the Staff's theory that any factual information offered to prove that DOE did not follow the requirements of NUREG-1563 is automatically not relevant, since NUREG-1563 is not a regulatory requirement. In so arguing, NRC Staff makes the same mistake it did in Section 4 above, ignoring the fact that DOE, free to commit to any standard for the implementation of expert elicitation it chose, chose to commit to the full implementation of and adherence to NUREG-1563 as its expert elicitation methodology of choice. Having so committed in its LA and QARD, **that** is the only standard by which DOE's compliance in the area of expert elicitation can reasonably be evaluated.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi). As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements; and as indicated in II.G. above, NRC Staff improperly shifts the burden of proof to Nevada to establish

that DOE **failed** to meet the requirements of 10 C.F.R. § 63.21(c)(19), instead of imposing the burden of proof on DOE to establish its compliance with that regulation.

REPLY – NEV-SAFETY-167 – PROBABILISTIC VOLCANIC HAZARD ANALYSIS EXPERT ELICITATION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

In challenging the materiality to findings the NRC must make, NRC Staff must take into account the NRC's regulations and DOE's LA. Consideration of both is necessary, because without it, it is obviously impossible for the NRC Staff to measure the success of the LA in meeting NRC's regulatory requirements. However, NRC Staff focuses its entire materiality argument only on NRC regulations and NRC Staff guidance. It quotes NRC regulation 10 C.F.R. § 63.21(c)(19) as merely requiring "an explanation of how expert elicitation was used" (Answer at 902), implying that the "how" issue is merely a checkmark: DOE will be issued a free pass provided it says **anything** about how it used expert elicitation, no matter how inappropriately or inadequately it may have been used. Then, the NRC Staff proceeds to denigrate its own Staff guidance, both NUREG-1563 (the detailed requirements for an appropriate expert elicitation) and NUREG-1804 (its Yucca Mountain Review Plan articulating its specific expectations for compliance in any instance where DOE elects to rely on expert elicitation). NRC Staff makes the point several times that its NUREGs are not regulations and are not requirements, something with which Nevada takes no issue. Nonetheless, NRC Staff

argues that "the admissibility of NEV-SAFETY-165 turns on the question of whether DOE is required to follow NUREG-1563" (*id*. at 902) and concludes that DOE was not so required, because (as Nevada agrees) NUREG-1563 is NRC guidance, rather than NRC regulation. That ends NRC Staff's analysis, but it ignores the most important component of what should have been its analysis of whether DOE's LA and the commitments therein are sufficient in light of the NRC's regulations and regulatory guidance. DOE is free to embrace in its LA a commitment to observe and adhere to any standard that it wishes to set out (so long as it is not violative of NRC regulations) so long as DOE keeps its commitment.

DOE committed in SAR Subsections 5.4 and in QARD 2.2.9 and 2.2.13.B.7 to strictly embrace the guidance contained in NRC's NUREG-1563 as its methodology in meeting the requisites of 10 C.F.R. § 63.21(c)(19) for the use of expert elicitation in support of the LA. In the same two references, DOE committed to explain the justification for any instance in which it departed from the guidance of NUREG-1563. DOE neither followed the guidance of NUREG-1563 nor did it explain the rationale for its departures from doing so. While DOE might have adopted some other methodology for implementing expert elicitation and offered it as compliant with 10 C.F.R. § 63.21(c)(19), DOE instead chose to commit to the implementation of NUREG-1563. It is that commitment which renders relevant NRC Staff's Yucca Mountain Review Plan NUREG-1804. The primary components of NRC's review of DOE's expert elicitation compliance are contained in NUREG-1804 Section 2.5.4.1(2) (providing that Staff will evaluate the extent to which the guidance in NUREG-1563 was used by DOE to perform expert elicitations) and Section 2.5.4.1(9) (the Staff will verify that DOE provided an adequate explanation for any variance from NUREG-1563 guidance).

Having committed to a specific standard to describe its use of expert elicitation and the adequacy thereof, DOE's compliance must be assessed in light of its adherence to or departure from the standard DOE itself adopted. Accordingly, the assessment of DOE's adherence to or departure from NUREG-1563 – the standard DOE committed to – is material to the findings the NRC must make in this proceeding.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff advances to totally meritless arguments with respect to Nevada's compliance with Section 5. First, it erroneously states that "Petitioner must meet its burden of presenting factual information **and** expert opinion" to support its contention. The fact is, expert opinion is not required. The Case Management Order of June 20, 2008, specifically recognizes that contentions can be filed that raise pure legal issues, and that any contention may cite to facts contained in appropriate portions of the SAR and any applicable DOE reference documents. *See U.S. Dep't of Energy (High-Level Waste Repository: Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (June 20, 2008), slip op. at 6 and 7-8. Nevada has done so in this contention by identifying the appropriate SAR subsections and portions of referenced DOE documents (citing to the LSN) as well as the reasoning for its conclusions. *See* 10 C.F.R. § 2.309(f)(1)(vi) (requiring "references to specific portions of the application (including the applicant's environmental report and safety report) that the petitioner disputes and the supporting reasons for each dispute"). Moreover, Nevada is free to frame its contentions using assertions of counsel, *see Consumers Power Co. (Midland Plant, Units 1 and 2)*, ALAB-691, 16 NRC 897 (1982), 1982 NRC Lexis 92, *43, which must in fact be the case for contentions that raise pure legal issues. This contention is amply supported by many pages of factual information and analysis, and no expert opinion is necessary to support a fact-based challenge.

NRC Staff's second argument in this section is a rehash of its entire argument under Section 4 above. Specifically, NRC Staff reiterates its emphasis from Section 4 that NUREG-1563 is NRC Staff guidance and is not a mandatory regulation. Accordingly, the Staff argues that all the factual information provided by Nevada in Section 5 is irrelevant due to the Staff's theory that any factual information offered to prove that DOE did not follow the requirements of NUREG-1563 is automatically not relevant, since NUREG-1563 is not a regulatory requirement. In so arguing, NRC Staff makes the same mistake it did in Section 4 above, ignoring the fact that DOE, free to commit to any standard for the implementation of expert elicitation it chose, chose to commit to the full implementation of and adherence to NUREG-1563 as its expert elicitation methodology of choice. Having so committed in its LA and QARD, **that** is the only standard by which DOE's compliance in the area of expert elicitation can reasonably be evaluated.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi). As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements; and as indicated in II.G. above, NRC Staff improperly shifts the burden of proof to Nevada to establish

that DOE **failed** to meet the requirements of 10 C.F.R. § 63.21(c)(19), instead of imposing the burden of proof on DOE to establish its compliance with that regulation.

REPLY – NEV-SAFETY-168 – RETRIEVAL PRACTICALITY

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's Response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

Nevada cites to a specific subsections other 1.11, namely subsection 1.3.1.2.8 (Petition at 909). Moreover, as indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-169 – DEFERRED RETRIEVAL PLANS

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

This contention alleges non-compliance with 10 C.F.R. §§ 63.21(c)(7) and 63.31(a)(1)-(3). It poses a legal question regarding how one or more provisions in Part 63 should be interpreted and questions regarding how Part 63 should be interpreted are obviously material on their face. Staff's argument goes to the merits, and if it is relevant at all at the contention stage, it belongs under 5.

In any event, 10 C.F.R. § 63.21(c)(7) is the key regulation. It requires that DOE's application have a "description of plans for retrieval." A requirement for a "description" of a "plan" may logically imply the existence the plan being described, but whether this is so depends on the regulatory history of the regulation. In this case the regulatory history is clear that actual plans are required. The preamble to the final Part 63 rule explains that "DOE can expect that its *plans and procedures* in this [retrieval] area will receive extensive, detailed review by the NRC *staff as part of any construction authorization review*. The feasibility and reasonableness of DOE's retrieval plans *will be reviewed by the NRC staff at the time of the license application submittal*." 66 Fed. Reg. 55,732, 55,743 (Nov. 2, 2001) [emphasis added].

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

   No reply necessary based on NRC Staff's Response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

   No reply necessary based on NRC Staff's Response.

REPLY – NEV-SAFETY-170 – CONSERVATISMS AND THE PMA

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

The PMA is part of DOE's application. If, as Staff` argues here (Answer at 923), 'the PMA is not being used [by] DOE to demonstrate that it [the TSPA] meets the requirements of Part 63," then it is should be struck from the application as completely irrelevant. But if, as the application indicates, DOE wants to use the PMA to bolster the credibility of its TSPA, then Nevada is entitled to challenge it.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Staff does not object to the contention for lack of specificity (10 C.F.R. § 2.309(f)(1)(i)), but complains here about a "blanket assertion" (Answer at 924). The essence of Nevada's contention is that the PMA assumes conservatisms on the PMA that do not, in fact, exist. To support this claim, Nevada cited to the PMA itself, to an expert opinion, and to other listed contentions that (in their supporting references and expert opinions) establish that elements of the TSPA are not conservative. These expert opinions were drafted by the experts and the affidavits incorporate material in the contentions merely to avoid the need for hundreds of affidavits, each associated with one contention. No law disallows this approach, or holds that such an approach disqualifies the opinion. Moreover, Nevada is entitled to cite to other

contentions. *U.S. Department of Energy (High-Level Waste Repository: Pre-Application Matters, Advisory PAPO Board),* LBP-08-10 at 7, 67 NRC 450 (June 20, 2008).

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

Staff complains about the statement "referred to in related subsections." As indicated in B above, Nevada's reference to the phrase "and similar subsections" in its contentions is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(vi).

REPLY – NEV-SAFETY-171 – PMA AND QA

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

This contention raises a material legal issue. That fact that the PMA "was conducted *in addition to* DOE's validation requirements and was included as a way to enhance confidence in the TSPA" (Answer at 928) establishes materiality, for analyses offered to "enhance confidence" are offered to show compliance with Part 63 and Nevada is entitled to challenge it. If DOE wants to use the PMA to bolster the credibility of its TSPA, then Nevada is entitled to challenge it; if the PMA is an optional analysis than has no bearing on DOE's safety case, then it should be struck from the application.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's Response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

Staff complains about the statement "referred to in related subsections." As indicated in B above, Nevada's reference to the phrase "and similar subsections" in its contentions is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(vi).

REPLY – NEV-SAFETY-172 – INSPECTION AND VERIFICATION OF TAD

NRC Staff places its response to NEV-SAFETY-172 in the category: "Not Opposed or Opposed in Part Contentions. The Staff does not oppose the admissibility of the following contentions" (Answer at 1571).

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

NRC Staff complains because, in this contention, Nevada raises a specifically identified SAR subsection, and then adds the phrase "similar and related" subsections. NRC Staff raises its complaint under 10 C.F.R. § 2.309(f)(1)(vi), asserting that that section requires information provided include references to specific portions of the application that the Petitioner disputes. NRC Staff claims disingenuously that it and DOE should not have to guess which sections Nevada believes are "similar and related" to the named subsection. As Nevada explains in detail in II.B. above, Nevada's reference to the phrase "and similar subsections" or "related

subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and therefore does not undermine its compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

Without suggesting that it is in any way a criticism of this contention, or questioning its admissibility on this ground, NRC Staff "notes" that in November it issued a Request for Additional Information (RAI) (LSN# NRC000029880), which according to NRC Staff "raised a similar issue" as this contention (Answer at 1621). NRC Staff goes on to suggest that DOE has "acknowledged its responsibility to assure that relevant work performed for DOE by subcontractors is accomplished in accordance with a compliant quality assurance program" (Answer at 1621-22). To the extent the NRC Staff adds this "note" in its response to this contention, Nevada would make two points: (1) neither the RAI sent by NRC Staff nor the response to it sent by DOE on December 10 are in any way part of the LA submitted by DOE on June 3, 2008, and accordingly, there is no reason that the matter should be "noted" at all in connection with this contention; and (2) if the "note" by NRC Staff is meant to suggest that DOE has yielded on the issue raised in this contention, and that it fully intends to inspect TAD canisters and their loading at the nuclear reactor sites (and abandon its position that it has no right to be there in the first place), NRC Staff will discover that no such concession has been made when it reads DOE's response regarding this Nevada contention. As indicated in II.C. above, Nevada's contention bases far exceed NRC requirements.

REPLY – NEV-SAFETY-173 – EMPLACEMENT DRIFT MONITORING

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

Nevada established the materiality of its contention when it stated that the cited deficiencies mean that "the LA assumptions related to waste package emplacement and the effectiveness of the engineered barrier system are unfounded" (Petition at 935). This means that the TSPA relies on unfounded assumptions, and without a valid TSPA, there can be no showing of compliance with EPA dose standards as required by 10 C.F.R. § 63.311.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's Response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As indicated in II.B. above, Nevada's reference to the phrase "and similar subsections" in its contentions is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv) or (vi).

REPLY – NEV-SAFETY-174 – CONTROLS AND RESTRICTIONS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

As noted in the Petition, DOE has not identified the details and mechanisms it will use to implement the flight restrictions and operational controls that supposedly will be in place in accordance with and to ensure compliance with the Part 63 requirements cited in the Petition. In addition, there is no evidence that any methodology exists to ensure compliance with the restrictions. For example, DOE does not address how it will ensure that no more that 1,000 aircraft fly over the restricted airspace, or that no aircraft will overfly the area with ordnance or electronic jamming pods, or that aircraft will operate in straight and level flight over the area. Moreover, even though the DOE insists that these procedural controls will ensure compliance, any aircraft in distress with an emergency is authorized to deviate from all rules and regulations in order to ensure the safety of the aircraft. Therefore, during an in-flight emergency the rules

that the DOE has imposed over Yucca Mountain, do not apply to the stricken aircraft. The proposed restricted airspace over Yucca Mountain will be meaningless if an aircraft has a catastrophic emergency, which normally occurs prior to a crash. The restrictions to flight near the repository only apply to aircraft without emergencies.

Aircraft that are disabled or wounded will declare an emergency and exercise a rule called Captain's Authority. These aircraft operate entirely at the Captain's discretion. In these circumstances, the normal airspace and flight restrictions do not apply to the aircraft and the Captain can do whatever he/she deems necessary to save the aircraft, including flying into airspace that is normally restricted. The recent example of the US Airways flight that landed in the Hudson River is a classic example because the Captain was authorized to save the disabled aircraft in the best way he saw fit. Under normal rules of flying, pilots must land on prepared surfaces or lose their license; however, under an emergency situation, the normal flying rules no longer apply. The Captain is has sole discretion to save the aircraft, even if it means ignoring normal rules.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10

C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

Finally NRC Staff's Answer refers to a Request for Information submitted to DOE on November 18, 2008 and DOE's response dated December 31, 2008, to support the argument that this contention may be moot. However, both documents post-dates the statements contained in DOE's LA and SAR by 5-6 months, and therefore neither document is not appropriate for consideration here.

REPLY – NEV-SAFETY-175 – CONTROLS ON PILOT RELIEF

1. A statement of the contention itself

No reply necessary based on NRC Staff's response

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As noted in the Petition, DOE has not identified the details and mechanisms it will use to implement the flight restrictions and operational controls that supposedly will be in place in accordance with and to ensure compliance with the Part 63 requirements cited in the Petition. In addition, there is no evidence that any methodology exists to ensure compliance with the restrictions. For example, DOE does not address how it will ensure that no pilot will use a piddle pack when operating within the flight restricted airspace. Moreover, even though the DOE insists that these procedural controls will ensure compliance, any aircraft in distress with an emergency is authorized to deviate from all rules and regulations in order to ensure the safety of the aircraft. Therefore, during an in-flight emergency the rules that the DOE has imposed over Yucca Mountain, do not apply to the stricken aircraft. The proposed restricted airspace over Yucca Mountain will be meaningless if an aircraft has a catastrophic emergency, which normally occurs prior to a crash. The restrictions to flight near the repository only apply to aircraft without emergencies.

Aircraft that are disabled or wounded will declare an emergency and exercise a rule called Captain's Authority. These aircraft operate entirely at the Captain's discretion. In these circumstances, the normal airspace and flight restrictions do not apply to the aircraft and the Captain can do whatever he/she deems necessary to save the aircraft, including flying into airspace that is normally restricted. The recent example of the US Airways flight that landed in the Hudson River is a classic example because the Captain was authorized to save the disabled aircraft in the best way he saw fit. Under normal rules of flying, pilots must land on prepared surfaces or lose their license; however, under an emergency situation, the normal flying rules no

longer apply. The Captain is has sole discretion to save the aircraft, even if it means ignoring normal rules.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

Finally NRC Staff's Answer refers to a Request for Information submitted to DOE on November 18, 2008 and DOE's response dated December 31, 2008, to support the argument that this contention may be moot. However, both documents post-dates the statements contained in DOE's LA and SAR by 5-6 months, and therefore neither document is not appropriate for consideration here.

REPLY – NEV-SAFETY-176 – CONTROLS ON PILOT MANEUVERING

1. A statement of the contention itself

No reply necessary based on NRC Staff's response

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As noted in the Petition, DOE has not identified the details and mechanisms it will use to implement the flight restrictions and operational controls that supposedly will be in place in accordance with and to ensure compliance with the Part 63 requirements cited in the Petition. In addition, there is no evidence that any methodology exists to ensure compliance with the restrictions. For example, DOE does not address how it will ensure that no more that 1,000 aircraft fly over the restricted airspace, or that no aircraft will overfly the area with ordnance or electronic jamming pods, or that aircraft will operate in straight and level flight over the area. Moreover, even though the DOE insists that these procedural controls will ensure compliance, any aircraft in distress with an emergency is authorized to deviate from all rules and regulations in order to ensure the safety of the aircraft. Therefore, during an in-flight emergency the rules that the DOE has imposed over Yucca Mountain, do not apply to the stricken aircraft. The proposed restricted airspace over Yucca Mountain will be meaningless if an aircraft has a catastrophic emergency, which normally occurs prior to a crash. The restrictions to flight near the repository only apply to aircraft without emergencies.

Aircraft that are disabled or wounded will declare an emergency and exercise a rule called Captain's Authority. These aircraft operate entirely at the Captain's discretion. In these circumstances, the normal airspace and flight restrictions do not apply to the aircraft and the Captain can do whatever he/she deems necessary to save the aircraft, including flying into airspace that is normally restricted. The recent example of the US Airways flight that landed in the Hudson River is a classic example because the Captain was authorized to save the disabled aircraft in the best way he saw fit. Under normal rules of flying, pilots must land on prepared surfaces or lose their license; however, under an emergency situation, the normal flying rules no

longer apply. The Captain is has sole discretion to save the aircraft, even if it means ignoring normal rules.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

Finally NRC Staff's Answer refers to a Request for Information submitted to DOE on November 18, 2008 and DOE's response dated December 31, 2008, to support the argument that this contention may be moot. However, both documents post-dates the statements contained in DOE's LA and SAR by 5-6 months, and therefore neither document is not appropriate for consideration here.

REPLY – NEV-SAFETY-177 – CONTROLS ON HELICOPTERS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

As noted in the Petition, DOE has not identified the details and mechanisms it will use to implement the flight restrictions and operational controls that supposedly will be in place in accordance with and to ensure compliance with the Part 63 requirements cited in the Petition. In addition, there is no evidence that any methodology exists to ensure compliance with the restrictions. For example, DOE does not address how it will ensure that helicopter pilots will not fly within 0.5 miles of the repository. Moreover, even though the DOE insists that these procedural controls will ensure compliance, any aircraft in distress with an emergency is authorized to deviate from all rules and regulations in order to ensure the safety of the aircraft. Therefore, during an in-flight emergency the rules that the DOE has imposed over Yucca Mountain, do not apply to the stricken aircraft. The proposed restricted airspace over Yucca Mountain will be meaningless if an aircraft has a catastrophic emergency, which normally occurs prior to a crash. The restrictions to flight near the repository only apply to aircraft without emergencies.

Aircraft that are disabled or wounded will declare an emergency and exercise a rule called Captain's Authority. These aircraft operate entirely at the Captain's discretion. In these circumstances, the normal airspace and flight restrictions do not apply to the aircraft and the Captain can do whatever he/she deems necessary to save the aircraft, including flying into airspace that is normally restricted. The recent example of the US Airways flight that landed in the Hudson River is a classic example because the Captain was authorized to save the disabled aircraft in the best way he saw fit. Under normal rules of flying, pilots must land on prepared surfaces or lose their license; however, under an emergency situation, the normal flying rules no

longer apply. The Captain is has sole discretion to save the aircraft, even if it means ignoring normal rules.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

Finally NRC Staff's Answer refers to a Request for Information submitted to DOE on November 18, 2008 and DOE's response dated December 31, 2008, to support the argument that this contention may be moot. However, both documents post-dates the statements contained in DOE's LA and SAR by 5-6 months, and therefore neither document is not appropriate for consideration here.

REPLY – NEV-SAFETY-178 – BASIS FOR AIRCRAFT EXCLUSIONS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

NRC Staff's arguments about the qualifications of Mr. Hugh Horstman are completely unfounded as he is fully qualified to opine on matters set forth in this contention based upon his affidavit. *See* Petition, Attachment 12. In addition, Mr. Horstman is testifying on matters that fall within his area of expertise contrary to the case cited by NRC. Furthermore, Mr. Horstman

recently appeared as an expert witness in the Private Fuels Storage proceeding before the NRC on similar matters.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

The approved method of calculating crash frequencies, provided by the NRC, is called the "ACRAM" model (Petition at 953). It provides a methodology to calculate aircraft crashes based of four factors and is simple to understand and implement. DOE used the ACRAM model but based its calculations on a 100-mile regional setting and a 30-mile criterion zone in which no crashes have occurred to establish crash rates. DOE has examined aircraft crashes within 100 miles of Yucca Mountain, and virtually all of the Nevada Test and Training Range (NTTR) is contained in the 100 mile zone but only occupies approximately one third of the area contained in the 100 mile zone. However, the NTTR airspace is the only airspace that provides a reasonable basis that is applicable to determining crash frequency. Military fighter aircraft fly in the NTTR, not outside of it, and the repository is located inside the NTTR. Civilian aircraft routinely operate in the NTTR. Virtually all of the aircraft crashes inside the 100 mile zone have occurred in the NTTR.

By using a 100 mile circle, DOE increases the area by a factor of three, which correspondingly reduces the risk factor by the same factor. The purpose of using the 100 mile calculation is to create a larger area in order to reduce the calculated crash density. DOE also uses a 30 miles radius for further calculations for screening under the false assumption that the 30 mile zone is only for airways and approach or holding patterns, not maneuvering aircraft. Aggressive maneuvering occurs routinely within 30 miles of the repository and has occurred for decades given that the restricted airspace is designed for high performance maneuvering. The end result is that the DOE has further screened out typical flight activity near the repository by

excluding special mode flight activity, or all Type 0 events. In the DOE calculations, only normal mode flight activity (Type 1) is used, which is associated with a lower crash density. All crash frequency calculations based on the 30 mile exclusion zone are without basis.

It is not a coincidence that there have been no accidents in the observation period inside the 30 mile zone, since the size of this zone is arbitrarily defined by the DOE. However, if the zone were 50 miles, then there would be multiple aircraft crashes in the same observation period. DOE cannot exert control over all of the airspace inside the 30 mile zone, only the NTS, and thus has no authority to impose any further flight restrictions over the areas it does not control.

In sum, DOE has created a new model because if it properly used the ACRAM model along with the data provided by the Air Force the frequency analysis result would have been in excess of the screening threshold. It is important to understand that the aircraft operating outside the flight restricted airspace are not subject to the restrictions placed on those over the restricted airspace. The aircraft maneuver aggressively and at high speeds throughout the NTTR. Instead of using appropriate frequency factors for crash density calculations, the DOE has reduced or screened out as many of the relevant components as possible.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

Finally NRC Staff's Answer refers to a Request for Information submitted to DOE on November 18, 2008 and DOE's response dated December 31, 2008, to support the argument that this contention may be moot. However, both documents post-dates the statements contained in DOE's LA and SAR by 5-6 months, and therefore neither document is not appropriate for consideration here.

REPLY – NEV-SAFETY-179 – CONTROLS ON AIRCRAFT OPERATIONS (MID-AIR)

1. A statement of the contention itself

No reply necessary based on NRC Staff's response

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

DOE has classified aircraft crashes into two types, Type 0 and Type 1. In summary, Type 1 events are consistent with cruise type flight, whereas Type 0 events, according to the DOE interpretation, are not applicable to overflight above the repository. DOE further reclassifies all potential Type 1 flights as Type 0 if the aircraft were not flying completely straight and level. DOE then screens out all Type 0 events from its risk calculations. By screening out all Type 0 events, DOE significantly reduces the corresponding crash frequency estimates. Essentially, DOE has concocted a methodology in which only a handful of aircraft mishaps could possibly contribute to its crash frequency estimate.

DOE adopted an Air Force provided statistic that labels flights as "normal" or "special" depending on the maneuvering required for the flight. DOE then adopts what they call Type 0 to

further limit the number of crashes that are accepted into their crash database. This was not sufficient to generate a crash frequency that was tolerable, so DOE moved all mid-air collisions to category Type 1. DOE then also excluded all the aircraft with a crash initiating event further than 4.9 nautical miles from the site. This is not only unreasonable, it is not realistic or conservative, and the methodology has not been vetted by any outside organization or agency.

DOE incorrectly labels several accidents that are clearly Type 1 with the Type 0 classification, even though the aircraft were performing activities consistent with Type 1 activities and were also essentially flying straight and level. DOE also determined, on the basis of its own judgment, that several mid-air collisions that occurred during essentially straight and level flight were not Type 1 and these were reassigned, without justification or explanation, to Type 0.

Although mid-air collisions occur more frequently during simulated combat maneuvering, they also occur during non-combat maneuvering. In fact, the contention (Petition at 956-57) identified three mid-air collisions that occurred during routine flight in a normal flight mode, but DOE determined that they did not warrant the Type 1 classification. Instead they were assigned to Type 0 and were thus excluded from the crash frequency calculations.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

Finally NRC Staff's Answer refers to a Request for Information submitted to DOE on November 18, 2008 and DOE's response dated December 31, 2008, to support the argument that this contention may be moot. However, both documents post-dates the statements contained in DOE's LA and SAR by 5-6 months, and therefore neither document is not appropriate for consideration here.

REPLY – NEV-SAFETY-180 – CRASH FREQUENCY OF FIXED-WING AIRCRAFT

1. A statement of the contention itself

No reply necessary based on NRC Staff's response

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

DOE has classified aircraft crashes into two types, Type 0 and Type 1. In summary, Type 1 events are consistent with cruise type flight, whereas Type 0 events, according to the DOE interpretation, are not applicable to overflight above the repository. DOE further reclassifies all potential Type 1 flights as Type 0 if the aircraft were not flying completely straight and level. DOE then screens out all Type 0 events from its risk calculations. By screening out all Type 0 events, DOE significantly reduces the corresponding crash frequency estimates. Essentially, DOE has concocted a methodology in which only a handful of aircraft mishaps could possibly contribute to its crash frequency estimate.

DOE adopted an Air Force provided statistic that labels flights as "normal" or "special" depending on the maneuvering required for the flight. DOE then adopts what they call Type 0 to

further limit the number of crashes that are accepted into their crash database. This was not sufficient to generate a crash frequency that was tolerable, so DOE moved all mid-air collisions to category Type 1. DOE then also excluded all the aircraft with a crash initiating event further than 4.9 nautical miles from the site. This is not only unreasonable, it is not realistic or conservative, and the methodology has not been vetted by any outside organization or agency.

DOE incorrectly labels several accidents that are clearly Type 1 with the Type 0 classification, even though the aircraft were performing activities consistent with Type 1 activities and were also essentially flying straight and level. DOE also determined, on the basis of its own judgment, that several mid-air collisions that occurred during essentially straight and level flight were not Type 1 and these were reassigned, without justification or explanation, to Type 0.

Although mid-air collisions occur more frequently during simulated combat maneuvering, they also occur during non-combat maneuvering. In fact, the contention (Petition at 956-57) identified three mid-air collisions that occurred during routine flight in a normal flight mode, but DOE determined that they did not warrant the Type 1 classification. Instead they were assigned to Type 0 and were thus excluded from the crash frequency calculations.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

REPLY – NEV-SAFETY-181 – BASIS FOR CRASH DENSITY CALCULATIONS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

DOE uses in its calculations the historical number of crashes that occurred in a large regional setting during a specific observation period. The observation period used by DOE results in an average sortie count per year. The observation period used included both Gulf Wars in Iraq and the one in Afghanistan. During the deployments to Iraq and Afghanistan, the flight activity in the NTTR was cut almost in half. DOE did not adjust its average to reflect the huge deployments or any other anomalies. Further, DOE assumes that the number of sorties will not increase in the future. Thus, the DOE baseline of sorties per year is misleading and not conservative.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material

dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

Finally NRC Staff's Answer refers to a Request for Information submitted to DOE on November 18, 2008 and DOE's response dated December 31, 2008, to support the argument that this contention may be moot. However, both documents post-dates the statements contained in DOE's LA and SAR by 5-6 months, and therefore neither document is not appropriate for consideration here.

REPLY – NEV-SAFETY-182 – GLIDE DISTANCE

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

NRC Staff's arguments about the qualifications of Mr. Hugh Horstman are completely unfounded as he is fully qualified to opine on matters set forth in this contention based upon his affidavit (Petition, Attachment 12). In addition, Mr. Horstman is testifying on matters that fall within his area of expertise contrary to the case cited by NRC. Furthermore, Mr. Horstman

recently appeared as an expert witness in the Private Fuels Storage proceeding before the NRC on similar matters.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

DOE attempts to manipulate the crash frequency by making a false assumption that pilot ejection is an immediate response to engine failure or other crash-initiating events. This assumption eliminates the distance an aircraft travels from the catastrophic initiating event until actual pilot ejection. In many cases, this distance is well in excess of 20 miles. Additionally, DOE inappropriately screens out numerous historical crashes by artificially defining a 30 mile zone around the repository in which crashes have not occurred, resulting in a crash density that is not accurate. Furthermore, DOE claims that because the repository is near the NTTR border, the NTS border and an airway that pilots will not fly aggressively. This assumption is used to justify a lower crash density and is also false.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

Finally NRC Staff's Answer refers to a Request for Information submitted to DOE on November 18, 2008 and DOE's response dated December 31, 2008, to support the argument that this contention may be moot. However, both documents post-date the statements contained in DOE's LA and SAR by 5-6 months, and therefore neither document is not appropriate for consideration here.

REPLY – NEV-SAFETY-183 – CRASH RATES

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive. When Staff counsel argue that a referenced study does not support the contention, they are engaging in a technical dispute with the expert about the meaning of the study. Counsel are not qualified as experts and cannot engage in a scientific dispute, and even if they could, this argument again impermissibly addresses the merits.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

DOE attempts to manipulate the crash frequency by making a false assumption that pilot ejection is an immediate response to engine failure or other crash-initiating events. This assumption eliminates the distance an aircraft travels from the catastrophic initiating event until actual pilot ejection. In many cases, this distance is well in excess of 20 miles. Additionally, DOE inappropriately screens out numerous historical crashes by artificially defining a 30 mile zone around the repository in which crashes have not occurred, resulting in a crash density that is not accurate. Furthermore, DOE claims that because the repository is near the NTTR border, the NTS border and an airway that pilots will not fly aggressively. This assumption is used to justify a lower crash density and is also false.

As indicated in II.C above, Nevada's contention bases included under Section 5 far exceed the Commission's contention requirements and support the existence of a material dispute. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, when the opinions refer to other scientific studies, it is obviously the expert judgment that the studies are supportive.

Furthermore, as indicated in II.B above, Nevada's reference to the phrase "and similar subsections" or "related subsections" is fully in accord with the specificity requirement of 10 C.F.R. § 2.309(f)(1)(i) and does not undermine compliance with 10 C.F.R. § 2.309(f)(1)(iv), (v), or (vi).

Finally NRC Staff's Answer refers to a Request for Information submitted to DOE on November 18, 2008 and DOE's response dated December 31, 2008, to support the argument that

this contention may be moot. However, both documents post-date the statements contained in DOE's LA and SAR by 5-6 months, and therefore neither document is not appropriate for consideration here.

REPLY – NEV-SAFETY-184 – RIGHT-OF-WAY N-48602

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

NRC argues that Nevada fails to satisfy the pleading requirements of 10 C.F.R. § 2.309(f)(1)(vi) because "Nevada does not raise a genuine dispute with respect to a material issue of law or fact with the applicant" for the reasons that "DOE acknowledges that right-of-way N-48602 is not a sufficient legal interest to satisfy § 63.121(a) and explains that completion of the land withdrawal or acquisition process will clear the land of all encumbrances prohibited by § 63.121(b)" (Answer at 976).

NRC and Nevada agree that this contention focuses on a genuine dispute that is material to the findings that NRC must make to license Yucca Mountain and therefore within the scope of this proceeding – namely, whether Right-of-Way N-48602 as described in SAR Subsection 5.8.1.1 satisfies the requirements of 10 C.F.R. § 63.121. In that regard, it is critical to consider

exactly what DOE said, and did not say, in SAR Subsection 5.8.1.1 with regard to Right-of-Way N-48602:

> Right-of-Way N-48602 was granted to DOE by the Bureau of Land Management subject to concurrence by the United States Air Force on October 10, 1989, and renewed on June 28, 1994; January 5, 2001; and April 8, 2004. The most recent renewal of this right-of-way expires in 2014 (BLM 2008). This right-of-way reservation covers a portion of the Nevada Test and Training Range. The Bureau of Land Management retains the right to issue rights-of-way on the Nevada Test and Training Range, with the concurrence of the U.S. Air Force, under Section 3011(b)(5)(E) of the Military Lands Withdrawal Act of 1999, Public Law No. 106-65, 113 Stat. 885 (October 5, 1999). The current right-of-way covers a portion of the GROA and the northwestern portion of the surrounding land. The land within this right-of-way has been withdrawn from all forms of appropriation under the public land laws, including mining laws and geothermal leasing laws.

SAR at 5.8-3. SAR Figure 5.8-1 illustrates that the vast majority of the emplacement tunnels at Yucca Mountain are in land whose ownership and control is governed by Right-of-Way N-48602. DOE provides no other discussion of Right-of-Way N-48602 in the SAR.

However, contrary to NRC Staff's position, this contention **does** articulate a material issue of law on which Nevada and DOE disagree. Specifically, in this contention Nevada highlights the mistaken impression created by DOE – i.e., that Right-of-Way N-48602 is under DOE's jurisdiction and control and is permanently reserved for its use – and also highlights what DOE wholly fails to acknowledge, i.e., that Right-of-Way N-48602 only permits site characterization studies (as opposed to construction and/or operation of the repository) (Petition at 976). While NRC Staff's Answer (at 976) points to conclusory statements in SAR Subsection 5.8.1.1 regarding the nature of DOE's legal interests in land in general, those statements are not included in the specific discussion regarding Right-of-Way N-48602. More significantly, and contrary to NRC Staff's statement to the contrary (Answer at 976) that lacks any supporting citation or reference, SAR Subsection 5.8.1.1 in fact fails to address the penultimate conclusion of whether or not Right-of-Way N-48602 **itself** does or does not satisfy the requirements of 10

C.F.R. §§ 63.121(a)(1) and (a)(2). In fact, SAR Subsections 5.8 and 5.8.1 imply the exact opposition conclusion by omitting any discussion of the fact that Right-of-Way N-48602 only permits site characterization while simultaneously commenting that the lands subject to Right-of-Way N-48602 with been "withdrawn from all forms of appropriation under federal law."

It is also highly relevant that DOE has specifically chosen to address Right-of-Way N-48602 **and** its legislative efforts in SAR Subsection 5.8.1.1 – noting in SAR Subsection 5.8.1 that it "is currently examining appropriate courses of action that will conform to the requirements" of Section 63.121 including, but not limited to, "a legislative land withdrawal . . . ." In other words, clearly DOE is holding open the option of using Right-of-Way N-48602 to satisfy the requirements of 10 C.F.R. §§ 63.121(a)(1) and (a)(2) regardless of the results of its ongoing efforts to secure a legislative land withdrawal. To be sure, DOE would not have included a discussion of Right-of-Way N-48602 (or any other similar interest) if it were solely relying on a legislative enactment to withdraw all interests in all land necessary for the construction of Yucca Mountain. Accordingly, Nevada must be permitted to litigate whether or not Right-of-Way N-48602 **itself** satisfies Sections 63.121(a)(1) and (a)(2) without regard to any land withdrawal effort. Moreover, nowhere in SAR Subsection 5.8.1 or 5.8.1.1 does DOE indicate that there are any efforts underway to modify or expand or revise in any manner the specific interest in land afforded DOE under Right-of-Way N-48602. Therefore, the legal interests in land as they currently appear in Right-of-Way N-48602 are the only interests that need be considered when assessing whether Right-of-Way N-48602 complies with 10 C.F.R. §§ 63.121(a)(1) and (a)(2).

Finally, NRC acknowledges the significance of the issue raised in this contention but suggests that its resolution be deferred until "an appropriate time in the future" (Answer at 976-

77, n.61). But 10 C.F.R. §§ 63.121(a)(1) and (a)(2) are not written in the future tense and do not allow for deferred compliance until some undefined point later in time than the filing of the LA. While it is true that the NRC Staff review of DOE's LA is an ongoing process that will eventually culminate in a decision (to be documented in a Safety Evaluation Report) regarding regulatory compliance, that fact cannot possibly mean that Nevada cannot bring forward this contention now or that Nevada must wait until some undefined point in the future to do so (particularly given the standards for late-filed contentions), otherwise all contentions challenging DOE's compliance with governing regulations must await the completion of the NRC Staff's review of the LA. While DOE is free to continue its effort to secure a legislative land withdrawal while the NRC Staff reviews the LA, at the same time Nevada must be permitted to pursue its contentions regarding what is now in the LA during that NRC Staff review.

REPLY – NEV-SAFETY-185 – RIGHT-OF-WAY N-47748

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

NRC argues that Nevada fails to satisfy the pleading requirements of 10 C.F.R. § 2.309(f)(1)(vi) because "Nevada does not raise a genuine dispute with respect to a material issue of law or fact with the applicant" for the reasons that "DOE acknowledges that right-of-way N-47748 is not a sufficient legal interest to satisfy § 63.121(a) and explains that completion of the land withdrawal or acquisition process will clear the land of all encumbrances prohibited by § 63.121(b)" (Answer at 978-79).

NRC and Nevada agree that this contention focuses on a genuine dispute that is material to the findings that NRC must make to license Yucca Mountain and therefore within the scope of this proceeding – namely, whether Right-of-Way N-47748 as described in SAR Subsection 5.8.1.1 satisfies the requirements of 10 C.F.R. § 63.121. In that regard, it is critical to consider

exactly what DOE said, and did not say, in SAR Subsection 5.8.1.1 with regard to Right-of-Way N-47748:

> Right-of-Way N-47748 was granted to DOE by the Bureau of Land Management on January 6, 1988, and renewed on January 5, 2001 and December 20, 2007. The right-of-way expires on December 31, 2014. Most of this right-of-way is located within the southwestern portion of the area. This right-of-way covers public land administered by the Bureau of Land Management (BLM 2007).

SAR at 5.8-3. SAR Figure 5.8-1 illustrates that a substantial portion of the emplacement tunnels at Yucca Mountain are in land whose ownership and control is governed by Right-of-Way N-47748. DOE provides no other discussion of Right-of-Way N-47748 in the SAR.

However, contrary to NRC Staff's position, this contention **does** articulate a material issue of law on which Nevada and DOE disagree. Specifically, in this contention Nevada highlights the mistaken impression created by DOE – i.e., that Right-of-Way N-47748 is under DOE's jurisdiction and control and is permanently reserved for its use – and also highlights what that DOE wholly fails to acknowledge, i.e., that Right-of-Way N-47748 is available for public access and use and that it only permits site characterization studies (as opposed to construction and/or operation of the repository) (Petition at 980). While NRC Staff's Answer (at 978) points to conclusory statements in SAR Subsection 5.8.1.1 regarding the nature of DOE's legal interests in land in general, those statements are not included in the specific discussion regarding Right-of-Way N-47748. More significantly, and contrary to NRC Staff's statement to the contrary (Answer at 978) that lacks any supporting citation or reference, SAR Subsection 5.8.1.1 in fact fails to address the penultimate conclusion of whether or not Right-of-Way N-47748 **itself** does or does not satisfy the requirements of 10 C.F.R. §§ 63.121(a)(1) and (a)(2). In fact, SAR Subsections 5.8 and 5.8.1 imply the exact opposition conclusion by omitting any discussion of the fact that Right-of-Way N-47748 only permits site characterization.

It is also highly relevant that DOE has specifically chosen to address Right-of-Way N-47748 **and** its legislative efforts in SAR Subsection 5.8.1.1 – noting in SAR Subsection 5.8.1 that it "is currently examining appropriate courses of action that will conform to the requirements" of Section 63.121 including, but not limited to, "a legislative land withdrawal . . . ." In other words, clearly DOE is holding open the option of using Right-of-Way N-47748 to satisfy the requirements of 10 C.F.R. §§ 63.121(a)(1) and (a)(2) regardless of the results of its ongoing efforts to secure a legislative land withdrawal. To be sure, DOE would not have included a discussion of Right-of-Way N-47748 (or any other similar interest) if it were solely relying on a legislative enactment to withdraw all interests in all land necessary for the construction of Yucca Mountain. Accordingly, Nevada must be permitted to litigate whether or not Right-of-Way N-47748 **itself** satisfies Sections 63.121(a)(1) and (a)(2) without regard to any land withdrawal effort. Moreover, nowhere in SAR Subsection 5.8.1 or 5.8.1.1 does DOE indicate that there are any efforts underway to modify or expand or revise in any manner the specific interest in land afforded DOE under Right-of-Way N-47748. Therefore, the legal interests in land as they currently appear in Right-of-Way N-47748 are the only interests that need be considered when assessing whether Right-of-Way N-47748 complies with 10 C.F.R. §§ 63.121(a)(1) and (a)(2).

Finally, NRC acknowledges the significance of the issue raised in this contention but suggests that its resolution be deferred until "an appropriate time in the future" (Answer at 979, n.62). But 10 C.F.R. §§ 63.121(a)(1) and (a)(2) are not written in the future tense and do not allow for deferred compliance until some undefined point later in time than the filing of the LA. While it is true that the NRC Staff review of DOE's LA is an ongoing process that will eventually culminate in a decision (to be documented in a Safety Evaluation Report) regarding

regulatory compliance, that fact cannot possibly mean that Nevada cannot bring forward this contention now or that Nevada must wait until some undefined point in the future to do so (particularly given the standards for late-filed contentions), otherwise all contentions challenging DOE's compliance with governing regulations must await the completion of the NRC Staff's review of the LA. While DOE is free to continue its effort to secure a legislative land withdrawal while the NRC Staff reviews the LA, at the same time Nevada must be permitted to pursue its contentions regarding what is now in the LA during that NRC Staff review.

REPLY – NEV-SAFETY-186 – "RANCH BOUNDARY" LAND

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

NRC argues that Nevada fails to satisfy the pleading requirements of 10 C.F.R. § 2.309(f)(1)(vi) because "Nevada does not raise a genuine dispute with respect to a material issue of law or fact with the applicant" for the reasons that "DOE acknowledges that the Memorandum of Agreement is not a sufficient legal interest to satisfy § 63.121(a)(1) and explains that completion of the land withdrawal or acquisition process will clear the land of all encumbrances prohibited by § 63.121(a)(2)" (Answer at 981).

NRC and Nevada agree that this contention focuses on a genuine dispute that is material to the findings that NRC must make to license Yucca Mountain and therefore within the scope of this proceeding – namely, whether a Memorandum of Agreement (MOA) between two DOE offices that allows for the use of approximately 58,000 acres of non-public land on the Nevada

Test Site (referred to as the Ranch Boundary) as described in SAR Subsection 5.8.1.1 satisfies the requirements of 10 C.F.R. § 63.121. In that regard, it is critical to consider exactly what DOE said, and did not say, in SAR Subsection 5.8.1.1 with regard to the MOA:

> [A] Memorandum of Agreement between the predecessor offices of the DOE National Nuclear Security Agency Nevada Site Office and the DOE Office of Civilian Radioactive Waste Management (Aquilina and Nelson 1994) allows the use of about 58,000 acres on Nevada Test Site land for Yucca Mountain project activities. Figure 5.8-1 shows the agreement area, which is known as the "ranch boundary.

SAR at 5.8-3. SAR Figure 5.8-1 illustrates that the entire surface facilities at Yucca Mountain are on land (referred to as the Ranch Boundary) whose ownership and control is governed by the MOA. DOE provides no other discussion of the MOA or the Ranch Boundary in the SAR.

However, contrary to NRC Staff's position, this contention **does** articulate a material issue of law on which Nevada and DOE disagree. Specifically, in this contention Nevada highlights the mistaken impression created by DOE – i.e., that the Ranch Boundary is permanently reserved for DOE use – and also highlights what DOE wholly fails to acknowledge, i.e., that the MOA can be terminated on 90 days notice and only permits site characterization studies (as opposed to construction and/or operation of the repository) (Petition at 984). While NRC Staff's Answer (at 981) points to conclusory statements in SAR Subsection 5.8.1.1 regarding the nature of DOE's legal interests in land in general, those statements are not included in the specific discussion regarding the MOA. More significantly, and contrary to NRC Staff's statement to the contrary (Answer at 981) that lacks any supporting citation or reference, SAR Subsection 5.8.1.1 in fact fails to address the penultimate conclusion of whether or not the MOA or the Ranch Boundary **itself** does or does not satisfy the requirements of 10 C.F.R. §§ 63.121(a)(1) and (a)(2). In fact, SAR Subsections 5.8 and 5.8.1 imply the exact opposition

conclusion by omitting any discussion of the fact that MOA can be terminated on 90 days notice and only permits site characterization.

It is also highly relevant that DOE has specifically chosen to address the MOA **and** its legislative efforts in SAR Subsection 5.8.1.1 – noting in SAR Subsection 5.8.1 that it "is currently examining appropriate courses of action that will conform to the requirements" of Section 63.121 including, but not limited to, "a legislative land withdrawal . . . ." In other words, clearly DOE is holding open the option of using the MOA to satisfy the requirements of 10 C.F.R. §§ 63.121(a)(1) and (a)(2) regardless of the results of its ongoing efforts to secure a legislative land withdrawal. To be sure, DOE would not have included a discussion of the MOA or the Ranch Boundary (or any other similar interest) if it were solely relying on a legislative enactment to withdraw all interests in all land necessary for the construction of Yucca Mountain. Accordingly, Nevada must be permitted to litigate whether or not the MOA or the Ranch Boundary **itself** satisfies Sections 63.121(a)(1) and (a)(2) without regard to any land withdrawal effort. Moreover, nowhere in SAR Subsection 5.8.1 or 5.8.1.1 does DOE indicate that there are any efforts underway to modify or expand or revise in any manner the specific interest in land afforded DOE under the MOA. Therefore, the legal interests in land as they currently appear in the MOA are the only interests that need be considered when assessing whether the MOA complies with 10 C.F.R. §§ 63.121(a)(1) and (a)(2).

Finally, NRC acknowledges the significance of the issue raised in this contention but suggests that its resolution be deferred until "an appropriate time in the future" *Answer at 981-82, n.63). But 10 C.F.R. §§ 63.121(a)(1) and (a)(2) are not written in the future tense and do not allow for deferred compliance until some undefined point later in time than the filing of the LA. While it is true that the NRC Staff review of DOE's LA is an ongoing process that will

eventually culminate in a decision (to be documented in a Safety Evaluation Report) regarding regulatory compliance, that fact cannot possibly mean that Nevada cannot bring forward this contention now or that Nevada must wait until some undefined point in the future to do so (particularly given the standards for late-filed contentions), otherwise all contentions challenging DOE's compliance with governing regulations must await the completion of the NRC Staff's review of the LA. While DOE is free to continue its effort to secure a legislative land withdrawal while the NRC Staff reviews the LA, at the same time Nevada must be permitted to pursue its contentions regarding what is now in the LA during that NRC Staff review.

REPLY – NEV-SAFETY-187 – PUBLIC LAND ORDER 7653

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

NRC argues that Nevada fails to satisfy the pleading requirements of 10 C.F.R. § 2.309(f)(1)(vi) because "Nevada does not raise a genuine dispute with respect to a material issue of law or fact with the applicant" for the reasons that "DOE acknowledges that this public land order is not a sufficient legal interest to satisfy § 63.121(a)(1) and explains that completion of the land withdrawal or acquisition process will clear the land of all encumbrances prohibited by § 63.121(a)(2)" (Answer at 983-84).

NRC and Nevada agree that this contention focuses on a genuine dispute that is material to the findings that NRC must make to license Yucca Mountain and therefore within the scope of this proceeding – namely, whether Public Land Order 7653 as described in SAR Subsection 5.8.1.1 satisfies the requirements of 10 C.F.R. § 63.121. In that regard, it is critical to consider

exactly what DOE said, and did not say, in SAR Subsection 5.8.1.1 with regard to Public Land Order 7653:

> Public Land Order 7653 is a land withdrawal for a period of 10 years to evaluate the lands for the potential construction, operation, and maintenance of a rail line (Caliente Rail Corridor) for transportation of spent nuclear fuel (SNF) and high-level radioactive waste (HLW) to a geologic repository at Yucca Mountain (70 FR 76854).

SAR at 5.8-3. SAR Figure 5.8-1 illustrates that lands governed by Public Land Order 7653 lie within the geologic repository operations area and within the Yucca Mountain land withdrawal area boundary and the pre-closure controlled area boundary. DOE provides no other discussion of Public Land Order 7653 in the SAR.

However, contrary to NRC Staff's position, this contention **does** articulate a material issue of law on which Nevada and DOE disagree. Specifically, in this contention Nevada highlights the mistaken impression created by DOE – i.e., that Public Land Order 7653 is under DOE's jurisdiction and control and is permanently reserved for DOE use – and also highlights what DOE wholly fails to acknowledge, i.e., that the land governed by Public Land Order 7653 is available for public use (Petition at 988). While NRC Staff's Answer (at 983) points to conclusory statements in SAR Subsection 5.8.1.1 regarding the nature of DOE's legal interests in land in general, those statements are not included in the specific discussion regarding Public Land Order 7653. More significantly, and contrary to NRC Staff's statement to the contrary (Answer at 983-84) that lacks any supporting citation or reference, SAR Subsection 5.8.1.1 in fact fails to address the penultimate conclusion of whether or not Public Land Order 7653 **itself** does or does not satisfy the requirements of 10 C.F.R. §§ 63.121(a)(1) and (a)(2). In fact, SAR Subsections 5.8 and 5.8.1 imply the exact opposition conclusion by omitting any discussion of

the fact that the land associated with Public Land Order 7653 is under the control of the Bureau of Land Management and available for public access.

It is also highly relevant that DOE has specifically chosen to address Public Land Order 7653 **and** its legislative efforts in SAR Subsection 5.8.1.1 – noting in SAR Subsection 5.8.1 that it "is currently examining appropriate courses of action that will conform to the requirements" of Section 63.121 including, but not limited to, "a legislative land withdrawal . . . ." In other words, clearly DOE is holding open the option of using Public Land Order 7653 to satisfy the requirements of 10 C.F.R. §§ 63.121(a)(1) and (a)(2) regardless of the results of its ongoing efforts to secure a legislative land withdrawal. To be sure, DOE would not have included a discussion of Public Land Order 7653 (or any other similar interest) if it were solely relying on a legislative enactment to withdraw all interests in all land necessary for the construction of Yucca Mountain. Accordingly, Nevada must be permitted to litigate whether or not Public Land Order 7653 **itself** satisfies Sections 63.121(a)(1) and (a)(2) without regard to any land withdrawal effort. Moreover, nowhere in SAR Subsection 5.8.1 or 5.8.1.1 does DOE indicate that there are any efforts underway to modify or expand or revise in any manner the specific interest in land afforded DOE under Public Land Order 7653. Therefore, the legal interests in land as they currently appear in Public Land Order 7653 are the only interests that need be considered when assessing whether Public Land Order 7653 complies with 10 C.F.R. §§ 63.121(a)(1) and (a)(2).

Finally, NRC acknowledges the significance of the issue raised in this contention but suggests that its resolution be deferred until "an appropriate time in the future" (Answer at 984, n.64). But 10 C.F.R. §§ 63.121(a)(1) and (a)(2) are not written in the future tense and do not allow for deferred compliance until some undefined point later in time than the filing of the LA. While it is true that the NRC Staff review of DOE's LA is an ongoing process that will

eventually culminate in a decision (to be documented in a Safety Evaluation Report) regarding regulatory compliance, that fact cannot possibly mean that Nevada cannot bring forward this contention now or that Nevada must wait until some undefined point in the future to do so (particularly given the standards for late-filed contentions), otherwise all contentions challenging DOE's compliance with governing regulations must await the completion of the NRC Staff's review of the LA. While DOE is free to continue its effort to secure a legislative land withdrawal while the NRC Staff reviews the LA, at the same time Nevada must be permitted to pursue its contentions regarding what is now in the LA during that NRC Staff review.

REPLY – NEV-SAFETY-188 – PUBLIC LAND ORDER 6802/7534

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

NRC argues that Nevada fails to satisfy the pleading requirements of 10 C.F.R. § 2.309(f)(1)(vi) because "Nevada does not raise a genuine dispute with respect to a material issue of law or fact with the applicant" for the reasons that "DOE acknowledges that these public land orders are not a sufficient legal interest to satisfy § 63.121(a)(1) and explains that completion of the land withdrawal or acquisition process will clear the land of all encumbrances prohibited by § 63.121(a)(2)" (Answer at 986).

NRC and Nevada agree that this contention focuses on a genuine dispute that is material to the findings that NRC must make to license Yucca Mountain and therefore within the scope of this proceeding – namely, whether Public Land Order 6802/7534 as described in SAR Subsection 5.8.1.1 satisfies the requirements of 10 C.F.R. § 63.121. In that regard, it is critical to

consider exactly what DOE said, and did not say, in SAR Subsection 5.8.1.1 with regard to Public Land Order 6802/7534:

> Public Land Order 6802 (55 FR 39152) was executed by the Department of the Interior on September 25, 1990, and extended by Public Land Order 7534 (67 FR 53359) on July 31, 2002. It expires on January 31, 2010. These public land orders cover 4255.5 acres and withdraw the land from the operation of the mining and mineral leasing laws and overlay a part of right-of-way N-47748 (BLM 2007). While these public land orders do not grant the DOE additional land-use rights above those specified in the right-of-way, they do preclude the staking and filing of mining claims.

SAR at 5.8-3. SAR Figure 5.8-1 illustrates that a substantial portion of the emplacement tunnels at Yucca Mountain are in land whose ownership and control is governed by Public Land Order 6802/7534. DOE provides no other discussion of Public Land Order 6802/7534 in the SAR.

However, contrary to NRC Staff's position, this contention **does** articulate a material issue of law on which Nevada and DOE disagree. Specifically, in this contention Nevada highlights the mistaken impression created by DOE – i.e., that Public Land Order 6802/7534 is under DOE's jurisdiction and control and is permanently reserved for DOE use – and also highlights what DOE wholly fails to acknowledge, i.e., that Public Land Order 6802/7534 creates a significant encumbrance because it only withdraws the land from mining and mineral leasing laws (as opposed to construction and/or operation of the repository) (Petition at 992). While NRC Staff's Answer (at 986) points to conclusory statements in SAR Subsection 5.8.1.1 regarding the nature of DOE's legal interests in land in general, those statements are not included in the specific discussion regarding Public Land Order 6802/7534. More significantly, and contrary to NRC Staff's statement to the contrary (Answer at 986) that lacks any supporting citation or reference, SAR Subsection 5.8.1.1 in fact fails to address the penultimate conclusion of whether or not Public Land Order 6802/7534 **itself** does or does not satisfy the requirements of 10 C.F.R. §§ 63.121(a)(1) and (a)(2). In fact, SAR Subsections 5.8 and 5.8.1 imply the exact

opposition conclusion by omitting any discussion of the fact that the land associated with Public Land Order 6802/7534 is under the control of the Bureau of Land Management and available for public access.

It is also highly relevant that DOE has specifically chosen to address Public Land Order 6802/7534 **and** its legislative efforts in SAR Subsection 5.8.1.1 – noting in SAR Subsection 5.8.1 that it "is currently examining appropriate courses of action that will conform to the requirements" of Section 63.121 including, but not limited to, "a legislative land withdrawal . . . ." In other words, clearly DOE is holding open the option of using Public Land Order 6802/7534 to satisfy the requirements of 10 C.F.R. §§ 63.121(a)(1) and (a)(2) regardless of the results of its ongoing efforts to secure a legislative land withdrawal. To be sure, DOE would not have included a discussion of Public Land Order 6802/7534 (or any other similar interest) if it were solely relying on a legislative enactment to withdraw all interests in all land necessary for the construction of Yucca Mountain. Accordingly, Nevada must be permitted to litigate whether or not Public Land Order 6802/7534 **itself** satisfies Sections 63.121(a)(1) and (a)(2) without regard to any land withdrawal effort. Moreover, nowhere in SAR Subsection 5.8.1 or 5.8.1.1 does DOE indicate that there are any efforts underway to modify or expand or revise in any manner the specific interest in land afforded DOE under Public Land Order 6802/7534. Therefore, the legal interests in land as they currently appear in Public Land Order 6802/7534 are the only interests that need be considered when assessing whether Public Land Order 6802/7534 complies with 10 C.F.R. §§ 63.121(a)(1) and (a)(2).

Finally, NRC acknowledges the significance of the issue raised in this contention but suggests that its resolution be deferred until "an appropriate time in the future" (Answer at 987, n.65). But 10 C.F.R. §§ 63.121(a)(1) and (a)(2) are not written in the future tense and do not

allow for deferred compliance until some undefined point later in time than the filing of the LA. While it is true that the NRC Staff review of DOE's LA is an ongoing process that will eventually culminate in a decision (to be documented in a Safety Evaluation Report) regarding regulatory compliance, that fact cannot possibly mean that Nevada cannot bring forward this contention now or that Nevada must wait until some undefined point in the future to do so (particularly given the standards for late-filed contentions), otherwise all contentions challenging DOE's compliance with governing regulations must await the completion of the NRC Staff's review of the LA. While DOE is free to continue its effort to secure a legislative land withdrawal while the NRC Staff reviews the LA, at the same time Nevada must be permitted to pursue its contentions regarding what is now in the LA during that NRC Staff review.

REPLY – NEV-SAFETY-189 – PATENT 27-83-002

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC argues that Nevada fails to satisfy the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) because "Nevada does not offer any expert opinion or supporting facts to support the assertion that DOE will not be able to prevent adverse human actions that could significantly reduce the repository's ability to achieve isolation" and that "Nevada offers nothing to support its claim that DOE will not be able to comply with the radiation exposure and radioactive material release performance objectives in 10 C.F.R. § 63.111(a) and (b)" (Answer at 989). NRC is correct that Nevada has not offered an expert witness in support of Contention NEV-SAFETY-189; however, NRC misapprehends what Nevada is arguing (*infra*) which, if clearly understood, obviates any need for an expert witness.

Specifically, NEV-SAFETY-189 is a legal contention (Petition at 994) because it focuses on whether or not, in light of the location and nature of Patent 27-83-02, DOE can exert "jurisdiction and control" as required under 10 C.F.R. § 63.121(b) and on whether or not DOE

can exert "jurisdiction or control" as required under 10 C.F.R. § 63.121(c). See the discussion in Section 6 below. The facts supporting the contention are cited in Section 5 of Nevada's Petition (at 995-97). In sum, Nevada's interpretation of compliance with Sections 63.121(b) and (c) focuses on the explicit language of the regulations which requires some form of jurisdiction and control (or jurisdiction or control) over the land covered by Patent 27-83-02, whereas DOE would rely upon a calculational analysis as a substitute to demonstrate compliance with Sections 63.121(b) and (c) even though neither regulation allows for such an approach. Contrary to NRC Staff's assertion (Answer at 989), in this contention Nevada is not challenging any DOE demonstration regarding either "adverse human actions that could significantly reduce the geologic repository's ability to achieve isolation" or compliance "with the radiation exposure and radioactive material release performance objectives in 10 C.F.R. § 63.11(a) and (b)." Therefore, there is no need for an expert witness.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

NRC argues that Nevada fails to satisfy the pleading requirements of 10 C.F.R. § 2.309(f)(1)(vi) to establish "a genuine dispute on a material issue of fact or law" because Nevada's "assertion that DOE does not exercise jurisdiction and control over all the land within the vicinity of the repository but outside of the geologic repository operations area is insufficient to demonstrate that DOE has not met the regulatory requirements" contained in 10 C.F.R. §§ 63.121(b) and (c) (Answer at 989-90). For the reasons that follow, not only has NRC misread Nevada's contention but NRC has apparently overlooked the significance of all of the requirements contained within these two regulations.

Nevada and NRC agree that the provisions contained within 10 C.F.R. § 63.121(a) only apply within the geologic repository operations area (GROA) and that the provisions contained

within 10 C.F.R. §§ 63.121(b) and (c) only apply outside the GROA. Nevada and NRC also agree that Sections 63.121(b) and (c) speak to the need for "appropriate controls." However, at the crux of this particular contention is the specific requirement in Section 63.121(b) that "DOE shall exercise any jurisdiction and control . . . necessary to prevent adverse human actions that could significantly reduce the geologic repository's ability to achieve isolation," as well as the specific requirement in Section 63.121(c) that "DOE shall exercise any jurisdiction or control of activities necessary to ensure the requirements at § 63.111(a) and (b) are met." In other words, Nevada maintains that the "appropriate controls" that DOE "shall exercise" must include "jurisdiction and control" under subparagraph (b) or "jurisdiction or control" under subparagraph (c) to achieve the specified regulatory objectives.

Nevada has made clear in this contention that the location of Patent 27-83-02, *i.e.*, within the Yucca Mountain land withdrawal area boundary and pre-closure area boundary, as well as the nature of Patent 27-83-02, which creates rights in perpetuity to mine 182.5 acres of land, by operation of law preclude DOE from exercising "any jurisdiction and control" or "any jurisdiction or control" necessary to achieve the specified regulatory objectives under either 10 C.F.R. §§ 63.121(b) or (c) (Petition at 996-97). Contrary to NRC Staff's assertion (Answer at 990), Nevada has not ignored DOE's explanation in the SAR regarding why Patent 27-83-02 will not affect the repository's ability to isolate waste or DOE's ability to satisfy preclosure performance objectives. Rather Nevada's interpretation of compliance with Sections 63.121(b) and (c) focuses on the explicit language of the regulations which requires some form of jurisdiction and control (or jurisdiction or control) over the land whereas DOE would rely upon a calculational analysis as a substitute to demonstrate compliance with Sections 63.121(b) and (c) even though neither regulation allows for such an approach.

Finally, the point made by Nevada that the SAR is inaccurate and materially incomplete is reflective of the fact that nowhere in the SAR's only discussion of Patent 27-83-02 (*i.e.*, SAR Subsection 5.8.2.2.1) is there any indication that the land covered by the patent lies wholly within the Yucca Mountain land withdrawal area boundary and pre-closure area boundary. The point is not that there is a regulatory requirement to make such a disclosure, but rather the omission is significant because the location of Patent 27-83-02 reveals that the holder of the patent has the right to a mining claim that lies on land for which DOE needs to secure "jurisdiction and control" or "jurisdiction or control" to comply with the requirements in 10 C.F.R. §§ 63.121(b) and (c).

REPLY – NEV-SAFETY-190 – UNPATENTED LODE AND PLACER MINING CLAIMS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC argues that Nevada fails to satisfy the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) because "Nevada does not offer any expert opinion or supporting facts to support the assertion that DOE will not be able to prevent adverse human actions that could significantly reduce the repository's ability to achieve isolation" and that "Nevada offers nothing to support its claim that DOE will not be able to comply with the radiation exposure and radioactive material release performance objectives in 10 C.F.R. § 63.111(a) and (b)" (Answer at 992). NRC is correct that Nevada has not offered an expert witness in support of Contention NEV-SAFETY-190; however, NRC misapprehends what Nevada is arguing (*infra*) which, if clearly understood, obviates any need for an expert witness.

Specifically, NEV-SAFETY-190 is a legal contention (Petition at 998) because it focuses on whether or not, in light of the location and nature of at least 60 active unpatented lode and placer mining claims, DOE can exert "jurisdiction and control" as required under 10 C.F.R. §

63.121(b) and on whether or not DOE can exert "jurisdiction or control" as required under 10 C.F.R. § 63.121(c). The facts supporting the contention are cited in Section 5 of Nevada's Petition (at 990-1000). In sum, Nevada's interpretation of compliance with Sections 63.121(b) and (c) focuses on the explicit language of the regulations which requires some form of jurisdiction and control (or jurisdiction or control) over the land covered by these 60 active unpatented lode and placer mining claims, whereas DOE would rely upon a calculational analysis as a substitute to demonstrate compliance with Sections 63.121(b) and (c) even though neither regulation allows for such an approach. Contrary to NRC Staff's assertion (Answer at 992), in this contention Nevada is not challenging any DOE demonstration regarding either "adverse human actions that could significantly reduce the geologic repository's ability to achieve isolation" or compliance "with the radiation exposure and radioactive material release performance objectives in 10 C.F.R. § 63.11(a) and (b)." Therefore, there is no need for an expert witness.

NRC also challenges Nevada's "assertion that DOE does not exercise jurisdiction and control over all the land within the vicinity of the repository but outside of the geologic repository operations area is insufficient to demonstrate that DOE has not met the regulatory requirements" contained in 10 C.F.R. §§ 63.121(b) and (c) (Answer at 992-93). For the reasons that follow, not only has NRC misread Nevada's contention but NRC has apparently overlooked the significance of all of the requirements contained within these two regulations.

Nevada and NRC agree that the provisions contained within 10 C.F.R. § 63.121(a) only apply within the geologic repository operations area (GROA) and that the provisions contained within 10 C.F.R. §§ 63.121(b) and (c) only apply outside the GROA. Nevada and NRC also agree that Sections 63.121(b) and (c) speak to the need for "appropriate controls." However, at

the crux of this particular contention is the specific requirement in Section 63.121(b) that "DOE shall exercise any jurisdiction and control . . . necessary to prevent adverse human actions that could significantly reduce the geologic repository's ability to achieve isolation," as well as the specific requirement in Section 63.121(c) that "DOE shall exercise any jurisdiction or control of activities necessary to ensure the requirements at § 63.111(a) and (b) are met." In other words, Nevada maintains that the "appropriate controls" that DOE "shall exercise" must include "jurisdiction and control" under subparagraph (b) or "jurisdiction or control" under subparagraph (c) to achieve the specified regulatory objectives.

Nevada has made clear in this contention that the location of at least 60 active unpatented lode and placer mining claims, *i.e.*, within the Yucca Mountain land withdrawal area boundary and pre-closure area boundary, as well as the nature of those mining claims, which affords a member of the public with the right to the claim to occupy the land to mine for valuable minerals, by operation of law preclude DOE from exercising "any jurisdiction and control" or "any jurisdiction or control" necessary to achieve the specified regulatory objectives under either 10 C.F.R. §§ 63.121(b) or (c) (Petition at 999-1000). Contrary to NRC Staff's assertion (Answer at 992), Nevada has not ignored DOE's explanation in the SAR regarding why these land interests will not affect the repository's ability to isolate waste or DOE's ability to satisfy preclosure performance objectives. Rather Nevada's interpretation of compliance with Sections 63.121(b) and (c) focuses on the explicit language of the regulations which requires some form of jurisdiction and control (or jurisdiction or control) over the land whereas DOE would rely upon a calculational analysis as a substitute to demonstrate compliance with Sections 63.121(b) and (c) even though neither regulation allows for such an approach.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

The point made by Nevada that the SAR is inaccurate and materially incomplete is reflective of the fact that nowhere in the SAR's only discussion of unpatented lode and placer mining claims (*i.e.*, SAR Subsection 5.8.2.2.2) is there any indication that the land covered by these mining claims lies wholly within the Yucca Mountain land withdrawal area boundary and pre-closure area boundary. In addition, no effort is made to identify that there are at least 60 lode and placer mining claims within those lands. The point is not that there is a regulatory requirement to make these disclosures, but rather the omission is significant because the location of the lode and placer mining claims (and the extremely large number of persons that have access to that location) reveals that the holder of each the claims has a right to a mining claim that lies on land for which DOE needs to secure "jurisdiction and control" or "jurisdiction or control" to comply with the requirements in 10 C.F.R. §§ 63.121(b) and (c).

See also the response in Section 5, *supra*.

REPLY – NEV-SAFETY-191 – NYE COUNTY MONITORING WELLS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC argues that Nevada fails to satisfy the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) because "Nevada does not offer any supporting basis for the assertion that DOE will not be able to prevent adverse human actions that could significantly reduce the repository's ability to achieve isolation" and that "Nevada offers nothing to support its claim that DOE will not be able to comply with the radiation exposure and radioactive material release performance objectives in 10 C.F.R. § 63.111(a) and (b)" (Answer at 995). NRC is correct that Nevada has not offered an expert witness in support of Contention NEV-SAFETY-191; however, NRC misapprehends what Nevada is arguing (*infra*) which, if clearly understood, obviates any need for an expert witness.

Specifically, NEV-SAFETY-191 is a legal contention (Petition at 1001) because it focuses on whether or not, in light of the location and nature of 17 monitoring wells drilled by Nye County, Nevada, DOE can exert "jurisdiction and control" as required under 10 C.F.R. §

63.121(b) and on whether or not DOE can exert "jurisdiction or control" as required under 10 C.F.R. § 63.121(c). The facts supporting the contention are cited in Section 5 of Nevada's Petition (at 1002-03). In sum, Nevada's interpretation of compliance with Sections 63.121(b) and (c) focuses on the explicit language of the regulations which requires some form of jurisdiction and control (or jurisdiction or control) over the land on which these 17 monitoring wells are located, whereas DOE would rely upon a calculational analysis as a substitute to demonstrate compliance with Sections 63.121(b) and (c) even though neither regulation allows for such an approach. Contrary to NRC Staff's assertion (Answer at 995), in this contention Nevada is not challenging any DOE demonstration regarding either "adverse human actions that could significantly reduce the geologic repository's ability to achieve isolation" or compliance "with the radiation exposure and radioactive material release performance objectives in 10 C.F.R. § 63.11(a) and (b)." Therefore, there is no need for an expert witness.

NRC also challenges Nevada's "assertion that DOE does not exercise jurisdiction and control over all the land within the vicinity of the repository but outside of the geologic repository operations area is insufficient to demonstrate that DOE has not met the regulatory requirements" contained in 10 C.F.R. §§ 63.121(b) and (c) (Answer at 995-96). For the reasons that follow, not only has NRC misread Nevada's contention but NRC has apparently overlooked the significance of all of the requirements contained within these two regulations.

Nevada and NRC agree that the provisions contained within 10 C.F.R. § 63.121(a) only apply within the geologic repository operations area (GROA) and that the provisions contained within 10 C.F.R. §§ 63.121(b) and (c) only apply outside the GROA. Nevada and NRC also agree that Sections 63.121(b) and (c) speak to the need for "appropriate controls." However, at the crux of this particular contention is the specific requirement in Section 63.121(b) that "DOE

shall exercise any jurisdiction and control . . . necessary to prevent adverse human actions that could significantly reduce the geologic repository's ability to achieve isolation," as well as the specific requirement in Section 63.121(c) that "DOE shall exercise any jurisdiction or control of activities necessary to ensure the requirements at § 63.111(a) and (b) are met." In other words, Nevada maintains that the "appropriate controls" that DOE "shall exercise" must include "jurisdiction and control" under subparagraph (b) or "jurisdiction or control" under subparagraph (c) to achieve the specified regulatory objectives.

Nevada has made clear in this contention that the location of 17 monitoring wells drilled by Nye County, Nevada, *i.e.*, within the Yucca Mountain land withdrawal area boundary and pre-closure area boundary, as well as the nature of the rights associated with these well, which affords Nye County representatives with the right to access, operate and maintain those wells, by operation of law preclude DOE from exercising "any jurisdiction and control" or "any jurisdiction or control" necessary to achieve the specified regulatory objectives under either 10 C.F.R. §§ 63.121(b) or (c) (Petition at 1002-03). Contrary to NRC Staff's assertion (Answer at 995), Nevada has not ignored DOE's explanation in the SAR regarding why these land interests will not affect the repository's ability to isolate waste or DOE's ability to satisfy preclosure performance objectives. Rather Nevada's interpretation of compliance with Sections 63.121(b) and (c) focuses on the explicit language of the regulations which requires some form of jurisdiction and control (or jurisdiction or control) over the land whereas DOE would rely upon a calculational analysis as a substitute to demonstrate compliance with Sections 63.121(b) and (c) even though neither regulation allows for such an approach.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

The point made by Nevada that the SAR is inaccurate and materially incomplete is reflective of the fact that nowhere in the SAR's only discussion of the Nye County monitoring wells (*i.e.*, SAR Subsection 5.8.2.2.3) is there any indication that the land on which 17 of these wells are located lies wholly within the Yucca Mountain land withdrawal area boundary and pre-closure area boundary. In addition, no effort is made to identify that there are, in fact, 17 wells within those lands. The point is not that there is a regulatory requirement to make these disclosures, but rather the omission is significant because the location of the wells reveals that representatives of Nye County, Nevada have a right to access and use 17 monitoring wells that lie on land for which DOE needs to secure "jurisdiction and control" or "jurisdiction or control" to comply with the requirements in 10 C.F.R. §§ 63.121(b) and (c).

See also the response in Section 5, *supra*.

REPLY – NEV-SAFETY-192 – LAND OUTSIDE DOE'S RIGHTS-OF-WAY

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC argues that Nevada fails to satisfy the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) because "Nevada does not offer any expert opinion or supporting facts to support the assertion that DOE will not be able to prevent adverse human actions that could significantly reduce the repository's ability to achieve isolation" and that "Nevada offers nothing to support its claim that DOE will not be able to comply with the radiation exposure and radioactive material release performance objectives in 10 C.F.R. § 63.111(a) and (b)" (Answer at 998). NRC is correct that Nevada has not offered an expert witness in support of Contention NEV-SAFETY-192; however, NRC misapprehends what Nevada is arguing (*infra*) which, if clearly understood, obviates any need for an expert witness.

Specifically, NEV-SAFETY-192 is a legal contention (Petition at 1005) because it focuses on whether or not, in light of the location and nature of 3 land areas lying within the Yucca Mountain land withdrawal area and pre-closure controlled area boundaries (but not

covered by DOE's 5 identified land interests within those boundaries), DOE can exert "jurisdiction and control" as required under 10 C.F.R. § 63.121(b) and on whether or not DOE can exert "jurisdiction or control" as required under 10 C.F.R. § 63.121(c). The facts supporting the contention are cited in Section 5 of Nevada's Petition (at 1006-07). In sum, Nevada's interpretation of compliance with Sections 63.121(b) and (c) focuses on the explicit language of the regulations which requires some form of jurisdiction and control (or jurisdiction or control) over the 3 specified land areas, whereas DOE would rely upon a calculational analysis as a substitute to demonstrate compliance with Sections 63.121(b) and (c) even though neither regulation allows for such an approach. Contrary to NRC Staff's assertion (Answer at 998), in this contention Nevada is not challenging any DOE demonstration regarding either "adverse human actions that could significantly reduce the geologic repository's ability to achieve isolation" or compliance "with the radiation exposure and radioactive material release performance objectives in 10 C.F.R. § 63.11(a) and (b)." Therefore, there is no need for an expert witness.

NRC also challenges Nevada's "assertion that DOE does not exercise jurisdiction and control over all the land within the vicinity of the repository but outside of the geologic repository operations area is insufficient to demonstrate that DOE has not met the regulatory requirements" contained in 10 C.F.R. §§ 63.121(b) and (c) (Answer at 998-99). For the reasons that follow, not only has NRC misread Nevada's contention but NRC has apparently overlooked the significance of all of the requirements contained within these two regulations.

Nevada and NRC agree that the provisions contained within 10 C.F.R. § 63.121(a) only apply within the geologic repository operations area (GROA) and that the provisions contained within 10 C.F.R. §§ 63.121(b) and (c) only apply outside the GROA. Nevada and NRC also

agree that Sections 63.121(b) and (c) speak to the need for "appropriate controls." However, at the crux of this particular contention is the specific requirement in Section 63.121(b) that "DOE shall exercise any jurisdiction and control . . . necessary to prevent adverse human actions that could significantly reduce the geologic repository's ability to achieve isolation," as well as the specific requirement in Section 63.121(c) that "DOE shall exercise any jurisdiction or control of activities necessary to ensure the requirements at § 63.111(a) and (b) are met." In other words, Nevada maintains that the "appropriate controls" that DOE "shall exercise" must include "jurisdiction and control" under subparagraph (b) or "jurisdiction or control" under subparagraph (c) to achieve the specified regulatory objectives.

Nevada has made clear in this contention that the location of 3 areas of land (north of Right-of-Way N-48602, southwest of Right-of-Way N-47748, and north, northeast and southeast of the Ranch Boundary), *i.e.*, within the Yucca Mountain land withdrawal area boundary and pre-closure area boundary, as well as the nature of those lands, which affords a member of the public access to those lands, by operation of law preclude DOE from exercising "any jurisdiction and control" or "any jurisdiction or control" necessary to achieve the specified regulatory objectives under either 10 C.F.R. §§ 63.121(b) or (c) (Petition at 1006-07). Contrary to NRC Staff's assertion (Answer at 998), Nevada has not ignored DOE's explanation in the SAR regarding why these land interests will not affect the repository's ability to isolate waste or DOE's ability to satisfy preclosure performance objectives. Rather Nevada's interpretation of compliance with Sections 63.121(b) and (c) focuses on the explicit language of the regulations which requires some form of jurisdiction and control (or jurisdiction or control) over the land whereas DOE would rely upon a calculational analysis as a substitute to demonstrate compliance with Sections 63.121(b) and (c) even though neither regulation allows for such an approach.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

The point made by Nevada that the SAR is inaccurate and materially incomplete is reflective of the fact that nowhere in the SAR's discussion of land (*i.e.*, SAR Subsections 5.8.1, 5.8.2 and 5.8.3) is there any discussion of any portion of any of these 3 land areas even though they lie within the Yucca Mountain land withdrawal area boundary and pre-closure area boundary. The point is not that there is a regulatory requirement to make such a disclosures, but rather the omission is significant because of the location of these three areas of land and the right of the public to access those lands for which DOE needs to secure "jurisdiction and control" or "jurisdiction or control" to comply with the requirements in 10 C.F.R. §§ 63.121(b) and (c).

See also the response in Section 5, *supra*.

REPLY – NEV-SAFETY-193 – LAND WITHDRAWAL

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

NRC argues that Nevada fails to satisfy the pleading requirements of 10 C.F.R. § 2.309(f)(1)(vi) because "Nevada does not raise a genuine *dispute* with respect to a material issue of law or fact with the applicant" for the reason that "DOE acknowledges that its current legal interests are not sufficient to satisfy § 63.121(a)(1) and explains that completion of the land withdrawal or acquisition process will clear the land of all encumbrances prohibited by § 63.121(a)(2)" (Answer at 1001) (emphasis supplied by NRC).

Contrary to NRC Staff's assertion, nowhere in SAR Subsections 5.8.1, 5.8.1.1, or 5.8.1.2, *i.e.*, the only locations in the SAR wherein DOE discusses its efforts to secure a legislative land withdrawal, does DOE admit that it currently does not comply with the requirements of 10 C.F.R. §§ 63.21(c)(24), 63.121(a), 63.121(b) or 63.121(c). Likewise, nowhere in SAR

Subsections 5.8.1, 5.8.1.1, or 5.8.1.2 does DOE admit it requires a legislative land withdrawal in order to comply with the requirements of 10 C.F.R. §§ 63.21(c)(24), 63.121(a), 63.121(b) or 63.121(c). At the most DOE states only that "currently these legal interests do not authorize the construction and operation of the repository," SAR at 5.8-3; however, "these legal interests" refer to "two rights-of-way, an administrative land withdrawal, and a public land order" *id*. at 5.8-2, and **not** the legislative land withdrawal at issue in this contention. Since the characterization of this contention by NRC is inaccurate, the NRC conclusion that follows is inappropriate and should not be heeded.

In sum, the dispute in this contention is **not** about whether DOE has currently pending a legislative land withdrawal. In addition, the dispute in this contention is **not** about what the language in the proposed legislative land withdrawal says or the timing of its submission to Congress or even when its enactment may occur. Rather, this contention asserts that without a legislative land withdrawal DOE cannot comply with the requirements of 10 C.F.R. §§ 63.21(c)(24), 63.121(a), 63.121(b) or 63.121(c). While this conclusion is obvious to Nevada and may even be so to the NRC, unfortunately DOE has not made such an admission (*see, e.g.,* DOE Answer at 1780-85) and hence the need for NEV-SAFETY-193. Moreover, if NRC were inclined to grant DOE a license to construct Yucca Mountain in the absence of a legislative land withdrawal, Nevada seeks through this contention to have a license condition imposed that precludes any construction activities from occurring until such time as that legislative land withdrawal becomes effective.

NRC acknowledges the significance of the issue raised in this contention but suggests that its resolution be deferred until "an appropriate time in the future" (Answer at 1001, n.66). But 10 C.F.R. §§ 63.21(c)(24) and 63.121(a), (b) and (c) are not written in the future tense and

do not allow for deferred compliance until some undefined point later in time than the filing of the LA. While it is true that the NRC Staff review of DOE's LA is an ongoing process that will eventually culminate in a decision (to be documented in a Safety Evaluation Report) regarding regulatory compliance, that fact cannot possibly mean that Nevada cannot bring forward this contention now or that Nevada must wait until some undefined point in the future to do so (particularly given the standards for late-filed contentions), otherwise all contentions challenging DOE's compliance with governing regulations must await the completion of the NRC Staff's review of the LA. While DOE is free to continue its effort to secure a legislative land withdrawal while the NRC Staff reviews the LA, at the same time Nevada must be permitted to pursue its contentions regarding what is now in the LA during that NRC Staff review.

REPLY – NEV-SAFETY-194 – VH-1 WATER RIGHTS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

NRC argues that Nevada fails to satisfy the pleading requirements of 10 C.F.R. § 2.309(f)(1)(vi) because "Nevada does not raise a genuine dispute with respect to a material issue of law or fact with the applicant" for the reason that "DOE acknowledges that its current water appropriation permit is not sufficient to meet the projected demands for water and explains that it has filed a request with the Office of the Nevada State Engineer for permanent rights to a sufficient amount of water" (Answer at 1002-03).

While NRC Staff's statement regarding DOE's acknowledgement and explanation is an accurate summary of what is contained in SAR Subsection 5.8.4 at 5.8-8, this contention does not dispute those facts. Rather, this contention focuses on the fact that nowhere in SAR Subsection 5.8.4, *i.e.*, the only location in the SAR wherein DOE discusses water rights needed

for the construction and operation of the Yucca Mountain repository, does DOE admit that its current water rights do not comply with the requirements of 10 C.F.R. §§ 63.21(c)(24), 63.121(b) and 63.121(d). Likewise, nowhere in SAR Subsections 5.8.4 does DOE admit it needs to secure additional water rights to comply with the requirements of 10 C.F.R. § 63.21(c)(24), 63.121(a), 63.121(b) or 63.121(c). While these conclusions are obvious to Nevada, and may even be so to the NRC, unfortunately DOE has not made such an admission (*see, e.g.,* DOE Answer at 1786-92) and hence the need for NEV-SAFETY-194.

With regard to the Nevada assertion that SAR Subsection 5.8.4 is materially incomplete (Petition at 1014), the SAR at 5.8-8 states that "supply from VH-1 will not provide for the projected water demands to construct and operate the repository," which implies that additional "supply from VH-1" could be used to meet projected water demands. Nevada's point is that when DOE was granted water rights to VH-1 the State of Nevada specifically "limited the use of the permit to road construction, dust suppression, tunneling, pad construction, scientific tests, culinary and other related site uses . . . ." (Petition at 1013) (citing LSN# DEN001373887 at 4 and 6). Therefore, SAR Subsection 5.8.4 is materially incomplete because it fails to recognize that no amount of water supply from VH-1 can be used to construct or operate the repository. NRC Staff's assertion that SAR Subsection is complete in its description of VH-1 is thus mistaken.

Finally, NRC acknowledges the significance of the issue raised in this contention but suggests that its resolution be deferred until "an appropriate time in the future" (Answer at 1003, n.67). But 10 C.F.R. §§ 10 C.F.R. §§ 63.21(c)(24), 63.121(b) and 63.121(d) are not written in the future tense and do not allow for deferred compliance until some undefined point later in time than the filing of the LA. Moreover, Section 63.121(d) is written in the past tense – "DOE

shall also have obtained such water rights . . ." – requiring DOE to already have demonstrated compliance. While it is true that the NRC Staff review of DOE's LA is an ongoing process that will eventually culminate in a decision (to be documented in a Safety Evaluation Report) regarding regulatory compliance, that fact cannot possibly mean that Nevada cannot bring forward this contention now or that Nevada must wait until some undefined point in the future to do so (particularly given the standards for late-filed contentions), otherwise all contentions challenging DOE's compliance with governing regulations must await the completion of the NRC Staff's review of the LA. While DOE is free to continue its effort to secure water rights while the NRC Staff reviews the LA, at the same time Nevada must be permitted to pursue its contentions regarding what is now in the LA during that NRC Staff review.

REPLY – NEV-SAFETY-195 – 9/11 TERRORIST ATTACK

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

As Nevada's contention points out, this same issue was raised in Nevada's June 4, 2008 petition to reject DOE's tendered application, and in response, the Commission ruled in CLI-08-20 that "[t]he matters raised in Nevada's . . . filings would be appropriately raised for consideration in response to [the] Notice of Hearing," and that dismissal of Nevada's petition was "without prejudice to the petitioners' right to pursue identical claims, but in the form of proposed adjudicatory contentions. . . ." *U.S. Department of Energy (High-Level Waste Repository: Pre-Application Matters)*, CLI-08-20 at 4, 5. Nevada is reasonable in thinking this meant an identical claim would be litigable in this licensing proceeding, for to think otherwise would read the Commission to say something quite strange – that it's rejection of Nevada's petition was without prejudice to Nevada filing a claim before a tribunal that would not entertain it.

In any event, if this is a rule challenge, then it is a proper one, and it is within the scope of this proceeding for the Licensing Board to certify the contention to the Commission as 10 C.F.R. § 2.335(d). As NEV-SAFETY-195 explains, the rule could not have been drafted as it was without recognition of the limited functions of private sector security forces, and the rule would not have excluded airborne attacks otherwise. Staff refers to the Commission's statement that it "maintained its view that that protection that against airborne attack could best be provided by

the strengthening of airport and airline security measures" (Answer at 1005) but the Commission was referring here to its thought process underlying the proposed rule, not the final one. Staff's argument that in the final rule the Commission specifically endorsed precisely what it thought in the proposed rule has no support in any language at 72 Fed. Reg. 12,707, and in any event, the quote supports Nevada's case because "strengthening of airport and airline security measures" is beyond the capability of private nuclear licensees. Staff's further reference to the Commission's statement that "it is highly unlikely that a significant release of radioactivity would occur from an aircraft impact on a dry spent fuel storage cask" (Answer at 1006) fails to note the Commission's statement immediately before the quote that "requirements related to the security of dry cask storage are beyond the scope of this rulemaking," and in any event, safety of dry storage casks has limited relevance to Yucca Mountain where spent fuel will be removed from such casks during pre-closure surface operations. Staff's further reference to NORTHCOM, NORAD, TSA and FAA further support Nevada's contention, for they illustrate the Commission's reliance on private sector limitations. Finally, the contention is clear that Nevada did not assume that DOE would necessarily meet an enhanced DBT all by itself. The contention noted specifically that DOE is "an Executive Branch agency with an important national security component and well-established relationships with the President and other agencies," meaning that DOE would work with these agencies in meeting its responsibilities to NRC.

4. <u>A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain</u>

No reply necessary based on NRC Staff's Response.

5. <u>A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials</u>

No reply necessary based on NRC Staff's Response.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

No reply necessary based on NRC Staff's Response.

REPLY – NEV-SAFETY-196 – DESCRIPTION OF SECURITY MEASURES

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Staff mischaracterizes the contention, which challenges the adequacy of the description, and does not claim that the plan itself is missing. Nevada's contention offers ample support for the proposition that DOE has not described its plan, as required, but merely promised to do so.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

See Nevada's argument in 5 above.

REPLY – NEV-SAFETY-197 – PHYSICAL PROTECTION STANDARD

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

This contention challenges, and asks for a waiver of, a Commission regulation under 10 C.F.R. § 2.335, and Staff states that "it does not oppose Nevada's request for a waiver" (Answer at 1011-1-1012). Nevada would not object if, after the Board makes the finding that Nevada complied with 10 C.F.R. § 2.335(d) and certified the matter to the Commission, the Commission addressed Nevada's contention in the rulemaking, provided that before the issuance of any construction authorization, Nevada is afforded a reasonable opportunity to file contentions addressed to compliance with the final rule.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Staff's argument is irrelevant and nonsensical given its statement that "it does not oppose Nevada's request for a waiver."

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

Staff's argument is irrelevant and nonsensical given its statement that "it does not oppose Nevada's request for a waiver."

REPLY – NEV-SAFETY-198 – MATERIAL CONTROL AND ACCOUNTING PLAN

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

This contention challenges, and asks for a waiver of, a Commission regulation under 10 C.F.R. § 2.335, and Staff states that "it does not oppose Nevada's request for a waiver" (Answer at 1016-1-1017). Nevada would not object if, after the Board makes the finding that Nevada complied with 10 C.F.R. § 2.335(d) and certified the matter to the Commission, the Commission addressed Nevada's contention in the rulemaking, provided that before the issuance of any construction authorization, Nevada is afforded a reasonable opportunity to file contentions addressed to compliance with the final rule.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Staff's argument is irrelevant and nonsensical given its statement that "it does not oppose Nevada's request for a waiver."

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

Staff's argument is irrelevant and nonsensical given its statement that "it does not oppose Nevada's request for a waiver."

REPLY – NEV-SAFETY-199 – PERFORMANCE CONFIRMATION AND AVAILABLE TECHNOLOGY

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

It is irrelevant here that Part 63 does not prescribe specific tests to be performed, that DOE has the burden to develop a satisfactory testing program, and that the Commission does not want to limit DOE's options regarding testing methodologies, because *some* level of detail about testing programs is necessary for compliance with § 63.21(c)(17) and subpart F, and it cannot be that whatever DOE chooses is sufficient for compliance.

Staff also argues that the contention is based on a faulty reading of 10 C.F.R. § 63.305(b). Staff is wrong. 10 C.F.R. § 63.305(b) states specifically that "human knowledge and technology" must remain constant "in all analyses done to demonstrate compliance with this *part*" [emphasis added]. Therefore, Staff cannot be correct in arguing that this prescription applies only to *subpart* L, and the prescription clearly applies to the confirmation program requirements in subpart F.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements.

This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage.

The SAR sections cited in this contention (Petition at 1032-1033) illustrate the deficiencies in the performance confirmation program sufficient to support a reasoned explanation as provided in the contention.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

See above. DOE's SAR, in sections cited in the contention (Petition at 1032-1033), says that some of the monitoring, measurement and inspection described in general terms in the LA will require development or integration of specific applications of technology at some future time, and untried technologies generally described may not be capable of the level of performance required. This states a violation of 10 C.F.R. § 63.305(b) and the contention clearly satisfies the requirement to show a genuine dispute with DOE.

REPLY – NEV-SAFETY-200 – PERFORMANCE CONFIRMATION PROGRAM LEVEL OF INFORMATION

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

The materiality of this contention is clear from the discussion in Section 4 (Petition at 1035-1036). Staff argues (Answer at 1025) that "Nevada fails to provide any analysis or reference that supports its proposition that DOE's SAR does not provide a description of the performance confirmation program that complies with 10 C.F.R. Part 63, subpart F, such that § 63.21(a)(3)(i) has not been met." This is either an argument that is not relevant to compliance with 10 C.F.R. § 2.309(f)(1)(iv) because it addresses matters that are relevant only under 10 C.F.R. § 2.309(f)(1)(v) or (vi), or an argument that misreads Part 63 because it wrongly assumes that non-compliance with subpart F is not material to granting of the application. If non-compliance with subpart F is not material, then there is no possible reason for the requirement 10 C.F.R. § 63.21(c)(17) that the application contain a "description of the performance confirmation program that meets the requirements of Subpart F of this part," or the related requirement in 10 C.F.R. § 63.102(m).

It is irrelevant here that Part 63 does not specify the level of detail required and that DOE had the burden to comply with subpart F, because *some* level of detail is required in order for

DOE to meet its burden to satisfy 10 C.F.R. § 63.21(c)(17) and subpart F. Further, the fact that the Commission did not want to limit DOE's options regarding testing methodologies cannot mean that whatever DOE chooses is sufficient for compliance.

Finally, 10 C.F.R. § 63.305(b) is applicable. It states specifically that "human knowledge or technology" must remain constant "[i]n all analyses done to demonstrate compliance with this *part*" [emphasis added]. Therefore, Staff cannot be correct in arguing that this prescription applies only to *subpart* L.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated in II.C. above, Nevada's contention bases included under Section 5 (which are also applicable to arguments under 6) far exceed the Commission's contention requirements. This contention is supported by expert opinions which, standing alone, are sufficient to support the contention. Staff arguments that still further reasoning or details should have been provided go to the weight of the opinions, and therefore to the merits, and are completely inappropriate at the contention stage. Moreover, the contention clearly alleges non-compliance with subpart F and the provisions of the Plan itself and SAR subsections cited in this contention (Petition at 1036-1038) illustrate the deficiencies in the performance confirmation program sufficient to support a reasoned explanation as provided in the contention.

A rigorously detailed description of plans to implement the performance confirmation program is integral to any determination of whether there is reasonable expectation that the repository will be in compliance with the performance objectives specified at § 63.113(b) and (c). Without describing the specific plans to successfully meet the mandate of § 63.102(m) that "[K]ey geotechnical and design parameters, including any interactions between natural and engineered systems and components, will be monitored throughout site characterization,

construction, emplacement, and operation. . .," the § 63.21(c)(17) requirement for the description of the performance confirmation program that meets the requirements of subpart F has not been met. Subpart F, at § 63.131(a) requires that the program "must provide data"; (c) requires that it "must include in situ monitoring"; and (d) requires that it "must be implemented" such that "[i]t monitors and analyzes changes from the baseline condition of parameters that could affect the performance of a geologic repository." In §63.132, (a) requires "a continuing program of surveillance, measurement, testing. . ."; (b) requires that "[s]ubsurface conditions must be monitored and evaluated. . . "; and (e) requires that "[i]n situ monitoring of the thermomechanical response of the underground facility must be conducted until permanent closure, to ensure that the performance of the geologic and engineering features is within design limits." The LA is deficient in that it does not include in its description of the performance confirmation program a specific demonstration, in the form of detailed plans, that these regulatory mandates will be met. The conceptual (in almost all respects) performance confirmation plan description in the SAR is sufficiently incomplete to preclude meaningful regulatory review.

Three of the twenty performance confirmation activities discussed in the SAR have associated test plans or technical work plans; the remaining are general conceptualizations (Petition at 1037).

6 <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

No reply necessary based on NRC Staff's Response.

REPLY – NEV-SAFETY-201 – RELIANCE ON PRELIMINARY OR CONCEPTUAL DESIGN INFORMATION

See Reply regarding NEV-SAFETY-146.

B. NEPA Contentions

REPLY – NEV-NEPA-01 – TRANSPORTATION SABOTAGE SCENARIOS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Although not presented as a response within an enumerated subsection of 10 C.F.R. § 2.309(f)(1), NRC challenges the admissibility of this contention on the grounds that Nevada's pleading fails to satisfy the requirements of 10 C.F.R. §§ 2.326 and 51.109.

- First, NRC Staff argues that "Nevada has not explicitly addressed the § 2.326 criteria . . . ." (Answer at 1334).

- Second, NRC Staff argues that "Nevada has not complied with the requirement in 10 C.F.R. §§ 2.326(b) and 51.109(a)(2) to file a supporting affidavit." *Id.*

- Third, NRC Staff asserts that the lists attached to the affidavits filed by Nevada in support of this contention "are neither signed nor initialed by the affiants, and there is no other indication that the affiants reviewed the list associated with his affidavit, and therefore had knowledge of the contents of the list, prior to it being filed." *Id.* at 1335.

- Fourth, "[n]either the contention nor the affidavits specify which statements in the contention are attributable" to which affiant if there is more than one. *Id.*

- Fifth, "[n]either the contention nor the affidavits explains the personal knowledge or facts upon which the affiants based his opinion." *Id*.

Nevada replies to each argument in turn below.

Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008, *U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326 much less a requirement that a petition in intervention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument. However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by making clear that DOE "fail[ed] to evaluate reasonably foreseeable attack scenarios that could result in significantly greater consequences than the scenarios considered by DOE," and that "[i]f reasonably foreseeable attack scenarios were added, the disclosure of radiological impacts could be materially different . . . ." (Petition at 1043). Detailed support for these assertions was provided in Section 5. *See id.* at 1044-45. *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the procedure required by law"), and *Oregon Environmental Council v. Kunzman*, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be

set aside if undertaken 'without observance of procedure required by law'"). *See also* Section II.H, *supra.* Accordingly, this contention satisfies the requirements of 10 C.F.R. § 2.326.

Nevada has in fact supported its contention with the affidavits of Mr. Robert Halstead, Mr. Steven Frishman, and Dr. Michael Thorne (Petition, Attachment 7 (Halstead), Attachment 20 (Frishman), and Attachment 3 (Thorne)). This alone suffices to defeat NRC Staff's argument, particularly in light of the fact that NRC Staff admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. § 51.109 "specifies what must be contained in a supporting affidavit . . . ." (Answer at 1334.) Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in each affidavit. NRC Staff improperly attempts to equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. Each of these affidavits are more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits the expert witnesses from adopting the statements contained in Section 5 as their own opinions. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The factual support contained in Section 5 of this contention, including all documentation cited, was identified by the expert witnesses. The text of Section 5 (and for the most part the statements contained in Sections 1, 2, and 6), which included reasoned bases and explanations, conclusions reached, and specific challenges to corresponding analyses in DOE's LA, was drafted, reviewed, and approved by the expert witnesses who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the

specific contention that the expert adopts. Nevada decided against having expert affidavits incorporate numerous paragraphs from multiple contentions to avoid burdening its Petition with hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each was assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial, especially since many of Nevada's experts lived in European countries where affidavit formalities are more complicated. NRC Staff's Answer cites nothing in support of its position that either the contention or the attachment to the affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

NRC Staff complains that since more than one affiant subscribed to Section 5, it cannot tell which parts of the paragraph are associated with which expert. No support is proffered that would require as much. Moreover, NRC Staff does not explain why a question regarding whether each expert adopted all or only a part of a Section 5 bears on admissibility of the contention, as opposed to admission of expert testimony at a hearing on the merits. In this contention, each expert wholly adopted all of Section 5, which obviously means that all of the Section 5 is adopted as the testimony of each of the expert.

Finally, NRC Staff asserts (Answer at 1335) that "[n]either the contention nor the affidavits explains the personal knowledge or facts upon which the affiants based his opinion." Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent with the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the Case

Management Order of June 20, 2008. NRC Staff has not challenged this contention on that ground. In addition, clearly each of the above-identified expert witnesses has adopted Section 5 of this contention as their own opinions in their affidavits. Moreover, each expert witness has attached to their affidavit a curriculum vitae that addresses in great detail their qualifications, experience, and expertise. When coupled together, these documents and statements clearly and unequivocally demonstrate that, based on the expert's personal knowledge and professional credentials, the facts and opinions set forth in Section 5 are those of the expert. NRC Staff's Answer fails to identify any support for its assertion to the contrary. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§ 2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore NRC Staff's effort to defeat admissibility of this contention must be rejected.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

No reply necessary based on NRC Staff's response.

REPLY – NEV-NEPA-02 – TRANSPORTATION SABOTAGE CLEANUP COSTS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Although not presented as a response within an enumerated subsection of 10 C.F.R. § 2.309(f)(1), NRC Staff challenges the admissibility of this contention on the grounds that Nevada's pleading fails to satisfy the requirements of 10 C.F.R. §§ 2.326 and 51.109.

- First, NRC Staff argues that "Nevada has not explicitly addressed the § 2.326 criteria . . . ." (Answer at 1337).

- Second, NRC Staff argues that "Nevada has not complied with the requirement in 10 C.F.R. §§ 2.326(b) and 51.109(a)(2) to file a supporting affidavit." *Id.*

- Third, NRC Staff asserts that the list attached to the affidavit filed by Nevada in support of this contention "is neither signed nor initialed by Mr. Halstead and there is no other indication that Mr. Halstead reviewed the list, and therefore had knowledge of the contents of the list, prior to it being filed." *Id.* at 1338.

- Fourth, "[n]either the contention itself nor Mr. Halstead's affidavit specifies which statements in the contention are attributable to Mr. Halstead." *Id.*

- Fifth, "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Mr. Halstead based his opinions." *Id*.

Nevada replies to each argument in turn below.

Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008, *U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326 much less a requirement that a petition in intervention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument. However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by making clear that DOE "fail[ed] to provide an estimate of the cost of cleanup and other economic impacts following a sabotage event that resulted in release of radioactive materials," which "is significant because, without considering the cleanup costs of reasonably foreseeable attack scenarios, there is no adequate disclosure of environmental impacts under NEPA. If the cleanup costs of reasonably foreseeable attack scenarios were added, the disclosure of radiological impacts could be materially different . . . ." (Petition at 1048). Detailed support for these assertions was provided in Section 5 (*see id.* at 1050-51). *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the procedure required by law"), and *Oregon*

Environmental Council v. Kunzman, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be set aside if undertaken 'without observance of procedure required by law'"). *See also* Section II.H, *supra.* Accordingly, this contention satisfies the requirements of 10 C.F.R. § 2.326.

Nevada has in fact supported its contention with the affidavit of Mr. Robert Halstead (Petition, Attachment 7). This alone suffices to defeat NRC Staff's argument, particularly in light of the fact that NRC admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. § 51.109 "specifies what must be contained in a supporting affidavit . . . ." (Answer at 1337). Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in his affidavit. NRC Staff improperly attempts to equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. Mr. Halstead's affidavit is more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits Mr. Halstead from adopting the statements contained in Section 5 as his own opinions. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The factual support contained in Section 5 of this contention, including all documentation cited, was identified by Mr. Halstead. The text of Section 5 (and for the most part the statements contained in Sections 1, 2 and 6), which included reasoned bases and explanations, conclusions reached, and specific challenges to corresponding analyses in DOE's LA, was drafted, reviewed, and approved by Mr. Halstead who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the specific contention that Mr. Halstead adopts. Nevada decided against having expert affidavits incorporate numerous

paragraphs from multiple contentions to avoid burdening its Petition with hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each was assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial, especially since many of Nevada's experts lived in European countries where affidavit formalities are more complicated. NRC Staff's Answer cites nothing in support of its position that either the contention or the attachment to Mr. Halstead's affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

NRC Staff complains that it cannot tell which parts of Section 5 have been adopted by Mr. Halstead. No support is proffered that would require as much. Moreover, NRC Staff does not explain why a question regarding whether Mr. Halstead adopted all or only a part of a Section 5 bears on admissibility of the contention, as opposed to admission of expert testimony at a hearing on the merits. In this contention, Mr. Halstead wholly adopted all of Section 5, which obviously means that all of the Section 5 is adopted as the testimony of Mr. Halstead.

Finally, NRC Staff asserts (Answer at 1338) that "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Mr. Halstead based his opinions." Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent with the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the Case Management Order of June 20, 2008. NRC Staff has not challenged this contention on that ground. In addition, clearly each Mr. Halstead has adopted Section 5 of this contention as his

own opinions in his affidavit. Moreover, Mr. Halstead has attached to his affidavit a curriculum vitae that addresses in great detail his qualifications, experience, and expertise. When coupled together, these documents and statements clearly and unequivocally demonstrate that, based on Mr. Halstead's personal knowledge and professional credentials, the facts and opinions set forth in Section 5 are those of Mr. Halstead. NRC Staff's Answer fails to identify any support for its assertion to the contrary. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§ 2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore NRC Staff's effort to defeat admissibility of this contention must be rejected.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

No reply necessary based on NRC Staff's response.

REPLY – NEV-NEPA-03 – TRANSPORTATION ACCIDENT CLEANUP COSTS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Although not presented as a response within an enumerated subsection of 10 C.F.R. § 2.309(f)(1), NRC Staff challenges the admissibility of this contention on the grounds that Nevada's pleading fails to satisfy the requirements of 10 C.F.R. §§ 2.326 and 51.109.

- First, NRC Staff argues that "Nevada has not explicitly addressed the § 2.326 criteria" and the "bare assertion[s]" found in the Petition (at 1052) are not sufficient to demonstrate significance or materiality (Answer at 1341-42).

- Second, NRC Staff argues that "Nevada has not complied with the requirement in 10 C.F.R. §§ 2.326(a)(3), 2.326(b) and 51.109(a)(2) to file a supporting affidavit." *Id*. at 1342.

- Third, NRC Staff asserts that the lists attached to the affidavits filed by Nevada in support of this contention "are neither signed nor initialed by the affiants, and there is no other indication that either affiant reviewed the list associated with his affidavit, and therefore had knowledge of the contents of the list, prior to it being filed." *Id.* at 1343.

- Fourth, "[n]either the contention nor the affidavits specify which statements in the contention are attributable" to which affiant if there is more than one. *Id.*

- Fifth, "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Mr. Halstead or Mr. Frishman based his opinion," or "the basis for the opinions offered by the affiants." *Id*. at 1343 and 1342.

- Sixth, NRC Staff has also challenged the admissibility of this contention under 10 C.F.R. § 2.309(f)(1)(v), citing two reports identified in the Petition and alleging that they do not provide sufficient support for Nevada's contention. *Id*. at 1344.

Nevada replies to all of these arguments in turn below.

Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008, *U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326 much less a requirement that a petition in intervention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument. However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in Section 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by making clear that DOE "fail[ed] to provide verifiable estimates of the costs of cleanup following severe transportation accidents that resulted in release of radioactive materials," which "is significant because, without considering reasonably foreseeable transportation accidents and their effects including cleanup costs, there is no adequate disclosure of environmental impacts under NEPA. If reasonably foreseeable

transportation accidents and their effects including cleanup costs were properly considered, the disclosure of radiological impacts could be materially different . . . ." (Petition at 1052). *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the procedure required by law"), and *Oregon Environmental Council v. Kunzman*, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be set aside if undertaken 'without observance of procedure required by law'"). *See also* Section II.H, *supra.* Contrary to NRC Staff's assertion that these "bare assertions" are insufficient to demonstrate significant and materiality, Section 1 of the contention is specifically required to be a concise, one-sentence summary of the contention; and all the detailed support for the contention (which demonstrates both significance and materiality) is contained in Section 5 (Petition at 1054-55). Accordingly, this contention satisfies the requirements of 10 C.F.R. § 2.326.

Nevada has in fact supported its contention with the affidavits of Mr. Robert Halstead and Mr. Steven Frishman (Petition, Attachment 7 (Halstead) and Attachment 20 (Frishman)). This alone suffices to defeat NRC Staff's argument, particularly in light of the fact that NRC Staff admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. § 51.109 "specifies what must be contained in a supporting affidavit . . . ." (Answer at 1342). Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in each affidavit. NRC Staff improperly attempts to equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. Each of these affidavits are more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits the expert witnesses from adopting the statements contained in Section 5 as their own

opinions. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The factual support contained in Section 5 of this contention, including all documentation cited, was identified by the expert witnesses. The text of Section 5 (and for the most part the statements contained in Sections 1, 2, and 6), which included reasoned bases and explanations, conclusions reached, and specific challenges to corresponding analyses in DOE's LA, was drafted, reviewed, and approved by the expert witnesses who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the specific contention that the expert adopts. Nevada decided against having expert affidavits incorporate numerous paragraphs from multiple contentions to avoid burdening its Petition with hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each was assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial, especially since many of Nevada's experts lived in European countries where affidavit formalities are more complicated. NRC Staff's Answer cites nothing in support of its position that either the contention or the attachment to the affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

NRC Staff complains that since more than one affiant subscribed to Section 5, it cannot tell which parts of the paragraph are associated with which expert. No support is proffered that

would require as much. Moreover, NRC Staff does not explain why a question regarding whether each expert adopted all or only a part of a Section 5 bears on admissibility of the contention, as opposed to admission of expert testimony at a hearing on the merits. In this contention, each expert wholly adopted all of Section 5, which obviously means that all of the Section 5 is adopted as the testimony of each of the expert.

NRC Staff asserts (Answer at 1343) that "[n]either the contention nor the affidavits explains the personal knowledge or facts upon which Mr. Halstead or Mr. Frishman based his opinion." In addition, NRC Staff asserts that (*id*. at 1342) "neither the affidavits nor the contention explain the basis for the opinions offered by the affiants." Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent with the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the Case Management Order of June 20, 2008. NRC Staff has not challenged this contention on that ground except to argue over merits, *infra*. In addition, clearly each of the above-identified expert witnesses has adopted Section 5 of this contention as their own opinions in their affidavits. Moreover, each expert witness has attached to their affidavit a curriculum vitae that addresses in great detail their qualifications, experience, and expertise. When coupled together, these documents and statements clearly and unequivocally demonstrate that, based on the expert's personal knowledge and professional credentials, the facts and opinions set forth in Section 5 are those of the expert. NRC Staff's Answer fails to identify any support for its assertion to the contrary. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§ 2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore NRC Staff's effort to defeat admissibility of this contention must be rejected.

Finally, NRC Staff attacks two of the reports identified in Nevada's Petition as not supporting the contention (Answer at 1344). Notwithstanding NRC Staff assertion, as discussed in the Petition (at 1055) both documents clearly relate to calculating clean-up costs for transportation accidents, and therefore both documents are quite relevant to this contention, which specifically addresses the inadequacy of DOE's calculation of clean-up costs for transportation accidents. Moreover, in each case, NRC Staff is making a merits-based challenge to the factual allegations contained in Petition, which is not appropriate at this stage of the proceeding when this Licensing Board is considering the admissibility of a contention. In fact, DOE has previously admitted that environmental contentions involving transportation impacts (such as presented in this contention) are proper for consideration in this very proceeding. *See Nuclear Energy Institute, Inc. v. EPA*, 373 F.3d 1251, 1313 (D.C. Cir. 2004) (where the Court made its decision "on the assurances of counsel for both NRC and DOE at oral argument that Nevada will be permitted to raise its substantive challenges to the FEIS in any NRC proceeding to decide whether to adopt the FEIS").

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

No reply necessary based on NRC Staff's response.

REPLY – NEV-NEPA-04 – SHARED USE OPTION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

NRC Staff contends (Answer at 1351) that "Nevada has not demonstrated that further analysis of impacts from the shared use option is necessary" because "the information that Nevada cites to is too uncertain to demonstrate that such induced traffic is a reasonably foreseeable impact that DOE should have considered in the Rail Alignment EIS." While Nevada and NRC Staff agree that DOE must take a "hard look" at the potential environmental impacts of its proposed action, NRC Staff would only look to effects which are shown to have some likelihood of occurring. *Id*. at 1350. Apparently NRC Staff (like DOE) is of the opinion that induced traffic growth is not likely to occur on the Caliente rail line and therefore its impacts need not be considered.

Based upon the factual allegations contained in the Petition (at 1059-60), Nevada maintains that DOE has not taken the requisite "hard look" at the environmental impacts from the shared use of the Caliente railroad line and DOE has not provided a reasonably thorough discussion of the probable environmental consequences in the Rail Alignment FEIS. In light of DOE's conclusion that induced traffic growth was "unknown at this time," Nevada offered one likely example of induced traffic growth and identified its possible impacts (Petition at 1059-60).

Nevada is not asking this Licensing Board to second guess DOE, but instead to look at the information and explanations proffered by DOE (in light of much contrary information) and determine whether DOE's assumptions and positions are indeed reasonable. To the degree that NRC Staff is arguing the one example of induced traffic growth proffered by Nevada is insufficient or that the likelihood of induced traffic growth is too unlikely, such arguments address the weight and relevance of the facts alleged in the contention. Such arguments go to the merits of the contention and not its admissibility.

In fact, counsel for DOE and NRC Staff have previously admitted that environmental contentions involving transportation impacts (such as presented in this contention) are proper for consideration in this very proceeding. *See Nuclear Energy Institute, Inc. v. EPA*, 373 F.3d 1251, 1313 (D.C. Cir. 2004) (where the Court made its decision "on the assurances of counsel for both NRC and DOE at oral argument that Nevada will be permitted to raise its substantive challenges to the FEIS in any NRC proceeding to decide whether to adopt the FEIS"). Long-standing NRC case law instructs Licensing Boards to address environmental impacts associated with related transportation activities away from the licensed premise. *See Kansas Gas & Electric Co. (Wolf Creek Nuclear Generating Station, Unit No. 1)*, CLI-77-1, 5 NRC 1 (1977), 1977 NRC LEXIS 197, *16-17. *See also Detroit Edison Co. (Greenwood Energy Center, Units 2 and 3)*, ALAB-247, 8 AEC 936 (1974). Licensing Boards should "heed the rule generally applicable for major Federal action in which two (or more) agencies are involved," namely that both agencies "must evaluate the environmental consequences of the entire project" and both agencies "must determine independently whether NEPA has been satisfied." *Tennessee Valley Authority (Phipps Bend Nuclear Plant, Units 1 and 2)*, ALAB-506, 8 NRC 533 (1978), 1978 NRC LEXIS 18, *28.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff asserts (Answer at 1351-52) that this contention fails to satisfy the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) because neither the information presented in Section 5 of the contention nor Mr. Halstead's affidavit explain the basis for the opinions provided. As the only specific deficiencies identified, NRC Staff first claims the "no citation to any research into travel behavior is provided nor is the source of the opinion . . . evident . . .," and second claims that "Nevada does not explain the likelihood of such shipments on the Caliente corridor." *Id*. at 1352. Nevada properly pled facts, cited to source materials, and offered supporting expert opinion from Robert Halstead in this contention, which more than suffices to comply with the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). Both of NRC Staff's arguments go to the merits of the facts alleged in the contention and not to its admissibility.

Although not presented as a response within an enumerated subsection of 10 C.F.R. § 2.309(f)(1), NRC Staff also challenges the admissibility of this contention on the grounds that Nevada's pleading fails to satisfy the requirements of 10 C.F.R. §§ 2.326 and 51.109.

- First, NRC Staff argues that "Nevada has not explicitly addressed the § 2.326 criteria" and neither the summary found in the Petition (at 1057) nor the remainder of the contention is sufficient to demonstrate significance or materiality (Answer at 1346).

- Second, NRC Staff argues that "Nevada has not complied with the requirement in 10 C.F.R. §§ 2.326(a)(3), 2.326(b) and 51.109(a)(2) to file a supporting affidavit." *Id*. at 1348.

- Third, NRC Staff asserts that the list attached to the affidavit filed by Nevada in support of this contention "is neither signed nor initialed by Mr. Halstead, and there is no other indication that Mr. Halstead reviewed the list, and therefore had knowledge of the contents of this list, prior to it being filed." *Id.* at 1349.

- Fourth, "[n]either the contention itself nor Mr. Halstead's affidavit specifies which statements in the contention are attributable to Mr. Halstead . . . ." *Id.*

- Fifth, "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Mr. Halstead based his opinions," or "the basis for Mr. Halstead's opinions." *Id*. at 1349 and 1348.

Nevada replies to all of these arguments in turn below.

Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008, *U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326 much less a requirement that a petition in intervention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument. However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in Section 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by making clear that DOE:

> fail[ed] to adequately evaluate operational impacts of the shared use option generally, and specifically fail[ed] to evaluate the potential operational impacts of induced traffic growth. This deficiency is significant because, without fully considering the operational impacts of shared use under common carrier obligations, there is no adequate disclosure under NEPA. If a reasonable discussion of the operational impacts of the shared use option was included, the disclosure of shared use operational impacts could be materially different.

(Petition at 1057). Nevada provided specific facts in support of these conclusions on Section 5 of its contention. *Id.* at 1059-60. *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the

procedure required by law"), and *Oregon Environmental Council v. Kunzman*, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be set aside if undertaken 'without observance of procedure required by law'"). *See also* Section II.H, *supra.* Arguments made by NRC Staff to the contrary (*see, e.g.,* Answer at 1347-48) go to the merits and not admissibility of this contention. Accordingly, this contention satisfies the requirements of 10 C.F.R. § 2.326.

Nevada has in fact supported its contention with the affidavit of Mr. Robert Halstead (Petition, Attachment 7). This alone suffices to defeat NRC Staff's argument, particularly in light of the fact that NRC Staff admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. § 51.109 "specifies what must be contained in a supporting affidavit . . . ." (Answer at 1348). Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in each affidavit. NRC Staff improperly attempts to equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. Mr. Halstead's affidavit is more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits Mr. Halstead from adopting the statements contained in Section 5 as his own opinions. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The factual support contained in Section 5 of this contention, including all documentation cited, was identified by Mr. Halstead. The text of Section 5 (and for the most part the statements contained in Sections 1, 2 and 6), which included reasoned bases and explanations, conclusions reached, and specific challenges to corresponding analyses in DOE's LA, was drafted, reviewed,

and approved by Mr. Halstead who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the specific contention that Mr. Halstead adopts. Nevada decided against having expert affidavits incorporate numerous paragraphs from multiple contentions to avoid burdening its Petition with hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each was assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial, especially since many of Nevada's experts lived in European countries where affidavit formalities are more complicated. NRC Staff's Answer cites nothing in support of its position that either the contention or the attachment to Mr. Halstead's affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

NRC Staff complains that it cannot tell which parts of Section 5 have been adopted by Mr. Halstead. No support is proffered that would require as much. Moreover, NRC Staff does not explain why a question regarding whether Mr. Halstead adopted all or only a part of a Section 5 bears on admissibility of the contention, as opposed to admission of expert testimony at a hearing on the merits. In this contention, Mr. Halstead wholly adopted all of Section 5, which obviously means that all of the Section 5 is adopted as the testimony of Mr. Halstead.

NRC Staff asserts (Answer at 1349) that "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Mr. Halstead based his opinions." In addition, NRC Staff asserts that (*id*. at 1348) "neither the contention nor affidavit explains the

basis for Mr. Halstead's opinions." Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent with the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the Case Management Order of June 20, 2008. NRC Staff has not challenged this contention on that ground except to argue over merits, *supra*. In addition, clearly Mr. Halstead has adopted Section 5 of this contention as his own opinions in his affidavit. Moreover, Mr. Halstead has attached to his affidavit a curriculum vitae that addresses in great detail his qualifications, experience, and expertise. When coupled together, these documents and statements clearly and unequivocally demonstrate that, based on Mr. Halstead's personal knowledge and professional credentials, the facts and opinions set forth in Section 5 are those of Mr. Halstead. NRC Staff's Answer fails to identify any support for its assertion to the contrary. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§ 2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore NRC Staff's effort to defeat admissibility of this contention must be rejected.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

No reply necessary based on NRC Staff's response.

REPLY – NEV-NEPA-05 – RADIOLOGICAL REGIONS OF INFLUENCE FOR TRANSPORTATION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

NRC Staff contends (Answer at 1359) that "Nevada has not demonstrated that further detailed information on exposed populations and health and safety impacts along existing transportation routes in Nevada is necessary" because Nevada "does not demonstrate that including such information in DOE's environmental documents would result in a *seriously* different picture of impacts from the repository and related transportation . . . ." While Nevada and NRC Staff agree that DOE must take a "hard look" at the potential environmental impacts of its proposed action, NRC Staff would only look to effects that are so serious as to paint a different picture of the impacts. *Id*. at 1359. Apparently NRC Staff (like DOE) is of the opinion that public health and safety impacts along transportation routes are not sufficiently serious to warrant further consideration.

Based upon the factual allegations contained in the Petition (at 1063), Nevada maintains that DOE has not taken the requisite "hard look" at the radiological regions of influence for transportation, specifically by failing to apply the preferred method of analysis consistently for transportation impacts in Nevada and nationally, and as a result DOE has failed to adequately

assess their environmental impacts. Nevada is not asking this Licensing Board to second guess DOE, but instead to look at the information and explanations proffered by DOE (in light of much contrary information) and determine whether DOE's assumptions and positions are indeed reasonable. To the degree that NRC Staff is arguing that the information provided by Nevada in this contention is not sufficiently "serious," such arguments address the weight of the facts alleged in the contention. Such arguments go to the merits of the contention and not its admissibility.

In fact, counsel for DOE and NRC Staff have previously admitted that environmental contentions involving transportation impacts (such as presented in this contention) are proper for consideration in this very proceeding. *See Nuclear Energy Institute, Inc. v. EPA*, 373 F.3d 1251, 1313 (D.C. Cir. 2004) (where the Court made its decision "on the assurances of counsel for both NRC and DOE at oral argument that Nevada will be permitted to raise its substantive challenges to the FEIS in any NRC proceeding to decide whether to adopt the FEIS"). Long-standing NRC case law instructs Licensing Boards to address environmental impacts associated with related transportation activities away from the licensed premise. *See Kansas Gas & Electric Co. (Wolf Creek Nuclear Generating Station, Unit No. 1)*, CLI-77-1, 5 NRC 1 (1977), 1977 NRC LEXIS 197, *16-17. *See also Detroit Edison Co. (Greenwood Energy Center, Units 2 and 3)*, ALAB-247, 8 AEC 936 (1974). Licensing Boards should "heed the rule generally applicable for major Federal action in which two (or more) agencies are involved," namely that both agencies "must evaluate the environmental consequences of the entire project" and both agencies "must determine independently whether NEPA has been satisfied." *Tennessee Valley Authority (Phipps Bend Nuclear Plant, Units 1 and 2)*, ALAB-506, 8 NRC 533 (1978), 1978 NRC LEXIS 18, *28.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff asserts (Answer at 1360) that this contention fails to satisfy the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) because neither the information presented in Section 5 of the contention nor Mr. Halstead's affidavit explain the basis for the opinions provided. As the only specific deficiency identified, NRC Staff asserts that "Nevada does not explain . . . the relationship of . . . population levels in the Las Vegas metropolitan area near existing transportation routes . . . to the sufficiency of DOE's impacts analysis, which considers doses to populations along representative rail routes in Nevada." *Id*. Surely even the NRC Staff can understand that the number of people living, working or visiting an area along a transportation route would be highly and directly relevant to an issue involving radiological exposures resulting from a transportation accident or sabotage event. Nevada properly pled facts, cited to source materials, and offered supporting expert opinion from Robert Halstead in this contention, which more than suffices to comply with the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). NRC Staff's arguments regarding exposure levels, population estimates and transportation routes all would go to merits of the facts alleged in the contention and not to its admissibility.

Although not presented as a response within an enumerated subsection of 10 C.F.R. § 2.309(f)(1), NRC Staff also challenges the admissibility of this contention on the grounds that Nevada's pleading fails to satisfy the requirements of 10 C.F.R. §§ 2.326 and 51.109.

- First, NRC Staff argues that "Nevada has not explicitly addressed the § 2.326 criteria" and the summary found in the Petition (at 1061) is not sufficient to demonstrate significance or materiality (Answer at 1355).

- Second, NRC Staff argues that "Nevada has not complied with the requirement in 10 C.F.R. §§ 2.326(a)(3), 2.326(b) and 51.109(a)(2) to file a supporting affidavit." *Id*. at 1356.

- Third, NRC Staff asserts that the list attached to the affidavit filed by Nevada in support of this contention "is neither signed nor initialed by Mr. Halstead, and there is no other indication that Mr. Halstead reviewed the list, and therefore had knowledge of the contents of this list, prior to it being filed." *Id.* at 1357.

- Fourth, "[n]either the contention itself nor Mr. Halstead's affidavit specifies which statements in the contention are attributable to Mr. Halstead . . . ." *Id.*

- Fifth, "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Mr. Halstead based his opinions," or "the basis for Mr. Halstead's opinion." *Id*. at 1357 and 1356.

Nevada replies to all of these arguments in turn below.

Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008, *U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326 much less a requirement that a petition in intervention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument. However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in Section 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by making clear that DOE:

> fail[ed] to apply the preferred method of analysis consistently for transportation impacts in Nevada and nationally. This failure is significant because without consistently evaluating the radiological regions of influence for transportation DOE has failed to adequately assess their environmental impacts, and because

> those environmental impacts could be materially different from that presented in the FSEIS and the RA FEIS, neither document can be adopted by the NRC.

(Petition at 1061). Nevada provided specific facts in support of these conclusions on Section 5 of its contention. *Id.* at 1063. *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the procedure required by law"), and *Oregon Environmental Council v. Kunzman*, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be set aside if undertaken 'without observance of procedure required by law'"). *See also* Section II.H, *supra.* Arguments made by NRC Staff to the contrary (*see, e.g.,* Answer at 1355) go to the merits and not admissibility of this contention. Accordingly, this contention satisfies the requirements of 10 C.F.R. § 2.326.

Nevada has in fact supported its contention with the affidavit of Mr. Robert Halstead. *See* Petition, Attachment 7. This alone suffices to defeat NRC Staff's argument, particularly in light of the fact that NRC Staff admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. § 51.109 "specifies what must be contained in a supporting affidavit . . . ." (Answer at 1356). Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in each affidavit. NRC Staff improperly attempts to equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. Mr. Halstead's affidavit is more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits Mr. Halstead from adopting the statements contained in Section 5 as his own opinions. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The factual support contained in Section 5 of this contention, including all documentation cited, was identified by Mr. Halstead. The text of Section 5 (and for the most part the statements contained in Sections 1, 2 and 6), which included reasoned bases and explanations, conclusions reached, and specific challenges to corresponding analyses in DOE's LA, was drafted, reviewed, and approved by Mr. Halstead who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the specific contention that Mr. Halstead adopts. Nevada decided against having expert affidavits incorporate numerous paragraphs from multiple contentions to avoid burdening its Petition with hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each was assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial, especially since many of Nevada's experts lived in European countries where affidavit formalities are more complicated. NRC Staff's Answer cites nothing in support of its position that either the contention or the attachment to Mr. Halstead's affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

NRC Staff complains that it cannot tell which parts of Section 5 have been adopted by Mr. Halstead. No support is proffered that would require as much. Moreover, NRC Staff does not explain why a question regarding whether Mr. Halstead adopted all or only a part of a Section 5 bears on admissibility of the contention, as opposed to admission of expert testimony

at a hearing on the merits. In this contention, Mr. Halstead wholly adopted all of Section 5, which obviously means that all of the Section 5 is adopted as the testimony of Mr. Halstead.

NRC Staff asserts (Answer at 1357) that "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Mr. Halstead based his opinions." In addition, NRC Staff asserts that (*id*. at 1360) "neither the contention nor affidavit explains the basis for Mr. Halstead's opinions." Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent with the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the Case Management Order of June 20, 2008. NRC Staff has not challenged this contention on that ground except to argue over merits, *supra*. In addition, clearly Mr. Halstead has adopted Section 5 of this contention as his own opinions in his affidavit. Moreover, Mr. Halstead has attached to his affidavit a curriculum vitae that addresses in great detail his qualifications, experience, and expertise. When coupled together, these documents and statements clearly and unequivocally demonstrate that, based on Mr. Halstead's personal knowledge and professional credentials, the facts and opinions set forth in Section 5 are those of Mr. Halstead. NRC Staff's Answer fails to identify any support for its assertion to the contrary. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§ 2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore NRC Staff's effort to defeat admissibility of this contention must be rejected.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

No reply necessary based on NRC Staff's response.

REPLY – NEV-NEPA-06 – CALIENTE RAIL ALIGNMENT PLAN AND PROFILE INFORMATION

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

NRC Staff contends (Answer at 1367) that "Nevada has not demonstrated that the issue raised in NEV-NEPA-06 is material to the finding the NRC must make to issue the construction authorization" because "Nevada has not shown that inclusion of further detail would materially affect the Rail Alignment EIS" and because Nevada has not demonstrate why "informing the public through the NEPA process . . . of a project's details" is relevant. While Nevada and NRC Staff agree that DOE must take a "hard look" at the potential environmental impacts of its proposed action, NRC Staff would only look to effects that are so serious as to paint a different picture of the impacts. *Id*. at 1366. Apparently NRC Staff (like DOE) is of the opinion that members of the public need not be informed of the detailed plan and profile drawings for the Caliente rail line, and that the absence of such information would not seriously affect the ability of the public to assess the environmental impacts of that line.

Based upon the factual allegations contained in the Petition (at 1067-69), Nevada maintains that DOE has not taken the requisite "hard look" at the detailed plan and profile information about the proposed Caliente rail (e.g., the vertical profile of the finished track-bed

structure, the top of rail elevation, the width and slope of ballast shoulders), or afforded members of the public the same opportunity (so as to verify the cut and fill requirements, the sub-ballast and ballast requirements, the right of way requirements, the disturbed area estimates, other major project attributes, and the resulting construction costs and impacts). Nevada is not asking this Licensing Board to second guess DOE, but instead to look at the information and explanations proffered by DOE (in light of much contrary information) and determine whether DOE's assumptions and positions are indeed reasonable. To the degree that NRC Staff is of the opinion that type of design detail identified by Nevada is not sufficiently "serious" or not "likely" to change the environmental impacts, such arguments address the weight and relevance of the facts alleged in the contention. Such arguments go to the merits of the contention and not its admissibility.

In fact, counsel for DOE and NRC Staff have previously admitted that environmental contentions involving transportation impacts (such as presented in this contention) are proper for consideration in this very proceeding. *See Nuclear Energy Institute, Inc. v. EPA*, 373 F.3d 1251, 1313 (D.C. Cir. 2004) (where the Court made its decision "on the assurances of counsel for both NRC and DOE at oral argument that Nevada will be permitted to raise its substantive challenges to the FEIS in any NRC proceeding to decide whether to adopt the FEIS"). Long-standing NRC case law instructs Licensing Boards to address environmental impacts associated with related transportation activities away from the licensed premise. *See Kansas Gas & Electric Co. (Wolf Creek Nuclear Generating Station, Unit No. 1)*, CLI-77-1, 5 NRC 1 (1977), 1977 NRC LEXIS 197, *16-17. *See also Detroit Edison Co. (Greenwood Energy Center, Units 2 and 3)*, ALAB-247, 8 AEC 936 (1974). Licensing Boards should "heed the rule generally applicable for major Federal action in which two (or more) agencies are involved," namely that both agencies "must

evaluate the environmental consequences of the entire project" and both agencies "must determine independently whether NEPA has been satisfied." *Tennessee Valley Authority (Phipps Bend Nuclear Plant, Units 1 and 2)*, ALAB-506, 8 NRC 533 (1978), 1978 NRC LEXIS 18, *28.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff asserts (Answer at 1368) that this contention fails to satisfy the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) because neither the information presented in Section 5 of the contention nor Mr. Halstead's affidavit explain the basis for the opinions provided. As the only specific deficiency identified, NRC Staff claims "it is not clear from reading the [Moore] report [cited in Petition at 1069] what the precise basis is for the opinions contained therein, nor is the significance of the information in the report explained as otherwise required" (Answer at 1368). Nevada properly pled facts, cited to source materials, and offered supporting expert opinion from Robert Halstead in this contention, which more than suffices to comply with the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). Clearly NRC Staff is free to explore the meaning and application of the cited Moore report, and to challenge its sufficiency, significance, and relevance. However, any such efforts go to the merits of the facts alleged in the contention and not to its admissibility.

Although not presented as a response within an enumerated subsection of 10 C.F.R. § 2.309(f)(1), NRC Staff also challenges the admissibility of this contention on the grounds that Nevada's pleading fails to satisfy the requirements of 10 C.F.R. §§ 2.326 and 51.109.

- First, NRC Staff argues that "Nevada does not explicitly address the motion to reopen criteria [Section 2.326]," and the summary found in the Petition (at 1065) is not sufficient to demonstrate significance or materiality (Answer at 1362).

- Second, NRC Staff argues that "Nevada has not complied with the requirement in 10 C.F.R. §§ 2.326(a)(3), 2.326(b) and 51.109(a)(2) to file a supporting affidavit." *Id*. at 1364.

- Third, NRC Staff asserts that the list attached to the affidavit filed by Mr. Halstead in support of this contention "is neither signed nor initialed by Mr. Halstead, and there is no other indication that he reviewed the list associated with his affidavit, and therefore had knowledge of the contents of the list, prior to it being filed." *Id.* at 1365.

- Fourth, "[n]either the contention itself nor the affidavit specifies which statements in the contention are [attributable to] Mr. Halstead . . . ." *Id.*

- Fifth, "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Mr. Halstead based his opinion," or "the basis for Mr. Halstead's opinions." *Id*. at 1365 and 1364.

Nevada replies to all of these arguments in turn below.

Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008, *U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326 much less a requirement that a petition in intervention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument. However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in Section 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by making clear that DOE "fail[ed] to provide sufficiently detailed plan and profile information about the proposed Caliente rail alignment"

which "is significant because, without sufficiently detailed rail alignment plan and profile information, the impact findings . . . cannot be verified and thus the FEIS and FSEIS cannot be adopted by the NRC" (Petition at 1065). Nevada provided specific facts in support of these conclusions on Section 5 of its contention. *Id.* at 1067-69. *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the procedure required by law"), and *Oregon Environmental Council v. Kunzman*, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be set aside if undertaken 'without observance of procedure required by law'"). *See also* Section II.H, *supra.* Arguments made by NRC Staff to the contrary (*see, e.g.,* Answer at 1363-64) go to the merits and not admissibility of this contention. Accordingly, this contention satisfies the requirements of 10 C.F.R. § 2.326.

Nevada has in fact supported its contention with the affidavit of Mr. Robert Halstead (Petition, Attachment 7). This alone suffices to defeat NRC Staff's argument, particularly in light of the fact that NRC Staff admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. § 51.109 "specifies what must be contained in a supporting affidavit . . . ." (Answer at 1364). Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in each affidavit. NRC Staff improperly attempts to equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. Mr. Halstead's affidavit is more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits Mr. Halstead from adopting the statements contained in Section 5 as his own opinions. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or

opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The factual support contained in Section 5 of this contention, including all documentation cited, was identified by Mr. Halstead. The text of Section 5 (and for the most part the statements contained in Sections 1, 2 and 6), which included reasoned bases and explanations, conclusions reached, and specific challenges to corresponding analyses in DOE's LA, was drafted, reviewed, and approved by Mr. Halstead who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the specific contention that Mr. Halstead adopts. Nevada decided against having expert affidavits incorporate numerous paragraphs from multiple contentions to avoid burdening its Petition with hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each was assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial, especially since many of Nevada's experts lived in European countries where affidavit formalities are more complicated. NRC Staff's Answer cites nothing in support of its position that either the contention or the attachment to Mr. Halstead's affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

NRC Staff complains that it cannot tell which parts of Section 5 have been adopted by Mr. Halstead. No support is proffered that would require as much. Moreover, NRC Staff does not explain why a question regarding whether Mr. Halstead adopted all or only a part of a

Section 5 bears on admissibility of the contention, as opposed to admission of expert testimony at a hearing on the merits. In this contention, Mr. Halstead wholly adopted all of Section 5, which obviously means that all of the Section 5 is adopted as the testimony of Mr. Halstead.

NRC Staff asserts (Answer at 1365) that "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Mr. Halstead based his opinion." In addition, NRC Staff asserts that (*id*. at 1364) "neither the contention nor affidavit explains the basis for Mr. Halstead's opinions." Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent with the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the Case Management Order of June 20, 2008. NRC Staff has not challenged this contention on that ground except to argue over merits, *supra*. In addition, clearly Mr. Halstead has adopted Section 5 of this contention as his own opinions in his affidavit. Moreover, Mr. Halstead has attached to his affidavit a curriculum vitae that addresses in great detail his qualifications, experience, and expertise. When coupled together, these documents and statements clearly and unequivocally demonstrate that, based on Mr. Halstead's personal knowledge and professional credentials, the facts and opinions set forth in Section 5 are those of Mr. Halstead. NRC Staff's Answer fails to identify any support for its assertion to the contrary. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§ 2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore NRC Staff's effort to defeat admissibility of this contention must be rejected.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

No reply necessary based on NRC Staff's response.

REPLY – NEV-NEPA-07 – OVERWEIGHT TRUCKS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff asserts (Answer at 1374) that this contention fails to satisfy the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) because neither the information presented in Section 5 of the contention nor Mr. Halstead's affidavit explain the basis for the opinions provided. As the only specific deficiency identified, NRC Staff claims

> Nevada does not explain why including two different impact estimates in the FSEIS renders the FSEIS inadequate. Beyond stating that there is little relevant literature on the topic, Nevada offers no additional documentary support for the assertions that use of overweight trucks would be likely to result in more frequent or longer stops or increased overall ship times.

(Answer at 1374). Nevada properly pled facts, cited to source materials, and offered supporting expert opinion from Robert Halstead in this contention, which more than suffices to comply with the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). The simple answer to DOE's question as to why different impact estimates render the FSEIS inadequate can be found in Section 5 wherein Nevada makes clear the FSEIS "contradicts previous DOE documents" (specifically four

previous DOE documents) (Petition at 1072). Moreover, DOE's FSEIS proposed the use of **overweight** trucks whereas the four previous DOE documents proposed the use of **legal-weight** trucks, and DOE failed to provide a systematic examination of the potential impacts from using overweight trucks (OWT). *Id*. And the reason for not offering supporting documentation – "DOE has not suggested use of OWT for the past 15 years." *Id.* at 1073. These simple explanations – in the contention itself – belie any effort by NRC Staff to discredit Nevada's compliance with the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v).

Although not presented as a response within an enumerated subsection of 10 C.F.R. § 2.309(f)(1), NRC Staff also challenges the admissibility of this contention on the grounds that Nevada's pleading fails to satisfy the requirements of 10 C.F.R. §§ 2.326 and 51.109.

- First, NRC Staff argues that "Nevada has not explicitly addressed the § 2.326 criteria," and neither the summary found in the Petition (at 1070) nor the remainder of the contention is sufficient to demonstrate significance or materiality (Answer at 1370).

- Second, NRC Staff argues that "Nevada has not complied with the requirement in 10 C.F.R. §§ 2.326(a)(3), 2.326(b) and 51.109(a)(2) to file a supporting affidavit." *Id*. at 1372.

- Third, NRC Staff asserts that the list attached to the affidavit filed by Mr. Halstead in support of this contention "is neither signed nor initialed by Mr. Halstead, and there is no other indication that he reviewed the list associated with his affidavit, and therefore had knowledge of the contents of this list, prior to it being filed." *Id.* at 1373.

- Fourth, "[n]either the contention nor the affidavit specifies which statements in the contention are Mr. Halstead's . . . ." *Id.*

- Fifth, "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Mr. Halstead based his opinion," or "the basis for Mr. Halstead's opinions." *Id*. at 1373 and 1371.

Nevada replies to all of these arguments in turn below.

Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008, *U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326 much less a requirement that a petition in intervention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument. However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in Section 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by making clear that DOE fail[ed] to systematically assess the impacts of using overweight trucks for spent fuel shipments to Yucca Mountain, nationally and in Nevada. This failure is significant because without assessing the impacts of using overweight trucks for spent fuel shipments DOE has failed to adequately assess their environmental impacts, and because those environmental impacts could be materially different from that presented in the FSEIS and the FEIS, neither document can be adopted by the NRC (Petition at 1070). Nevada provided specific facts in support of these conclusions on Section 5 of its contention. *Id.* at 1072-73. *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the procedure required by law"), and *Oregon Environmental Council v. Kunzman*, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be set aside if undertaken 'without observance of procedure required by law'"). *See also*

Section II.H, *supra.* Arguments made by NRC Staff to the contrary (*see, e.g.,* Answer at 1371-72) go to the merits and not admissibility of this contention. Accordingly, this contention satisfies the requirements of 10 C.F.R. § 2.326.

Nevada has in fact supported its contention with the affidavit of Mr. Robert Halstead. *See* Petition, Attachment 7. This alone suffices to defeat NRC Staff's argument, particularly in light of the fact that NRC Staff admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. § 51.109 "specifies what must be contained in a supporting affidavit . . . ." (Answer at 1372). Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in each affidavit. NRC Staff improperly attempts to equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. Mr. Halstead's affidavit is more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits Mr. Halstead from adopting the statements contained in Section 5 as his own opinions. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The factual support contained in Section 5 of this contention, including all documentation cited, was identified by Mr. Halstead. The text of Section 5 (and for the most part the statements contained in Sections 1, 2 and 6), which included reasoned bases and explanations, conclusions reached, and specific challenges to corresponding analyses in DOE's LA, was drafted, reviewed, and approved by Mr. Halstead who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the specific contention that Mr.

Halstead adopts. Nevada decided against having expert affidavits incorporate numerous paragraphs from multiple contentions to avoid burdening its Petition with hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each was assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial, especially since many of Nevada's experts lived in European countries where affidavit formalities are more complicated. NRC Staff's Answer cites nothing in support of its position that either the contention or the attachment to Mr. Halstead's affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

NRC Staff complains that it cannot tell which parts of Section 5 have been adopted by Mr. Halstead. No support is proffered that would require as much. Moreover, NRC Staff does not explain why a question regarding whether Mr. Halstead adopted all or only a part of a Section 5 bears on admissibility of the contention, as opposed to admission of expert testimony at a hearing on the merits. In this contention, Mr. Halstead wholly adopted all of Section 5, which obviously means that all of the Section 5 is adopted as the testimony of Mr. Halstead.

NRC Staff asserts (Answer at 1373) that "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Mr. Halstead based his opinion." In addition, NRC Staff asserts that (*id*. at 1371) the affidavit "does not include any explanation of the basis for Mr. Halstead's opinions." Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent with the requirements of 10

C.F.R. § 2.309(f)(1)(v) and the Case Management Order of June 20, 2008. NRC Staff has not challenged this contention on that ground except to argue over merits, *supra*. In addition, clearly Mr. Halstead has adopted Section 5 of this contention as his own opinions in his affidavit. Moreover, Mr. Halstead has attached to his affidavit a curriculum vitae that addresses in great detail his qualifications, experience, and expertise. When coupled together, these documents and statements clearly and unequivocally demonstrate that, based on Mr. Halstead's personal knowledge and professional credentials, the facts and opinions set forth in Section 5 are those of Mr. Halstead. NRC Staff's Answer fails to identify any support for its assertion to the contrary. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§ 2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore NRC Staff's effort to defeat admissibility of this contention must be rejected.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

No reply necessary based on NRC Staff's response.

REPLY – NEV-NEPA-08 – IMPACTS ON AESTHETIC RESOURCES

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

NRC Staff contends (Answer at 1380-81) that "Nevada has not demonstrated that further analysis of impacts on 'City' from construction and operation of a rail line in the Caliente corridor is necessary for the NRC to make the appropriate findings prior to issuing a construction authorization for the repository." While Nevada and NRC Staff agree that DOE must take a "hard look" at the potential environmental impacts of its proposed action, NRC would only look to effects that are so serious as to paint a different picture of the impacts. *Id*. at 1377. NRC Staff claims that Nevada "does not explain why DOE's consideration of impacts to 'City' was inadequate" and also that Nevada "never explains its reasoning behind the assertion that DOE's analysis does not constitute a 'hard look' . . . ." *Id.* at 1380.

Based upon the factual allegations contained in the Petition (at 1076-78), Nevada maintains that DOE has not properly considered the adverse impacts of rail construction and operation on "City" and also has chosen to ignore an alternative alignment that would mitigate those impacts. Contrary to NRC Staff's assertion, Nevada specifically identified three reasons why DOE's consideration of impacts to "City" was inadequate:

> "Construction of a rail line in the Caliente corridor, as it is currently located, would lead to termination of the project's economic benefits to the surrounding communities."
>
> "DOE ignored comments about noise impacts at key observation points . . . ."
>
> "Rail construction and operation will permanently destroy a visitor's experience of Heizer's isolated sculpture by causing irrevocable harm to the Valley's undisturbed emptiness and the silence of its delicate desert environment."

(Petition at 1076-1077; citing LSN# DN2000524151 at 2), at 1077, and at 1078 (citing NEV000005474). These reasons were presented specifically to demonstrate why DOE's environmental analysis of "City" fails to constitute a "hard look." Nevada is not asking this Licensing Board to second guess DOE, but instead to look at the information and explanations proffered by DOE (in light of much contrary information) and determine whether DOE's assumptions and positions are indeed reasonable. To the degree that NRC Staff is of the opinion that these impacts are not sufficiently "serious," such arguments address the weight and relevance of the facts alleged in the contention. Such arguments go to the merits of the contention and not its admissibility.

In fact, counsel for DOE and NRC Staff have previously admitted that environmental contentions involving transportation impacts (such as presented in this contention) are proper for consideration in this very proceeding. *See Nuclear Energy Institute, Inc. v. EPA*, 373 F.3d 1251, 1313 (D.C. Cir. 2004) (where the Court made its decision "on the assurances of counsel for both NRC and DOE at oral argument that Nevada will be permitted to raise its substantive challenges to the FEIS in any NRC proceeding to decide whether to adopt the FEIS"). Long-standing NRC case law instructs Licensing Boards to address environmental impacts associated with related transportation activities away from the licensed premise. *See Kansas Gas & Electric Co. (Wolf Creek Nuclear Generating Station, Unit No. 1)*, CLI-77-1, 5 NRC 1 (1977), 1977 NRC LEXIS 197, *16-17. *See also Detroit Edison Co. (Greenwood Energy Center, Units 2 and 3)*, ALAB-

247, 8 AEC 936 (1974). Licensing Boards should "heed the rule generally applicable for major Federal action in which two (or more) agencies are involved," namely that both agencies "must evaluate the environmental consequences of the entire project" and both agencies "must determine independently whether NEPA has been satisfied." *Tennessee Valley Authority (Phipps Bend Nuclear Plant, Units 1 and 2)*, ALAB-506, 8 NRC 533 (1978), 1978 NRC LEXIS 18, *28.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Although not presented as a response within an enumerated subsection of 10 C.F.R. § 2.309(f)(1), NRC Staff also challenges the admissibility of this contention on the grounds that Nevada's pleading fails to satisfy the requirements of 10 C.F.R. §§ 2.326 and 51.109.

- First, NRC Staff argues that "Nevada has not explicitly addressed the § 2.326 criteria," and the summary found in the Petition (at 1091) is not sufficient to demonstrate significance or materiality (Answer at 1376).

- Second, NRC Staff argues that "Nevada has not complied with the requirement in 10 C.F.R. §§ 2.326(a)(3), 2.326(b) and 51.109(a)(2) to file a supporting affidavit." *Id*. at 1378.

- Third, NRC Staff asserts that the list attached to the affidavit filed by Mr. Halstead in support of this contention "is neither signed nor initialed by Mr. Halstead and there is no other indication that Mr. Halstead reviewed the list, and therefore had knowledge of the contents of the list, prior to it being filed." *Id.*

- Fourth, "[n]either the contention itself nor Mr. Halstead's affidavit specifies which statements in the contention are attributable to Mr. Halstead . . . ." *Id.* at 1378-79.

- Fifth, "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Mr. Halstead based his opinions," or "the basis for Mr. Halstead's opinion regarding impacts to City." *Id*. at 1379 and 1377.

Nevada replies to all of these arguments in turn below.

Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008, *U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326 much less a requirement that a petition in intervention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument. However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in Section 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by making clear that DOE:

> fail[ed] to acknowledge unacceptable adverse impacts on a cultural resource of national and international significance, and fail[ed] to apply avoidance as the appropriate method of eliminating an unacceptable adverse impact that cannot be mitigated . . . This deficiency is significant because without appropriately considering rail alignment impacts on aesthetic resources DOE has failed to adequately assess their environmental impacts, and because those environmental impacts could be materially different from that presented in the FSEIS and the RA FEIS, neither document can be adopted by the NRC.

(Petition at 1074). Nevada provided specific facts in support of these conclusions in Section 5 of its contention. *Id.* at 1076-78. *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the procedure required by law"), and *Oregon Environmental Council v. Kunzman*, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be set aside if undertaken 'without observance of procedure required by law'"). *See also* Section II.H, *supra.* NRC Staff recognizes the factual assertions made by

Nevada in this contention, and concludes that it "does not meet the high evidentiary standard required for a motion to reopen" (Answer at 1377). In addition to the fact the NRC Staff does not articulate "why" the facts alleged by Nevada do not suffice or "what" the high evidentiary standard is (other than the requirement for significance and materiality), NRC Staff also conveniently overlooks the Commission's direction to apply the criteria in Section 2.326 "to the extent possible." Moreover, to the degree that DOE is arguing that the facts alleged by Nevada are not significant enough or that there are not enough facts for the contention to meet the significance requirement, such arguments go to the merits and not admissibility of this contention. Accordingly, this contention satisfies the requirements of 10 C.F.R. § 2.326.

Nevada has in fact supported its contention with the affidavit of Mr. Robert Halstead (Petition, Attachment 7). This alone suffices to defeat NRC Staff's argument, particularly in light of the fact that NRC Staff admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. § 51.109 "specifies what must be contained in a supporting affidavit . . . ." (Answer at 1378). Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in each affidavit. NRC Staff improperly attempts to equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. Mr. Halstead's affidavit is more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits Mr. Halstead from adopting the statements contained in Section 5 as his own opinions. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The factual support contained in Section 5 of this contention, including all documentation cited, was identified by Mr. Halstead. The text of Section 5 (and for the most part the statements contained in Sections 1, 2 and 6), which included reasoned bases and explanations, conclusions reached, and specific challenges to corresponding analyses in DOE's LA, was drafted, reviewed, and approved by Mr. Halstead who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the specific contention that Mr. Halstead adopts. Nevada decided against having expert affidavits incorporate numerous paragraphs from multiple contentions to avoid burdening its Petition with hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each was assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial, especially since many of Nevada's experts lived in European countries where affidavit formalities are more complicated. NRC Staff's Answer cites nothing in support of its position that either the contention or the attachment to Mr. Halstead's affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

NRC Staff complains that it cannot tell which parts of Section 5 have been adopted by Mr. Halstead. No support is proffered that would require as much. Moreover, NRC Staff does not explain why a question regarding whether Mr. Halstead adopted all or only a part of a Section 5 bears on admissibility of the contention, as opposed to admission of expert testimony

at a hearing on the merits. In this contention, Mr. Halstead wholly adopted all of Section 5, which obviously means that all of the Section 5 is adopted as the testimony of Mr. Halstead.

NRC Staff asserts (Answer at 1379) that "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Mr. Halstead based his opinions." In addition, NRC Staff asserts that (*id*. at 1377) "neither the affidavit nor the contention explains the basis for Mr. Halstead's opinion regarding impacts to City." Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent with the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the Case Management Order of June 20, 2008. NRC Staff has not challenged this contention on that ground except to argue over merits, *supra*. In addition, clearly each Mr. Halstead has adopted Section 5 of this contention as his own opinions in his affidavit. Moreover, Mr. Halstead has attached to his affidavit a curriculum vitae that addresses in great detail his qualifications, experience, and expertise. When coupled together, these documents and statements clearly and unequivocally demonstrate that, based on Mr. Halstead's personal knowledge and professional credentials, the facts and opinions set forth in Section 5 are those of Mr. Halstead. NRC Staff's Answer fails to identify any support for its assertion to the contrary. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§ 2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore NRC Staff's effort to defeat admissibility of this contention must be rejected.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

No reply necessary based on NRC Staff's response.

REPLY – NEV-NEPA-09 – TRANSPORTATION SABOTAGE RISK VS. AT-REACTOR STORAGE

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Although not presented as a response within an enumerated subsection of 10 C.F.R. § 2.309(f)(1), NRC Staff challenges the admissibility of this contention on the grounds that Nevada's pleading fails to satisfy the requirements of 10 C.F.R. §§ 2.326 and 51.109.

- First, NRC Staff argues that "Nevada has not explicitly addressed the § 2.326 criteria . . . ." (Answer at 1383).

- Second, NRC Staff argues that "Nevada has not complied with the requirement in 10 C.F.R. §§ 2.326(b) and 51.109(a)(2) to file a supporting affidavit." *Id.*

- Third, NRC Staff asserts that the list attached to the affidavit filed by Nevada in support of this contention "is neither signed nor initialed by Mr. Halstead, and there is no other indication that he reviewed the list associated with his affidavit, and therefore had knowledge of the contents of the list, prior to it being filed." *Id.* at 1384.

- Fourth, "[n]either the contention nor the affidavit specifies which statements in the contention are Mr. Halstead's . . . ." *Id.*

Nevada replies to each argument in turn below.

Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008, *U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326 much less a requirement that a petition in intervention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument. However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by making clear that DOE:

> fails to consider reasonably foreseeable sabotage events at one or more of the 76 identified commercial reactor or DOE storage sites. This deficiency is significant because, without equally considering reasonably foreseeable sabotage events under both the Proposed Action and the No-Action Alternative, DOE has failed to adequately assess their environmental impacts, and because those environmental impacts could be materially different from that presented in the FSEIS the document cannot be adopted by the NRC.

(Petition at 1079). Detailed support for these assertions was provided in Section 5. *Id.* at 1081-82. *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the procedure required by law"), and *Oregon Environmental Council v. Kunzman*, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be set aside if undertaken 'without observance of procedure required by law'"). *See also* Section II.H, *supra.* Accordingly, this contention satisfies the requirements of 10 C.F.R. § 2.326.

Nevada has in fact supported its contention with the affidavit of Mr. Robert Halstead (Petition, Attachment 7). This alone suffices to defeat NRC Staff's argument, particularly in light of the fact that NRC Staff admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. § 51.109 "specifies what must be contained in a supporting affidavit . . . ." (Answer at 1383). Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in his affidavit. NRC Staff improperly attempts to equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. Mr. Halstead's affidavit is more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits Mr. Halstead from adopting the statements contained in Section 5 as his own opinions. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The factual support contained in Section 5 of this contention, including all documentation cited, was identified by Mr. Halstead. The text of Section 5 (and for the most part the statements contained in Sections 1, 2 and 6), which included reasoned bases and explanations, conclusions reached, and specific challenges to corresponding analyses in DOE's LA, was drafted, reviewed, and approved by Mr. Halstead who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the specific contention that Mr. Halstead adopts. Nevada decided against having expert affidavits incorporate numerous paragraphs from multiple contentions to avoid burdening its Petition with hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its

experts, each was assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial, especially since many of Nevada's experts lived in European countries where affidavit formalities are more complicated. NRC Staff's Answer cites nothing in support of its position that either the contention or the attachment to Mr. Halstead's affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

NRC Staff complains that it cannot tell which parts of Section 5 have been adopted by Mr. Halstead. No support is proffered that would require as much. Moreover, NRC Staff does not explain why a question regarding whether Mr. Halstead adopted all or only a part of a Section 5 bears on admissibility of the contention, as opposed to admission of expert testimony at a hearing on the merits. In this contention, Mr. Halstead wholly adopted all of Section 5, which obviously means that all of the Section 5 is adopted as the testimony of Mr. Halstead. Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent with the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the Case Management Order of June 20, 2008. NRC Staff has not challenged this contention on that ground. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§ 2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore NRC Staff's effort to defeat admissibility of this contention must be rejected.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

No reply necessary based on NRC Staff's response.

REPLY – NEV-NEPA-10 – LONG-TERM RADIATION EXPOSURE FOLLOWING SABOTAGE

1. A statement of the contention itself

NRC Staff asserts (Answer at 1388) "that Nevada has alleged a multi-issue contention" based upon the statements contained in Section 1 of the contention. Contrary to NRC Staff's assertion, this contention alleged that DOE "fail[ed] to provide a realistic estimate of population radiation doses and the cost of cleanup following a sabotage event" (Petition at 1083). Both are clearly related since the estimated cleanup costs for radiation exposure from a sabotage event are directly related to the size of the population that was exposed. (In fact, as Americans have learned from the tragic events of September 11, 2001, saboteurs specifically identify their targets and actions to impact the largest number of people possible.) This contention went on to explain that, because the insurance coverage limits under Price Anderson would be inadequate to cover cleanup costs, Congress would have to provide supplemental funding but that such legislation would take additional time and hence additional exposure would occur. *Id*. If Nevada had placed either of these two related arguments in separate contentions, then their resolution would depend upon the resolution of other contentions notwithstanding the fact that all issues stemmed from a single set of facts – DOE's failure to realistically estimate dose and cleanup costs from a sabotage event. Accordingly, Nevada has satisfied the requirements of 10 C.F.R. § 2.309(f)(1)(i) and the Case Management Order of June 20, 2008.

NRC Staff also addresses Nevada's contentions presented as NEV-NEPA-01 and NEV-NEPA-02, and refers to arguments made in response to those contentions (Answer at 1388-89). However, Nevada did not cross-reference its contention in NEV-NEPA-10 with either (or both) of its contentions in NEV-NEPA-01 and/or NEV-NEPA-02. Therefore, NRC Staff is not permitted to respond to this contention by cross-referencing its response to either or both of those

two contentions. Rather, NRC Staff's arguments with regard to NEV-NEPA-10 must be made in response to this contention and not in response to other contentions. Without waiving the foregoing position, to the degree that the Licensing Board should choose to consider NRC Staff's arguments made in responses to NEV-NEPA-01 and NEV-NEPA-02, Nevada hereby adopts and incorporates by reference its replies to NRC Staff's responses to NEV-NEPA-01 and NEV-NEPA-02.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff alleges that "Nevada has not met its burden of providing supporting facts or expert opinion on its radiation exposure claim" because this contention "provides no quantitative or independent assessments of the alleged increased dose to the public after a delay in cleanup" (Answer at 1389). Of course NRC Staff also overlooks the fact that DOE has not provided an estimate of the cost of cleanup after a sabotage scenario involving truck or rail shipping casks (Petition at 1085). But, to the contrary, this contention makes specific reference to the 33-page report by Resnikoff & Travers that addresses cleanup cost estimates and radiation exposure estimates for a range of sabotage event scenarios. *Id.*, citing NEV000005444. NRC Staff further asserts that "the contention mentions the Resnikoff report, but this report relates to clean-up

costs. Nevada has not met its burden of providing supporting facts or expert opinion on its radiation exposure claim . . . ." (Answer at 1389). Contrary to NRC Staff's implication that the Resnikoff report (NEV000005444) does not address radiation exposure, a mere cursory review of pages 18-29 reveals an extensive discussion in text (with eight tables and four figures) regarding radiation exposures to the population at large and to the maximum exposed individual. NRC Staff's claim is clearly wrong. Since this issue is the only argument presented by NRC Staff, and it fails, Nevada's contention must be found to satisfy the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v).

Although not presented as a response within an enumerated subsection of 10 C.F.R. § 2.309(f)(1), NRC Staff also challenges the admissibility of this contention on the grounds that Nevada's pleading fails to satisfy the requirements of 10 C.F.R. §§ 2.326 and 51.109.

- First, NRC Staff argues that "Nevada fails to address the criteria of section 2.326," and the summary found in the Petition (at 1083) is not sufficient to demonstrate significance or materiality (Answer at 1386).

- Second, NRC Staff argues that "Nevada has not complied with the requirement in 10 C.F.R. §§ 2.326(b) and 51.109(a)(2) to file a supporting affidavit." *Id*. at 1387.

- Third, NRC Staff asserts that the list attached to the affidavit filed by Mr. Halstead in support of this contention "is neither signed nor initialed by Mr. Halstead and there is no other indication that Mr. Halstead reviewed the list, and therefore had knowledge of the contents of the list, prior to it being filed." *Id.* at 1387-88.

- Fourth, "[n]either the contention itself nor Mr. Halstead's affidavit specifies which statements in the contention are attributable to Mr. Halstead . . . ." *Id.* at 1388.

- Fifth, "[i]t is not clear from the contention or the affidavit on what facts or knowledge Mr. Halstead based his opinions on long-term exposure." *Id*.

Nevada replies to all of these arguments in turn below.

Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008, *U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326 much less a requirement that a petition in intervention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument. However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in Section 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by making clear that DOE:

> fail[ed] to provide a realistic estimate of population radiation doses and the cost of cleanup following a sabotage event . . . . This deficiency is significant because, without considering a reasonable cost of cleanup following a sabotage event, DOE has failed to adequately assess its environmental impact, and because that environmental impact could be materially different from that presented in the FSEIS, the document cannot be adopted by the NRC.

Petition at 1083. Nevada provided specific facts in support of these conclusions in Section 5 of its contention. *Id.* at 1085-86. *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the procedure required by law"), and *Oregon Environmental Council v. Kunzman*, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be set aside if undertaken 'without observance of procedure required by law'"). *See also* Section II.H, *supra.* NRC Staff recognizes the factual assertions made by Nevada in this contention, and concludes that, with regard to "long-term radiation exposure

following sabotage," that they "fail[]to address the section 2.326(a) heightened admissibility standards" (Answer at 1386). In addition to the fact the NRC Staff does not articulate "why" the facts alleged by Nevada do not suffice, NRC Staff also conveniently overlooks the Commission's direction to apply the criteria in Section 2.326 "to the extent possible." As noted above and contrary to NRC Staff's assertion, the factual support provided in Section 5 of this contention, including its reference to the Resnikoff report (which specifically addresses radiation exposures following sabotage) is more than adequate to satisfy the significance and materiality requirements of Section 2.326. To the degree that NRC Staff is arguing that the facts alleged by Nevada are not significant enough or that there are not enough facts for the contention to meet the significance requirement, such arguments go to the merits and not admissibility of this contention. Accordingly, this contention satisfies the requirements of 10 C.F.R. § 2.326.

Nevada has in fact supported its contention with the affidavit of Mr. Robert Halstead (Petition, Attachment 7). This alone suffices to defeat NRC Staff's argument, particularly in light of the fact that NRC Staff admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. § 51.109 "specifies what must be contained in a supporting affidavit. . . ." (Answer at 1387). Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in each affidavit. NRC Staff improperly attempts to equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. Mr. Halstead's affidavit is more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits Mr. Halstead from adopting the statements contained in Section 5 as his own opinions. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or

opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The factual support contained in Section 5 of this contention, including all documentation cited, was identified by Mr. Halstead. The text of Section 5 (and for the most part the statements contained in Sections 1, 2 and 6), which included reasoned bases and explanations, conclusions reached, and specific challenges to corresponding analyses in DOE's LA, was drafted, reviewed, and approved by Mr. Halstead who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the specific contention that Mr. Halstead adopts. Nevada decided against having expert affidavits incorporate numerous paragraphs from multiple contentions to avoid burdening its Petition with hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each was assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial, especially since many of Nevada's experts lived in European countries where affidavit formalities are more complicated. NRC Staff's Answer cites nothing in support of its position that either the contention or the attachment to Mr. Halstead's affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

NRC Staff complains that it cannot tell which parts of Section 5 have been adopted by Mr. Halstead. No support is proffered that would require as much. Moreover, NRC Staff does not explain why a question regarding whether Mr. Halstead adopted all or only a part of a

Section 5 bears on admissibility of the contention, as opposed to admission of expert testimony at a hearing on the merits. In this contention, Mr. Halstead wholly adopted all of Section 5, which obviously means that all of the Section 5 is adopted as the testimony of Mr. Halstead.

NRC Staff asserts (Answer at 1388) that "[i]t is not clear from the contention or the affidavit on what facts or knowledge Mr. Halstead based his opinions on long-term exposure." Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent with the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the Case Management Order of June 20, 2008. NRC Staff's challenge to this contention on that ground is groundless as exemplified by the fact that NRC Staff completely misread or wholly overlooked specific discussion contained in the document referenced in Section 5, *supra*. In addition, clearly Mr. Halstead has adopted Section 5 of this contention as his own opinions in his affidavit. Moreover, Mr. Halstead has attached to his affidavit a curriculum vitae that addresses in great detail his qualifications, experience, and expertise. When coupled together, these documents and statements clearly and unequivocally demonstrate that, based on Mr. Halstead's personal knowledge and professional credentials, the facts and opinions set forth in Section 5 are those of Mr. Halstead. NRC Staff's Answer fails to identify any support for its assertion to the contrary. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§ 2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore NRC Staff's effort to defeat admissibility of this contention must be rejected.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

No reply necessary based on NRC Staff's response.

REPLY – NEV-NEPA-11 – SABOTAGE RISK, PRESSURIZED CASK

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's responses.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Although not presented as a response within an enumerated subsection of 10 C.F.R. § 2.309(f)(1), NRC Staff challenges the admissibility of this contention on the grounds that Nevada's pleading fails to satisfy the requirements of 10 C.F.R. §§ 2.326 and 51.109.

- First, NRC Staff argues that "Nevada has not explicitly addressed the § 2.326 criteria" and the bare assertion in Section 1 of Nevada's Petition (at 1087) does not suffice to demonstrate significance or materiality (Answer at 1391).

- Second, NRC Staff argues that "Nevada has not complied with the requirement in 10 C.F.R. §§ 2.326(b) and 51.109(a)(2) to file a supporting affidavit." *Id*. at 1392.

- Third, NRC Staff asserts that the list attached to the affidavit filed by Nevada in support of this contention "is neither signed nor initialed by Mr. Halstead, and there is no other indication that Mr. Halstead reviewed the list, and therefore had knowledge of the contents of the list, prior to it being filed." *Id.* at 1393.

- Fourth, "[n]either the contention itself nor Mr. Halstead's affidavit specifies which statements in the contention are attributable to Mr. Halstead . . . ." *Id.*

- Fifth, "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Mr. Halstead based his opinions" or "the basis for the opinions offered . . . ." *Id*. at 1393 and 1392.

Nevada replies to each argument in turn below.

Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008, *U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326 much less a requirement that a petition in intervention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument. However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by making clear that DOE:

> fail[ed] to properly account for cask pressurization in a sabotage event during transportation. The cost/benefit ratio is therefore biased towards the preferred alternative. This deficiency is significant because without appropriately considering a sabotage event during transportation, DOE has failed to adequately assess its environmental impacts, and because those environmental impacts could be materially different from that presented in the FSEIS, the document cannot be adopted by the NRC.

(Petition at 1087). Detailed support for these assertions was provided in Section 5. *Id.* at 1089. *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the procedure required by law"), and *Oregon*

Environmental Council v. Kunzman, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be set aside if undertaken 'without observance of procedure required by law'"). *See also* Section II.H, *supra.* Accordingly, this contention satisfies the requirements of 10 C.F.R. § 2.326.

Nevada has in fact supported its contention with the affidavit of Mr. Robert Halstead (Petition, Attachment 7). This alone suffices to defeat NRC Staff's argument, particularly in light of the fact that NRC Staff admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. § 51.109 "specifies what must be contained in a supporting affidavit. . . ." (Answer at 1392). Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in his affidavit. NRC Staff improperly attempts to equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. Mr. Halstead's affidavit is more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits Mr. Halstead from adopting the statements contained in Section 5 as his own opinions. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The factual support contained in Section 5 of this contention, including all documentation cited, was identified by Mr. Halstead. The text of Section 5 (and for the most part the statements contained in Sections 1, 2 and 6), which included reasoned bases and explanations, conclusions reached, and specific challenges to corresponding analyses in DOE's LA, was drafted, reviewed, and approved by Mr. Halstead who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the specific contention that Mr.

Halstead adopts. Nevada decided against having expert affidavits incorporate numerous paragraphs from multiple contentions to avoid burdening its Petition with hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each was assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial, especially since many of Nevada's experts lived in European countries where affidavit formalities are more complicated. NRC Staff's Answer cites nothing in support of its position that either the contention or the attachment to Mr. Halstead's affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

NRC Staff complains that it cannot tell which parts of Section 5 have been adopted by Mr. Halstead. No support is proffered that would require as much. Moreover, NRC Staff does not explain why a question regarding whether Mr. Halstead adopted all or only a part of a Section 5 bears on admissibility of the contention, as opposed to admission of expert testimony at a hearing on the merits. In this contention, Mr. Halstead wholly adopted all of Section 5, which obviously means that all of the Section 5 is adopted as the testimony of Mr. Halstead.

Finally, NRC Staff asserts (Answer at 1393) that "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Mr. Halstead based his opinions." In addition, NRC Staff asserts (*id*. at 1392) that "[n]either the affidavit nor the contention explain the basis for the opinions offered by the affiants [sic: affiant]." Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent

with the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the Case Management Order of June 20, 2008. NRC Staff has not challenged this contention on that ground. In addition, clearly Mr. Halstead has adopted Section 5 of this contention as his own opinions in his affidavit. Moreover, Mr. Halstead has attached to his affidavit a curriculum vitae that addresses in great detail his qualifications, experience, and expertise. When coupled together, these documents and statements clearly and unequivocally demonstrate that, based on Mr. Halstead's personal knowledge and professional credentials, the facts and opinions set forth in Section 5 are those of Mr. Halstead. NRC Staff's Answer fails to identify any support for its assertion to the contrary. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§ 2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore NRC Staff's effort to defeat admissibility of this contention must be rejected.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

No reply necessary based on NRC Staff's response.

REPLY – NEV-NEPA-12 – TRANSPORTATION RISK ASSUMPTIONS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Although not presented as a response within an enumerated subsection of 10 C.F.R. § 2.309(f)(1), NRC Staff challenges the admissibility of this contention on the grounds that Nevada's pleading fails to satisfy the requirements of 10 C.F.R. §§ 2.326 and 51.109.

- First, NRC Staff argues that "Nevada has not explicitly addressed the § 2.326 criteria," and the statements contained in Section 1 of the Petition (at 1091) lack support, but then acknowledges that "if the expert affidavit is accepted as legally sufficient" then "all three § 2.326(a) criteria have been met . . . ." (Answer at 1396).

- Second, NRC Staff argues that "Nevada has not complied with the requirement in 10 C.F.R. §§ 2.326(a)(3), 2.326(b) and 51.109(a)(2) to file a supporting affidavit." *Id.*

- Third, NRC Staff asserts that the lists attached to the affidavits filed by Nevada in support of this contention "are neither signed nor initialed by the affiants, and there is no other indication that either affiant reviewed the list associated with his affidavit, and therefore had knowledge of the contents of this list, prior to it being filed." *Id.* at 1397.

- Fourth, "[n]either the contention nor the affidavits specifies which statements in the contention are attributable to either or both" affiants. *Id.*

- Fifth, "[n]either the contention nor the affidavits explains the personal knowledge or facts upon which Mr. Halstead or Mr. Frishman based his opinion." *Id*.

Nevada replies to each argument in turn below.

Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008, *U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326 much less a requirement that a petition in intervention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument. However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by making clear that DOE:

> fail[ed] to use the consistent application of weather and release fraction assumptions to all reasonably foreseeable accident and sabotage scenarios. This deficiency is significant because, without the consistent application of weather and release fraction assumptions to transportation accident or sabotage events, DOE has failed to adequately assess their environmental impacts, and because those environmental impacts could be materially different from that presented in the FSEIS and the [Rail Alignment FEIS], neither document can be adopted by the NRC.

(Petition at 1091). Detailed support for these assertions was provided in Section 5. (*See id.* at 1093-94). *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS

depends upon whether it was prepared in observation of the procedure required by law"), and *Oregon Environmental Council v. Kunzman*, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be set aside if undertaken 'without observance of procedure required by law'"). *See also* Section II.H, *supra.* NRC Staff concurs subject to its challenge of the adequacy of the affidavits filed in support of this contention (Answer at 1396). Based upon the discussion on the adequacy of the affidavits presented below, this contention satisfies the requirements of 10 C.F.R. § 2.326.

Nevada has in fact supported its contention with the affidavits of Mr. Robert Halstead and Mr. Steven Frishman (Petition, Attachment 7 (Halstead) and Attachment 20 (Frishman)). This alone suffices to defeat NRC Staff's argument, particularly in light of the fact that NRC Staff admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. § 51.109 "specifies what must be contained in a supporting affidavit . . . ." (Answer at 1396). Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in each affidavit. NRC Staff improperly attempts to equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. Each of these affidavits are more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits the expert witnesses from adopting the statements contained in Section 5 as their own opinions. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The factual support contained in Section 5 of this contention, including all documentation cited, was identified by the expert witnesses. The text of Section 5 (and for the most part the statements contained in Sections 1, 2 and 6), which included reasoned bases and explanations,

conclusions reached, and specific challenges to corresponding analyses in DOE's LA, was drafted, reviewed, and approved by the expert witnesses who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the specific contention that the expert adopts. Nevada decided against having expert affidavits incorporate numerous paragraphs from multiple contentions to avoid burdening its Petition with hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each was assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial, especially since many of Nevada's experts lived in European countries where affidavit formalities are more complicated. NRC Staff's Answer cites nothing in support of its position that either the contention or the attachment to the affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

NRC Staff complains that since more than one affiant subscribed to Section 5, it cannot tell which parts of the paragraph are associated with which expert. No support is proffered that would require as much. Moreover, NRC Staff does not explain why a question regarding whether each expert adopted all or only a part of a Section 5 bears on admissibility of the contention, as opposed to admission of expert testimony at a hearing on the merits. In this contention, each expert wholly adopted all of Section 5, which obviously means that all of the Section 5 is adopted as the testimony of each of the expert.

Finally, NRC Staff asserts (Answer at 1397) that "[n]either the contention nor the affidavits explains the personal knowledge or facts upon which Mr. Halstead or Mr. Frishman based his opinion." Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent with the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the Case Management Order of June 20, 2008. NRC Staff has not challenged this contention on that ground. In addition, clearly each of the above-identified expert witnesses has adopted Section 5 of this contention as their own opinions in their affidavits. Moreover, each expert witness has attached to their affidavit a curriculum vitae that addresses in great detail their qualifications, experience, and expertise. When coupled together, these documents and statements clearly and unequivocally demonstrate that, based on the expert's personal knowledge and professional credentials, the facts and opinions set forth in Section 5 are those of the expert. NRC Staff's Answer fails to identify any support for its assertion to the contrary. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§ 2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore NRC Staff's effort to defeat admissibility of this contention must be rejected.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

No reply necessary based on NRC Staff's response.

REPLY – NEV-NEPA-13 – GRAZING IMPACTS

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

NRC Staff contends (Answer at 1405) that "Nevada has not demonstrated that the issue raised in NEV-NEPA-13 is material to the findings the NRC must make to issue a construction authorization for the repository." While Nevada and NRC Staff agree that DOE must take a "hard look" at the potential environmental impacts of its proposed action, NRC Staff would only look to effects that are so serious as to paint a different picture of the impacts or have some likelihood of occurring. (*Id*. at 1404-05). In that regard, however, NRC Staff only claims that "the analysis Nevada seeks assumes that the rail line will necessarily be constructed through the most productive allotments," but that Nevada "has not demonstrated that such an assumption is reasonable . . . ." (*Id.* at 1405).

Based upon the factual allegations contained in the Petition (at 1097-98), Nevada maintains that DOE has not properly considered the impacts of railroad construction on up to 32 active Bureau of Land Management grazing allotments. Contrary to NRC Staff's assertion, Nevada specifically identified the assumption underlying its claim that the rail line will be constructed through the most productive allotments:

> It is important to note that the location of the rail bed to local topography is also a critical factor in determining the loss of forage. Nevada is an arid state. Most drainages are ephemeral, flowing only in response to precipitation events. Most of these events do not provide enough rainfall to cause streams to flow. Rather, as the precipitation comes down, water runs down the side slopes of drainages, soaking into the bottom lands, replenishing soil moisture in these locations. Thus, the "bottom lands" of ephemeral drainages have the most abundant forage, with less and less forage available as you climb up slope.
>
> The rail line will preferentially be located in these same bottom lands. Thus, the construction of the rail line takes the most productive land out of production.

Petition at 1098 (citing LSN# DEN001586806 at 249-250) Nevada is not asking this Licensing Board to second guess DOE, but instead to look at the information and explanations proffered by DOE (in light of much contrary information) and determine whether DOE's assumptions and positions are indeed reasonable. Any arguments by NRC Staff addressing the reasonableness or likelihood of the foregoing assumption, or that the assumption is not sufficiently "serious," address the weight and relevance of the facts alleged in the contention. Such arguments go to the merits of the contention and not its admissibility.

In fact, counsel for DOE and NRC Staff have previously admitted that environmental contentions involving transportation impacts (such as presented in this contention) are proper for consideration in this very proceeding. *See Nuclear Energy Institute, Inc. v. EPA*, 373 F.3d 1251, 1313 (D.C. Cir. 2004) (where the Court made its decision "on the assurances of counsel for both NRC and DOE at oral argument that Nevada will be permitted to raise its substantive challenges to the FEIS in any NRC proceeding to decide whether to adopt the FEIS"). Long-standing NRC case law instructs Licensing Boards to address environmental impacts associated with related transportation activities away from the licensed premise. *See Kansas Gas & Electric Co. (Wolf Creek Nuclear Generating Station, Unit No. 1)*, CLI-77-1, 5 NRC 1 (1977), 1977 NRC LEXIS 197, *16-17. *See also Detroit Edison Co. (Greenwood Energy Center, Units 2 and 3)*, ALAB-

247, 8 AEC 936 (1974). Licensing Boards should "heed the rule generally applicable for major Federal action in which two (or more) agencies are involved," namely that both agencies "must evaluate the environmental consequences of the entire project" and both agencies "must determine independently whether NEPA has been satisfied." *Tennessee Valley Authority (Phipps Bend Nuclear Plant, Units 1 and 2)*, ALAB-506, 8 NRC 533 (1978), 1978 NRC LEXIS 18, *28.

NRC Staff also asserts that "Nevada offers no explanation as to how DOE has abdicated" its primary and non-delegable responsibility to complete the analysis of the environmental impacts associated with this contention (Answer at 1405, quoting from Petition at 1096). The explanation can be found in the following admission by DOE: "DOE acknowledges that consideration of site-specific characteristics could result in greater losses of forage and greater losses of animal unit months, than estimated in the Rail Alignment FEIS, but DOE defers actual evaluation of these impacts until some future date following a DOE request for a BLM right-of-way grant." (Petition at 1099, citing the Rail Alignment FEIS at 4-46 to 4-47). In other words, DOE is deferring completion of the environmental analysis of grazing impacts "until some future date." Such a deferral is particularly significant given the DOE acknowledgement that "site-specific characteristics could result in greater losses of forage and greater losses of animal unit months" than DOE "estimated in the Rail Alignment FEIS."

In sum, Nevada has properly complied with the requirements contained in 10 C.F.R. § 2.309(f)(1)(iv) in drafting this contention, and NRC Staff's effort to dismiss the contention on those grounds must therefore be rejected.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff asserts (Answer at 1406) that this contention fails to satisfy the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) because the Moore document referenced and quoted from extensively in Section 5 of the contention "consists only of Mr. Moore's opinion" and neither the contention nor the referenced document "explains the basis for Mr. Moore's expertise." Nevada properly pled facts and cited to source materials in this contention, and Robert Halstead and Steven Frishman wholly adopted the information provided in Section 5 as each of their own expert opinion. Mr. Moore's expertise is not relevant here. Thus, this pleading satisfies the requirements of 10 C.F.R. § 2.309(f)(1)(v). If NRC Staff wishes to challenge the factual statements or expert opinions contained in Section 5 as lacking sufficient support or in some manner deficient in their conclusions, NRC Staff is free to do so but such arguments go to the merits of the facts alleged in the contention and not to its admissibility. NRC Staff's comments regarding the deficiency of the affidavit proffered by Messrs. Halstead and Frishman are addressed below.

Although not presented as a response within an enumerated subsection of 10 C.F.R. § 2.309(f)(1), NRC Staff challenges the admissibility of this contention on the grounds that Nevada's pleading fails to satisfy the requirements of 10 C.F.R. §§ 2.326 and 51.109.

- First, NRC Staff argues that "Nevada has not explicitly addressed the § 2.326 criteria," and the statements contained in Section 1 of the Petition (at 1095) as well as the remainder of the contention are not sufficient to demonstrate significance or materiality (Answer at 1401).

- Second, NRC Staff argues that "Nevada has not complied with the requirement in 10 C.F.R. §§ 2.326(a)(3), 2.326(b) and 51.109(a)(2) to file a supporting affidavit." *Id*. at 1402.

- Third, NRC Staff asserts that the lists attached to the affidavits filed by Nevada in support of this contention "are neither signed nor initialed by the

> affiants, and there is no other indication that either affiant reviewed the list associated with his affidavit, and therefore had knowledge of the contents of this list, prior to it being filed." *Id.* at 1403.

- Fourth, "[n]either the contention nor the affidavits specify which statements in the contention are attributable to either or both" affiants. *Id.*

- Fifth, "[n]either the contention nor the affidavits explain the personal knowledge or facts upon which Mr. Halstead or Mr. Frishman based his opinion" or the "reasons for the affiants' opinions. *Id*. at 1403-04 and 1402.

Nevada replies to each argument in turn below.

Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008, *U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326 much less a requirement that a petition in intervention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument. However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by making clear that DOE

> failed to apply the appropriate methodology in assessing the impacts of railroad construction on up to 32 active Bureau of Land Management (BLM) grazing allotments. This deficiency is significant because, without accurately assessing impacts of railroad construction on grazing allotments, there is no adequate disclosure of alternatives under NEPA. If reasonable alternative corridors, alignments, and segments were assessed, the disclosure of impacts on grazing

> allotments could be materially different, thus the FEIS and FSEIS cannot be adopted by the NRC.

Petition at 1095. Detailed support for these assertions was provided in Section 5. (*See id.* at 1097-98). *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the procedure required by law"), and *Oregon Environmental Council v. Kunzman*, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be set aside if undertaken 'without observance of procedure required by law'"). *See also* Section II.H, *supra.* NRC Staff recognizes the factual assertions made by Nevada in this contention, but concludes that they do not "provide sufficient support" that "the analysis of grazing impacts is significant" or sufficiently serious or material. (Answer at 1401-02). These arguments (which are nothing more than assertions by counsel) go to the merits of the contention and not to its materiality. Accordingly, this contention satisfies the requirements of 10 C.F.R. § 2.326.

Nevada has in fact supported its contention with the affidavits of Mr. Robert Halstead and Mr. Steven Frishman. *See* Petition, Attachment 7 (Halstead) and Attachment 20 (Frishman). This alone suffices to defeat NRC Staff's argument, particularly in light of the fact that NRC Staff admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. § 51.109 "specifies what must be contained in a supporting affidavit . . . ." (Answer at 1402). Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in each affidavit. NRC Staff improperly attempts to equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. Each of these affidavits are more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits the expert witnesses from adopting the statements contained in Section 5 as their own

opinions. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The factual support contained in Section 5 of this contention, including all documentation cited, was identified by the expert witnesses. The text of Section 5 (and for the most part the statements contained in Sections 1, 2 and 6), which included reasoned bases and explanations, conclusions reached, and specific challenges to corresponding analyses in DOE's LA, was drafted, reviewed, and approved by the expert witnesses who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the specific contention that the expert adopts. Nevada decided against having expert affidavits incorporate numerous paragraphs from multiple contentions to avoid burdening its Petition with hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each was assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial, especially since many of Nevada's experts lived in European countries where affidavit formalities are more complicated. NRC Staff's Answer cites nothing in support of its position that either the contention or the attachment to the affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

NRC Staff complains that since more than one affiant subscribed to Section 5, it cannot tell which parts of the paragraph are associated with which expert. No support is proffered that

would require as much. Moreover, NRC Staff does not explain why a question regarding whether each expert adopted all or only a part of a Section 5 bears on admissibility of the contention, as opposed to admission of expert testimony at a hearing on the merits. In this contention, each expert wholly adopted all of Section 5, which obviously means that all of the Section 5 is adopted as the testimony of each of the expert.

Finally, NRC Staff asserts (Answer at 1403-04) that "[n]either the contention nor the affidavits explain the personal knowledge or facts upon which Mr. Halstead or Mr. Frishman based his opinion." NRC Staff also asserts (*id.* at 1402) that "neither the affidavits nor the contention explain the supporting reasons for the affiants' opinions." Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent with the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the Case Management Order of June 20, 2008. NRC Staff has not challenged this contention on that ground, except with regard to arguments going to the merits, *supra*. In addition, clearly each of the above-identified expert witnesses has adopted Section 5 of this contention as their own opinions in their affidavits. Moreover, each expert witness has attached to their affidavit a curriculum vitae that addresses in great detail their qualifications, experience, and expertise. When coupled together, these documents and statements clearly and unequivocally demonstrate that, based on the expert's personal knowledge and professional credentials, the facts and opinions set forth in Section 5 are those of the expert. NRC Staff's Answer fails to identify any support for its assertion to the contrary. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§ 2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore NRC Staff's effort to defeat admissibility of this contention must be rejected.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

No reply necessary based on NRC Staff's response.

REPLY – NEV-NEPA-14 – DEFERRED ASSESSMENT OF RAILROAD CONSTRUCTION IMPACTS ON GRAZING

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

NRC Staff contends (Answer at 1412) that "Nevada has not demonstrated that DOE's current analysis of impacts to grazing allotments from construction of the rail line violates the requirement that DOE take a 'hard look' at all reasonably foreseeable environmental impacts. Nor has Nevada demonstrated that DOE has improperly segmented its impacts analysis." As the basis for its arguments, NRC Staff presents two legal theories: (1) applying the "tiering" concept, DOE's environmental assessment "need not be completed in one single analysis," and (2) under regulations issued by the Council for Environmental Quality (CEQ) and applicable case law, DOE may "rely on environmental analyses completed by other agencies" even those at some undefined future point in time. *Id*. at 1411-12. In other words, NRC Staff has put forth its legal analysis to challenge a contention that NRC Staff describes (*id*. at 1407) as raising "primarily legal issues." To the degree that this dispute involves competing legal theories or involves a difference of opinion regarding the conclusions that can be drawn from the facts alleged by Nevada is its Petition (at 1102-03), such arguments go to the merits of the contention and not its admissibility.

Based upon the factual allegations contained in the Petition (at 1102-03), Nevada maintains that DOE illegally defers assessment of impacts of railroad construction on individual grazing allotments to a future action by the Bureau of Land Management (BLM), including the responsibility for mitigation of those impacts. Nevada is not asking this Licensing Board to second guess DOE, but instead to look at the information and explanations proffered by DOE (in light of much contrary information) and determine whether DOE's assumptions and positions are indeed reasonable. Moreover, to the degree that the resolution of the issues identified in this contention hinge upon legal arguments, suffice it to say that summary judgment motions would be an appropriate vehicle for their resolution. At any rate, both the factual and legal disputes identified by NRC Staff go to the merits of the contention and not its admissibility. Accordingly, Nevada has satisfied the pleading requirements contained in 10 C.F.R. § 2.309(f)(1)(v), and NRC Staff's arguments to the contrary should be rejected.

In fact, counsel for DOE and NRC Staff have previously admitted that environmental contentions involving transportation impacts (such as presented in this contention) are proper for consideration in this very proceeding. *See Nuclear Energy Institute, Inc. v. EPA*, 373 F.3d 1251, 1313 (D.C. Cir. 2004) (where the Court made its decision "on the assurances of counsel for both NRC and DOE at oral argument that Nevada will be permitted to raise its substantive challenges to the FEIS in any NRC proceeding to decide whether to adopt the FEIS"). Long-standing NRC case law instructs Licensing Boards to address environmental impacts associated with related transportation activities away from the licensed premise. *See Kansas Gas & Electric Co. (Wolf Creek Nuclear Generating Station, Unit No. 1)*, CLI-77-1, 5 NRC 1 (1977), 1977 NRC LEXIS 197, *16-17. *See also Detroit Edison Co. (Greenwood Energy Center, Units 2 and 3)*, ALAB-247, 8 AEC 936 (1974). Licensing Boards should "heed the rule generally applicable for major

Federal action in which two (or more) agencies are involved," namely that both agencies "must evaluate the environmental consequences of the entire project" and both agencies "must determine independently whether NEPA has been satisfied." *Tennessee Valley Authority (Phipps Bend Nuclear Plant, Units 1 and 2)*, ALAB-506, 8 NRC 533 (1978), 1978 NRC LEXIS 18, *28.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Although not presented as a response within an enumerated subsection of 10 C.F.R. § 2.309(f)(1), NRC Staff challenges the admissibility of this contention on the grounds that Nevada's pleading fails to satisfy the requirements of 10 C.F.R. §§ 2.326 and 51.109.

- First, NRC Staff argues that "Nevada has not explicitly addressed the § 2.326 criteria," and none of the statements contained in the contention are sufficient to demonstrate significance or materiality (Answer at 1409).

- Second, NRC Staff argues that "Nevada has not complied with the requirement in 10 C.F.R. §§ 2.326(a)(3), 2.326(b) and 51.109(a)(2) to file a supporting affidavit." *Id.*

- Third, NRC Staff asserts that the lists attached to the affidavits filed by Nevada in support of this contention "are neither signed nor initialed by the affiants, and there is no other indication that either affiant reviewed the list associated with his affidavit, and therefore had knowledge of the contents of this list, prior to it being filed." *Id.* at 1410.

- Fourth, "[n]either the contention nor the affidavits specifies which statements in the contention are attributable to either or both" affiants. *Id.*

- Fifth, "[n]either the contention nor the affidavits explains the personal knowledge or facts upon which Mr. Halstead or Mr. Frishman based his opinion" or the "basis for the affiants' opinions. *Id*. at 1410 and 1409.

Nevada replies to each argument in turn below.

Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008, *U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory*

PAPO Board), LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326 much less a requirement that a petition in intervention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument. However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by making clear that DOE:

> illegally defer[red] assessment of impacts of railroad construction on individual BLM grazing allotments to a future action by the Bureau of Land Management (BLM). DOE has no authority to transfer its NEPA responsibilities to BLM, and DOE has no authority to assign to BLM the responsibility for mitigation of impacts resulting from DOE's proposed action. If the appropriate assessment and disclosure of railroad construction impacts on individual grazing allotments is deferred, the FEIS and FSEIS cannot be adopted by the NRC.

Petition at 1100. Detailed support for these assertions was provided in Section 5. *See id.* at 1102-03. *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the procedure required by law"), and *Oregon Environmental Council v. Kunzman*, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be set aside if undertaken 'without observance of procedure required by law'"). *See also* Section II.H, *supra.* NRC Staff recognizes the factual assertions made by Nevada in this contention, and concludes that they are "not sufficient to meet the high evidentiary standard set by 10 C.F.R. § 2.326(a)" (Answer at 1409). In addition to the fact the NRC Staff does not

articulate "why" the facts alleged by Nevada do not suffice, NRC Staff also conveniently overlooks the Commission's direction to apply the criteria in Section 2.326 "to the extent possible." Moreover, to the degree that DOE is arguing that the facts alleged by Nevada are not significant enough or that there are not enough facts for the contention to be meet the significance requirement or that the facts are not materially related to the issues raised in the contention, such arguments go to the merits and not admissibility of this contention. Accordingly, this contention satisfies the requirements of 10 C.F.R. § 2.326.

Nevada has in fact supported its contention with the affidavits of Mr. Robert Halstead and Mr. Steven Frishman. *See* Petition, Attachment 7 (Halstead) and Attachment 20 (Frishman). This alone suffices to defeat NRC Staff's argument, particularly in light of the fact that NRC Staff admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. § 51.109 "specifies what must be contained in a supporting affidavit . . . ." (Answer at 1409). Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in each affidavit. NRC Staff improperly attempts to equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. Each of these affidavits is more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits the expert witnesses from adopting the statements contained in Section 5 as their own opinions. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The factual support contained in Section 5 of this contention, including all documentation cited, was identified by the expert witnesses. The text of Section 5 (and for the most part the

statements contained in Sections 1, 2 and 6), which included reasoned bases and explanations, conclusions reached, and specific challenges to corresponding analyses in DOE's LA, was drafted, reviewed, and approved by the expert witnesses who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the specific contention that the expert adopts. Nevada decided against having expert affidavits incorporate numerous paragraphs from multiple contentions to avoid burdening its Petition with hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each was assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial, especially since many of Nevada's experts lived in European countries where affidavit formalities are more complicated. NRC Staff's Answer cites nothing in support of its position that either the contention or the attachment to the affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

NRC Staff complains that since more than one affiant subscribed to Section 5, it cannot tell which parts of the paragraph are associated with which expert. No support is proffered that would require as much. Moreover, NRC Staff does not explain why a question regarding whether each expert adopted all or only a part of a Section 5 bears on admissibility of the contention, as opposed to admission of expert testimony at a hearing on the merits. In this contention, each expert wholly adopted all of Section 5, which obviously means that all of the Section 5 is adopted as the testimony of each of the expert.

Finally, NRC Staff asserts (Answer at 1410) that "[n]either the contention nor the affidavits explains the personal knowledge or facts upon which Mr. Halstead or Mr. Frishman based his opinion." NRC Staff also asserts (*id.* at 1409) that "neither the affidavits nor the contention explain the basis for the affiants' opinions." Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent with the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the Case Management Order of June 20, 2008. NRC Staff has not challenged this contention on that ground, except with regard to arguments going to the merits, *supra*. In addition, clearly each of the above-identified expert witnesses has adopted Section 5 of this contention as their own opinions in their affidavits. Moreover, each expert witness has attached to their affidavit a curriculum vitae that addresses in great detail their qualifications, experience, and expertise. When coupled together, these documents and statements clearly and unequivocally demonstrate that, based on the expert's personal knowledge and professional credentials, the facts and opinions set forth in Section 5 are those of the expert. NRC Staff's Answer fails to identify any support for its assertion to the contrary. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§ 2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore NRC Staff's effort to defeat admissibility of this contention must be rejected.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

No reply necessary based on NRC Staff's response.

REPLY – NEV-NEPA-15 – TAD SHIPMENT ESTIMATES

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

NRC Staff contends (Answer at 1418-19) that this contention is not adequately supported by facts or expert opinion as evidenced by the following: (i) Nevada "does not offer evidence that goes beyond speculation to support the contention that DOE failed to consider reasonable shipping estimates; (ii) "Nevada fails to address the comment to DOE's FSEIS submitted by NEI"; and (iii) "the articles cited by Nevada offer no interpretations of the potential transportation impacts that are different from those presented in DOE analyses"; and (iv) "Nevada does not support the proposition that DOE failed to consider reasonable shipping estimates . . . ." *Id.* at 1418. First and foremost, NRC Staff has improperly characterized the facts and opinions presented by Nevada in Section 5 of this contention. Specifically, Nevada highlighted inconsistencies within the FSEIS, cited and explained supporting facts from the Nuclear Energy Institute (NEI), and presented opinions by and documentary evidence produced from Robert Halstead (who authored all of Section 5, *infra*) (Petition at 1107-09). Second, other

than citing to DOE's FSEIS itself, NRC Staff's arguments are merely unsupported assertions of counsel and are not supported by an expert witness. Third, NRC Staff's arguments are merely disguised merits challenges to the facts presented by Nevada. For example, the issue of whether shipping estimates are "reasonable," the possible effect of additional statements contained with the FSEIS on statements identified by Nevada, and the interpretation of articles relied upon by Nevada are matters that go to the merits of this contention and not its admissibility. In sum, Nevada has properly pled the facts within its contention consistent with the requirements of 10 C.F.R. § 2.309(f)(1)(v), and therefore NRC Staff's attempt to dismiss this contention should be denied.

Although not presented as a response within an enumerated subsection of 10 C.F.R. § 2.309(f)(1), NRC Staff also challenges the admissibility of this contention on the grounds that Nevada's pleading fails to satisfy the requirements of 10 C.F.R. §§ 2.326 and 51.109.

- First, NRC Staff argues that "Nevada does not explicitly addressed the § 2.326 criteria," and the neither the summary found in the Petition (at 1105) nor the remainder of the contention is sufficient to demonstrate significance or materiality (Answer at 1415).

- Second, NRC Staff argues that "Nevada has not complied with the requirement in 10 C.F.R. §§ 2.326(a)(3), 2.326(b) and 51.109(a)(2) to file a supporting affidavit." *Id*. at 1416.

- Third, NRC Staff asserts that the list attached to the affidavit filed by Mr. Halstead in support of this contention "is neither signed nor initialed by the affiant, and there is no other indication that the affiant reviewed the list associated with his affidavit, and therefore had knowledge of the contents of the list, prior to it being filed." *Id.* at 1417.

- Fourth, "[n]either the contention nor the affidavit specifies which statements in the contention are attributable" to the affiant. *Id.*

- Fifth, "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Mr. Halstead based his opinion," or "the supporting reasons for the affiant's opinions." *Id*. at 1417 and 1416.

Nevada replies to all of these arguments in turn below.

Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008, *U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326 much less a requirement that a petition in intervention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument. However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in Section 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by making clear that DOE:

> fail[ed] to consider reasonable shipment estimates based on the existing standard contracts and current modal capabilities of the shipping sites. Thus, the FSEIS fails to provide a sufficient basis for the transportation impacts . . . [and] fails to provide a basis for determining if DOE can comply with SAR Subsection 1.5.1.1, which presumes 90 percent of commercial spent nuclear fuel will be shipped in TAD canisters. Because DOE failed to consider reasonable shipment estimates, particularly regarding the modal mix between rail and truck, DOE has failed to adequately assess their environmental impacts, and because those environmental impacts could be materially different from that presented in the FSEIS and the [Rail Alignment FEIS], neither document can be adopted by the NRC.

(Petition at 1105). Nevada provided specific facts in support of these conclusions on Section 5 of its contention. *See id.* at 1107-09. *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the procedure required by law"), and *Oregon Environmental Council v. Kunzman*, 817 F.2d 484, 492

(9th Cir. 1987) ("agency action may be set aside if undertaken 'without observance of procedure required by law'"). *See also* Section II.H, *supra.* NRC Staff's arguments (Answer at 1415-16) focus on the proper percentage of shipments (90% vs. 88% vs. 75%), whether those shipments were "primary canistered," that some of the estimates are only "approximate," and even that the word "shall" in the SAR should be read "as an objective." Clearly such arguments go to the merits and not the admissibility of this contention. Accordingly, this contention satisfies the requirements of 10 C.F.R. § 2.326.

Nevada has in fact supported its contention with the affidavit of Mr. Robert Halstead. *See* Petition, Attachment 7. This alone suffices to defeat NRC Staff's argument, particularly in light of the fact that NRC Staff admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. § 51.109 "specifies what must be contained in a supporting affidavit . . . ." (Answer at 1416). Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in each affidavit. NRC Staff improperly attempts to equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. Mr. Halstead's affidavit is more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits Mr. Halstead from adopting the statements contained in Section 5 as his own opinions. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The factual support contained in Section 5 of this contention, including all documentation cited, was identified by Mr. Halstead. The text of Section 5 (and for the most part the statements

contained in Sections 1, 2 and 6), which included reasoned bases and explanations, conclusions reached, and specific challenges to corresponding analyses in DOE's LA, was drafted, reviewed, and approved by Mr. Halstead who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the specific contention that Mr. Halstead adopts. Nevada decided against having expert affidavits incorporate numerous paragraphs from multiple contentions to avoid burdening its Petition with hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each was assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial, especially since many of Nevada's experts lived in European countries where affidavit formalities are more complicated. NRC Staff's Answer cites nothing in support of its position that either the contention or the attachment to Mr. Halstead's affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

NRC Staff complains that it cannot tell which parts of Section 5 have been adopted by Mr. Halstead. No support is proffered that would require as much. Moreover, NRC Staff does not explain why a question regarding whether Mr. Halstead adopted all or only a part of a Section 5 bears on admissibility of the contention, as opposed to admission of expert testimony at a hearing on the merits. In this contention, Mr. Halstead wholly adopted all of Section 5, which obviously means that all of the Section 5 is adopted as the testimony of Mr. Halstead.

NRC Staff asserts (Answer at 1417) that "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Mr. Halstead based his opinion." In addition, NRC Staff asserts that (*id*. at 1416) "neither the affidavit nor the contention explains the supporting reasons for the affiant's opinions." Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent with the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the Case Management Order of June 20, 2008. NRC Staff has not challenged this contention on that ground except to argue over merits, *supra*. In addition, clearly Mr. Halstead has adopted Section 5 of this contention as his own opinions in his affidavits. Moreover, Mr. Halstead has attached to his affidavit a curriculum vitae that addresses in great detail his qualifications, experience, and expertise. When coupled together, these documents and statements clearly and unequivocally demonstrate that, based on Mr. Halstead's personal knowledge and professional credentials, the facts and opinions set forth in Section 5 are those of Mr. Halstead. NRC Staff's Answer fails to identify any support for its assertion to the contrary. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§ 2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore NRC Staff's effort to defeat admissibility of this contention must be rejected.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

No reply necessary based on NRC Staff's response.

REPLY – NEV-NEPA-16 – REPRESENTATIVE ROUTES

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

NRC Staff contends (Answer at 1424-25) that Nevada "fails to show that the Repository SEIS does not fully inform both the decision-maker and the general public regarding the potential impacts of the repository, or is otherwise inadequate." Specifically, NRC Staff states that "Nevada argues that DOE failed to take the requisite hard look at transportation impacts because DOE did not analyze routes suggested by railroads and affected states. However, Nevada does not argue that, had DOE analyzed these routes, the impacts presented in the Repository SEIS would have been any greater or different than the impacts currently analyzed in the Repository SEIS." *Id.* at 1424. NRC Staff's assertions are wholly without merit as can be seen from a review of Sections 1, 2, 5 and 6 of this contention.

> . . . without appropriately considering specific impacts from specific rail routes, DOE has failed to adequately assess environmental impacts, and because those environmental impacts could be **materially different** from that presented in the FSEIS the document cannot be adopted by the NRC.

(Petition at 1110) (emphasis added). Clearly NRC Staff is in error, and thus its argument challenging compliance with 10 C.F.R. § 2.309(f)(1)(iv) fails.

Nevertheless, Nevada wants to make clear that, based upon the factual allegations contained in the Petition (at 1112-13), DOE has not taken the requisite "hard look" at the affected environment for repository transportation impacts nationally and in Nevada because DOE has ignored information provided to it by potential rail carriers and by affected states about other potential rail routes. Nevada is not asking this Licensing Board to second guess DOE, but instead to look at the information and explanations proffered by DOE (in light of much contrary information) and determine whether DOE's assumptions and positions are indeed reasonable.

In fact, counsel for DOE and NRC Staff have previously admitted that environmental contentions involving transportation impacts (such as presented in this contention) are proper for consideration in this very proceeding. *See Nuclear Energy Institute, Inc. v. EPA*, 373 F.3d 1251, 1313 (D.C. Cir. 2004) (where the Court made its decision "on the assurances of counsel for both NRC and DOE at oral argument that Nevada will be permitted to raise its substantive challenges to the FEIS in any NRC proceeding to decide whether to adopt the FEIS"). Long-standing NRC case law instructs Licensing Boards to address environmental impacts associated with related transportation activities away from the licensed premise. *See Kansas Gas & Electric Co. (Wolf Creek Nuclear Generating Station, Unit No. 1)*, CLI-77-1, 5 NRC 1 (1977), 1977 NRC LEXIS 197, *16-17. *See also Detroit Edison Co. (Greenwood Energy Center, Units 2 and 3)*, ALAB-247, 8 AEC 936 (1974). Licensing Boards should "heed the rule generally applicable for major Federal action in which two (or more) agencies are involved," namely that both agencies "must evaluate the environmental consequences of the entire project" and both agencies "must determine independently whether NEPA has been satisfied." *Tennessee Valley Authority (Phipps Bend Nuclear Plant, Units 1 and 2)*, ALAB-506, 8 NRC 533 (1978), 1978 NRC LEXIS 18, *28.

5. <u>A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials</u>

NRC Staff asserts (Answer at 1425) that this contention fails to satisfy the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) because neither the information presented in Section 5 of the contention nor Mr. Halstead's affidavit explain the basis for the opinions provided. In this regard, NRC Staff claims that Nevada did not challenge the conclusion in the FSEIS that "the representative routes . . . provide a reasonable estimate of the environmental impacts from shipments to the proposed repository." *Id*. NRC Staff also claims that Nevada did not "provide any support (or even suggest) that the routes developed under Nevada's suggested methodology would result in a different or more exact calculation of impacts." *Id*.

NRC Staff's second claim is answered in the preceding discussion, *i.e.,* the statements contained in Section 1 of the contention, *supra*. Similarly, with regard to NRC Staff's first claim a review of Section 5 of the contention provides the very detail that NRC Staff claims is missing. "DOE has not defined the proposed action [i.e., route selection and identification] or **properly evaluated** its impacts in any meaningful way. . . . As a result, the FSEIS has not adequately assessed the environmental impacts associated with the transportation of high-level radioactive waste to Yucca Mountain . . . ." (Petition at 1113). As discussed in greater detail below, Section 5 was drafted by expert witness Robert Halstead. To the degree that NRC Staff is challenging the facts and opinions contained in this contention as not reasonable, or that those facts and opinions do not collectively advance the position articulate by Nevada, those arguments go to the merits of the contention and not the admissibility of the contention. In sum, Nevada properly pled facts, cited to source materials, and offered supporting expert opinion from Robert Halstead in this contention, which more than suffices to comply with the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v).

Although not presented as a response within an enumerated subsection of 10 C.F.R. § 2.309(f)(1), NRC Staff also challenges the admissibility of this contention on the grounds that Nevada's pleading fails to satisfy the requirements of 10 C.F.R. §§ 2.326 and 51.109.

- First, NRC Staff argues that "Nevada has not explicitly addressed the § 2.326 criteria" and the summary found in the Petition (at 1110) is not sufficient to demonstrate significance or materiality (Answer at 1421).

- Second, NRC Staff argues that "Nevada has not complied with the requirement in 10 C.F.R. §§ 2.326(a)(3), 2.326(b) and 51.109(a)(2) to file a supporting affidavit." *Id*. at 1422.

- Third, NRC Staff asserts that the lists attached to the affidavit filed by Nevada in support of this contention "are neither signed nor initialed by Mr. Halstead, and there is no other indication that Mr. Halstead reviewed the list, and therefore had knowledge of the contents of the list, prior to it being filed." *Id.* at 1423.

- Fourth, "[n]either the contention itself nor Mr. Halstead's affidavit specifies which statements in the contention are attributable to Mr. Halstead . . . ." *Id.*

- Fifth, "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Mr. Halstead based his opinions," or "the basis for his opinion." *Id*. at 1423-24 and 1422.

Nevada replies to all of these arguments in turn below.

Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008, *U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326 much less a requirement that a petition in intervention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument. However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in Section 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation

requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by making clear that DOE:

> fail[ed] to identify the affected environment for repository transportation impacts nationally and in Nevada. . . . DOE's representative rail routes incorporate rail industry practices in only a generic way, and ignore information provided to DOE by potential rail carriers and by affected states about other potential rail routes, different from those identified by DOE, that could be used for repository shipments. This deficiency is significant because without appropriately considering specific impacts from specific rail routes, DOE has failed to adequately assess environmental impacts, and because those environmental impacts could be materially different from that presented in the FSEIS the document cannot be adopted by the NRC.

(Petition at 1110). Nevada provided specific facts in support of these conclusions on Section 5 of its contention. *See id.* at 1112-13. *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the procedure required by law"), and *Oregon Environmental Council v. Kunzman*, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be set aside if undertaken 'without observance of procedure required by law'"). *See also* Section II.H, *supra.* Arguments made by NRC Staff to the contrary (*see, e.g.,* Answer at 1422) go to the merits and not admissibility of this contention. Accordingly, this contention satisfies the requirements of 10 C.F.R. § 2.326.

Nevada has in fact supported its contention with the affidavit of Mr. Robert Halstead. *See* Petition, Attachment 7. This alone suffices to defeat NRC Staff's argument, particularly in light of the fact that NRC Staff admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. § 51.109 "specifies what must be contained in a supporting affidavit . . . ." (Answer at 1422). Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in each affidavit. NRC Staff improperly attempts to

equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. Mr. Halstead's affidavit is more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits Mr. Halstead from adopting the statements contained in Section 5 as his own opinions. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The factual support contained in Section 5 of this contention, including all documentation cited, was identified by Mr. Halstead. The text of Section 5 (and for the most part the statements contained in Sections 1, 2 and 6), which included reasoned bases and explanations, conclusions reached, and specific challenges to corresponding analyses in DOE's LA, was drafted, reviewed, and approved by Mr. Halstead who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the specific contention that Mr. Halstead adopts. Nevada decided against having expert affidavits incorporate numerous paragraphs from multiple contentions to avoid burdening its Petition with hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each was assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial, especially since many of Nevada's experts lived in European countries where affidavit formalities are more complicated. NRC Staff's Answer cites nothing in support of its position that either the

contention or the attachment to Mr. Halstead's affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

NRC Staff complains that it cannot tell which parts of Section 5 have been adopted by Mr. Halstead. No support is proffered that would require as much. Moreover, NRC Staff does not explain why a question regarding whether Mr. Halstead adopted all or only a part of a Section 5 bears on admissibility of the contention, as opposed to admission of expert testimony at a hearing on the merits. In this contention, Mr. Halstead wholly adopted all of Section 5, which obviously means that all of the Section 5 is adopted as the testimony of Mr. Halstead.

NRC Staff asserts (Answer at 1423-24) that "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Mr. Halstead based his opinion." In addition, NRC Staff asserts that (*id*. at 1422) "neither the affidavit nor the contention explains the basis for his opinions." Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent with the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the Case Management Order of June 20, 2008. NRC Staff has not challenged this contention on that ground except to argue over merits, *supra*. In addition, clearly Mr. Halstead has adopted Section 5 of this contention as his own opinions in his affidavits. Moreover, Mr. Halstead has attached to his affidavit a curriculum vitae that addresses in great detail his qualifications, experience, and expertise. When coupled together, these documents and statements clearly and unequivocally demonstrate that, based on Mr. Halstead's personal knowledge and professional credentials, the facts and opinions set forth in Section 5 are those of Mr. Halstead. NRC Staff's Answer fails to identify any support for its assertion to the contrary. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§

2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore NRC Staff's effort to defeat admissibility of this contention must be rejected.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

No reply necessary based on NRC Staff's response.

REPLY – NEV-NEPA-17 – NRC STAFF'S NEPA REVIEW

Staff begins with three-page argument leading to the conclusion that the contention is inadmissible, presumably because of non-compliance with 10 C.F.R. §§ 2.326 and 51.109(a)(2). Nevada submits that no affidavit is needed because the contention raises a legal issue. The factual basis for the contention is apparent from the Staff's adoption decision, and the legal basis is found in case law and the Notice of Hearing. As explained below, the contention is significant because the approach the Board must take to the review of every environmental contention is materially affected.

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

The summary is perfectly adequate. Staff's argument is relevant, if at all, to compliance with 10 C.F.R. § 2.309(f)(1)(v), which Staff does not challenge.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's Response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

Staff here addresses the merits of Nevada's contention, and from the nature of Staff's argument, it is apparent that there is a material dispute. This issue was prompted by NRC Staff's

statement in its adoption decision that it was adopting DOE's NEPA statements even though it had done no detailed review of all technical aspects of them and would not necessarily have arrived at the same NEPA conclusions on matters of fact or policy. This left it unclear to Nevada how exactly Staff could have concluded that the FEISs complied with NEPA and CEQ regulations. This raises an important issue of the legal standard to be applied to the Commission's adoption decision. Nevada alleges here that the Commission cannot adopt DOE's FEISs (without supplementation) unless it conducts a detailed review, and reaches an independent conclusion, on all issues of fact or policy material to whether they comply fully with NEPA and CEQ regulations. See discussion in II.H. above. If this contention is correct, then the approach the Board must take to the review of every environmental contention (and uncontested issue) is materially affected. In particular, Nevada's contention means that, in adjudicating contested and uncontested NEPA issues, the Commission may substitute its judgment for DOE on whether NEPA and CEQ regulations are satisfied, as opposed to functioning like a reviewing court and applying an arbitrary and capricious or similar deferential review standard, or a standard for requiring that an FEIS be supplemented.

REPLY – NEV-NEPA-18 – OVERLAP BETWEEN NEPA AND AEA

NRC opening arguments are addressed below. Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008, *U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326 much less a requirement that a petition in intervention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument. However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by making clear that certain Nevada's TSPA contentions challenging aspects of DOE's TSPA are significant, individually but especially cumulatively, and if they were to be addressed in a satisfactory manner, the disclosure of overall impacts would be materially different. Support for these assertions was provided in Section 5 (Petition at 119). *See id.* at 1044-1045. *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the procedure required by law"), and *Oregon Environmental Council v. Kunzman*, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be set aside if undertaken 'without observance of procedure required by law'"). *See also* Section II.H, *supra.* Accordingly, this contention satisfies the requirements of 10 C.F.R. § 2.326.

Nevada has in fact supported its contention with the affidavit of Dr. Michael Thorne. This alone suffices to defeat NRC Staff's argument, particularly in light of the fact that NRC admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. §51.109 "specifies what must be contained in a supporting affidavit . . . ." (Answer at 1435). Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in the affidavit. NRC improperly attempts to equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. This affidavit is more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits the expert witness from adopting the statements contained in Section 5 as his opinion. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The text of Section 5 (and for the most part the statements contained in Sections 1, 2 and 6), which included reasoned bases and explanations, conclusions reached, and specific challenges to corresponding analyses in DOE's LA, was reviewed and approved by the expert witness who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the specific contention that the expert adopts. Nevada decided against having expert affidavits incorporate numerous paragraphs from multiple contentions to avoid burdening its Petition with hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each was assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a

number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial, especially since many of Nevada's experts lived in European countries where affidavit formalities are more complicated. NRC Staff's Answer cites nothing in support of its position that either the contention or the attachment to the affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

Finally, NRC asserts (Answer at 1436) that "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Dr. Thorne based his opinion." Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent with the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the Case Management Order of June 20, 2008. In addition, clearly Dr. Thorne has adopted Section 5 of this contention as his own opinions in his affidavit. Moreover, Dr. Thorne attached to his affidavit a curriculum vitae that addresses in great detail his qualifications, experience, and expertise. When coupled together, these documents and statements clearly and unequivocally demonstrate that, based on the expert's personal knowledge and professional credentials, the facts and opinions set forth in Section 5 are those of the expert. NRC Staff's Answer fails to identify any support for its assertion to the contrary. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§ 2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore NRC Staff's effort to defeat admissibility of this contention must be rejected.

1. <u>A statement of the contention itself</u>

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

The summary is perfectly adequate. Staff's argument is relevant, if at all, to compliance with 10 C.F.R. § 2.309(f)(1)(v), which is addressed below. If Staff had a problem with specificity, it should have challenged compliance with 10 C.F.R. § 2.309(f)(1)(i).

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

Whether the DOE FEIS can be adopted depends on whether its discussion of environmental impacts is sufficient, environmental impacts include radiological impacts from long-term disposal, and the adequacy of the discussion of the radiological impacts from long-term disposal depends on the TSPA. Therefore, this contention raises a material issue.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

As indicated above, Nevada's expert opinion affidavit is in proper form and constitutes admissible evidence. Moreover, Dr. Thorne's affidavit satisfies Nevada's obligation to show that the cumulative impact of its contentions is significant and would result in a materially different result. *See also* II.H. above for a discussion of the proper standards for admission of NEPA contentions.

Second, the fact that the contention refers to a large number of other contentions puts form over substance. The contention raises a single, specific NEPA claim, and the Advisory PAPO Board's June 20, 2008 Case Management Order, LBP-08-10, 67 NRC 450, specifically allows one contention to reference others. LBP-08-10 at 7. The only alternative would have been to add a NEPA contention for every TSPA radiological safety contention, alleging that it would dictate a materially different discussion of radiological environmental impacts when

considered with the others, but the specificity of each of those NEPA contentions would be no different than NEV-NEPA-18.

Moreover, Nevada's contention is not like the general allegations of inadequacy rejected in *Duke Energy Corporation (Oconee Nuclear Station, Units 1, 2, and 3)*, CLI-99-11, 49 NRC 328 (1999). There petitioner contended simply that the application "is incomplete, and should be withdrawn and/or summarily dismissed," and cited generally to a collection of topical reports and RAIs. Nevada refers to a defined collection of documents, each of which satisfies contention standards and was prepared specifically for this proceeding. Besides, if NEV-NEPA-18 is inadmissible as insufficiently specific, then it would follow that the cumulative NEPA impact of Nevada's safety contentions is non-litigable *per se*, which would deny Nevada its right to a hearing.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

See above.

REPLY – NEV-NEPA-19 – PEAK DOSE IDENTIFICATION

NRC opening arguments are addressed below. Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008, *U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory PAPO Board)*, LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326 much less a requirement that a petition in intervention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument. However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by stating that DOE's FEIS and FSEIS are inadequate because neither calculates or discloses the reasonably foreseeable impacts from releases of radioactive materials after 1,000,000 years, and that if these were to be done, the disclosure of radiological environmental impacts would be materially different. Support for these assertions was provided in Section 5 (Petition at 1122). *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the procedure required by law"), and *Oregon Environmental Council v. Kunzman*, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be set aside if undertaken 'without observance of procedure required by law'"). *See also* Section II.H, *supra.* Accordingly, this contention satisfies the requirements of 10 C.F.R. 2.326.

Nevada has in fact supported its contention with the affidavit of Dr. Michael Thorne. This alone suffices to defeat NRC Staff's argument, particularly in light of the fact that NRC admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. § 51.109 "specifies what must be contained in a supporting affidavit . . . ." (Answer at 1442). Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in the affidavit. NRC improperly attempts to equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. This affidavit is more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits the expert witness from adopting the statements contained in Section 5 as his opinion. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The text of Section 5, which included reasoned bases and explanations, was reviewed and approved by the expert witness who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the specific contention that the expert adopts. Nevada decided against having expert affidavits incorporate numerous paragraphs from multiple contentions to avoid burdening its Petition with hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each was assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial, especially since many of Nevada's

experts lived in European countries where affidavit formalities are more complicated. NRC Staff's Answer cites nothing in support of its position that either the contention or the attachment to the affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

Finally, NRC asserts (Answer at 1443) that "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Dr. Thorne based his opinion." Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent with the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the Case Management Order of June 20, 2008. In addition, clearly Dr. Thorne has adopted Section 5 of this contention as his own opinions in his affidavit. Moreover, Dr. Thorne attached to his affidavit a curriculum vitae that addresses in great detail his qualifications, experience, and expertise. When coupled together, these documents and statements clearly and unequivocally demonstrate that, based on the expert's personal knowledge and professional credentials, the facts and opinions set forth in Section 5 are those of the expert. NRC Staff's Answer fails to identify any support for its assertion to the contrary. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§ 2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore NRC Staff's effort to defeat admissibility of this contention must be rejected.

1. <u>A statement of the contention itself</u>

No reply necessary based on NRC Staff's Response.

2. <u>A brief summary of the basis for the contention</u>

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

Whether the DOE FEIS can be adopted depends on whether its discussion of environmental impacts is sufficient, environmental impacts include radiological impacts from long-term disposal, and the sufficiency of the discussion of the radiological impacts from long-term disposal depends in important part on when in time that discussion should end. Therefore, this contention raises a material issue.

As indicated in above, Nevada's expert opinion affidavits are in proper form and constitute admissible evidence. Moreover, Dr. Thorne's affidavit satisfies Nevada's obligation to show that the impact of its contentions is significant and would result in a materially different result. There is no requirement that each requirement of 10 C.F.R. §§ 2.326 and 51.109(a)(2) be addressed separately. *See also* II.H. above for a discussion of the proper standards for admission of NEPA contentions.

Staff's remaining argument addresses the merits, which is not a proper argument at the contention stage. In any event, neither the EPA regulation nor the anticipated NRC conforming regulation relate to compliance with NEPA. The National Academy of Sciences report cited by Staff is not inconsistent with Nevada's contention. At most, that report states that a compliance assessment for on the order of one-million years is feasible because this would be within the period of geologic stability. This supports Nevada's contention, at least to the extent that it argues for an evaluation of radiological environmental impacts beyond one million years, but within the period of geologic stability.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's Response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

No reply necessary based on NRC Staff's Response.

REPLY – NEV-NEPA-20 – RADIONUCLIDE CONTAMINATION OF AQUIFER

Staff begins with a long discussion regarding compliance with 10 C.F.R. §§ 2.326 and 50.109 (a), which is addressed below.

Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008*, U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory PAPO Board),* LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326, much less a requirement that a contention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument.

However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by making clear that DOE's analysis of cumulative impacts on groundwater from radionuclide contamination is significantly deficient and that, if this deficiency were to be remedied, the disclosure of impacts in the FEIS would be materially different. Detailed support for these assertions was provided in Sections 5 and 6 (Petition at 1125-1127). *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the procedure required by law"), and *Oregon Environmental Council v. Kunzman*, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be set aside if undertaken 'without observance of procedure required by law'"). *See*

also Section II.H, *supra.* Accordingly, this contention satisfies the requirements of 10 C.F.R. §2.326.

Nevada has in fact supported its contention with the affidavits of Mr. Steven Frishman, and Dr. Michael Thorne. This alone suffices to defeat Staff's argument, particularly in light of the fact that Staff admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. § 51.109 "specifies what must be contained in a supporting affidavit . . . ." (Answer at 1449). Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in each affidavit. Staff improperly attempts to equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. Each of these affidavits are more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits the expert witnesses from adopting the statements contained in Section 5 as their own opinions. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The factual support contained in Section 5 of this contention, including all documentation cited, was identified by the expert witnesses. The text of Section 5 (and for the most part the statements contained in Sections 1, 2 and 6), which included reasoned bases and explanations, conclusions reached, and specific challenges to corresponding analyses in DOE's FEIS, was drafted, reviewed, and approved by the expert witnesses who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the specific contention that the expert adopts. Nevada decided against having expert affidavits incorporate numerous paragraphs from multiple contentions to avoid burdening its Petition with

hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each was assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial, especially since many of Nevada's experts lived in European countries where affidavit formalities are more complicated. Staff's Answer cites nothing in support of its position that either the contention or the attachment to the affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

NRC Staff complains that since more than one affiant subscribed to Section 5, it cannot tell which parts of the paragraph are associated with which expert. No support is proffered that would require as much. Moreover, NRC Staff does not explain why a question regarding whether each expert adopted all or only a part of a Section 5 bears on admissibility of the contention, as opposed to admission of expert testimony at a hearing on the merits. In this contention, each expert wholly adopted all of Section 5, which obviously means that all of the Section 5 is adopted as the testimony of each of the expert.

Staff asserts (Answer at 1451) that "[n]either the contention nor the affidavits explains the personal knowledge or facts upon which Dr. Thorne or Mr. Frishman based his opinion." Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent with the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the Case Management Order of June 20, 2008. In addition, clearly each of the above-identified expert witnesses has adopted Section 5 of this contention as their own opinions in their affidavits.

Moreover, each expert witness has attached to their affidavit a curriculum vitae that addresses in great detail their qualifications, experience, and expertise. When coupled together, these documents and statements clearly and unequivocally demonstrate that, based on the expert's personal knowledge and professional credentials, the facts and opinions set forth in Section 5 are those of the expert. Staff's Answer fails to identify any support for its assertion to the contrary. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§ 2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore, NRC Staff's effort to defeat admissibility of this contention must be rejected.

Finally, Staff is wrong that Staff's conclusions in its adoption decision are insufficient to support the contention. The Staff's adoption decision goes far beyond a simple RAI, which merely asks questions and has no final staff conclusions, and which is the subject of *Duke Energy Corporation (Oconee Nuclear Station, Units 1, 2, and 3)*, CLI-99-11, 49 NRC 328, 336-7 (1999). Staff's adoption decision is more akin to a final SER. It reaches firm and final conclusions and is supported by analysis. The Board may take official notice of the adoption decision, and thereby make it admissible evidence supporting this contention.

1. <u>A statement of the contention itself</u>

   No reply necessary based on NRC Staff's Response.

2. <u>A brief one summary of the basis for the contention</u>

   No reply necessary based on NRC Staff's Response.

3. <u>A demonstration that the contention is within the scope of the hearing</u>

   No reply necessary based on NRC Staff's Response.

4. <u>A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain</u>

   No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

   See above.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

   No reply necessary based on NRC Staff's Response.

REPLY – NEV-NEPA-21 – CONTAMINATED AQUIFER DISCHARGES

Staff begins with a long discussion regarding compliance with 10 C.F.R. §§ 2.326 and 50.109(a), which is addressed below.

Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008*, U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory PAPO Board),* LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326, much less a requirement that a contention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument.

However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by making clear that DOE's analysis of cumulative impacts of land surface discharge of contaminated groundwater is significantly deficient and that, if this deficiency were to be remedied, the disclosure of impacts in the FEIS would be materially different. Detailed support for these assertions was provided in Sections 5 and 6 (Petition at 1129-1131). *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the procedure required by law"), and *Oregon Environmental Council v. Kunzman*, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be set aside if undertaken 'without observation of procedure required by law'"). *See*

also Section II.H, *supra.* Accordingly, this contention satisfies the requirements of 10 C.F.R. 2.326.

Nevada has in fact supported its contention with the affidavits of Mr. Steven Frishman, and Dr. Michael Thorne. This alone suffices to defeat Staff's argument, particularly in light of the fact that Staff admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. § 51.109 "specifies what must be contained in a supporting affidavit . . . ." (Answer at 1457). Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in each affidavit. Staff improperly attempts to equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. Each of these affidavits are more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits the expert witnesses from adopting the statements contained in Section 5 as their own opinions. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The factual support contained in Section 5 of this contention, including all documentation cited, was identified by the expert witnesses. The text of Section 5 (and for the most part the statements contained in Sections 1, 2 and 6), which included reasoned bases and explanations, conclusions reached, and specific challenges to corresponding analyses in DOE's FEIS, was drafted, reviewed, and approved by the expert witnesses who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the specific contention that the expert adopts. Nevada decided against having expert affidavits incorporate numerous paragraphs from multiple contentions to avoid burdening its Petition with

hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each was assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial, especially since many of Nevada's experts lived in European countries where affidavit formalities are more complicated. Staff's Answer cites nothing in support of its position that either the contention or the attachment to the affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

NRC Staff complains that since more than one affiant subscribed to Section 5, it cannot tell which parts of the paragraph are associated with which expert. No support is proffered that would require as much. Moreover, NRC Staff does not explain why a question regarding whether each expert adopted all or only a part of a Section 5 bears on admissibility of the contention, as opposed to admission of expert testimony at a hearing on the merits. In this contention, each expert wholly adopted all of Section 5, which obviously means that all of the Section 5 is adopted as the testimony of each of the expert.

Staff asserts (Answer at 1458) that "[n]either the contention nor the affidavits explain the personal knowledge or facts upon which Dr. Thorne or Mr. Frishman based his opinion." Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent with the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the Case Management Order of June 20, 2008. In addition, clearly each of the above-identified expert witnesses has adopted Section 5 of this contention as their own opinions in their affidavits.

Moreover, each expert witness has attached to their affidavit a curriculum vitae that addresses in great detail their qualifications, experience, and expertise. When coupled together, these documents and statements clearly and unequivocally demonstrate that, based on the expert's personal knowledge and professional credentials, the facts and opinions set forth in Section 5 are those of the expert. Staff's Answer fails to identify any support for its assertion to the contrary. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§ 2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore NRC Staff's effort to defeat admissibility of this contention must be rejected.

Finally, Staff is wrong that Staff's conclusions in its adoption decision are insufficient to support the contention. The Staff's adoption decision goes far beyond a simple RAI, which merely asks questions and has no final staff conclusions, and which is the subject of *Duke Energy Corporation (Oconee Nuclear Station, Units 1, 2, and 3)*, CLI-99-11, 49 NRC 328, 336-7 (1999). Staff's adoption decision is more akin to a final SER. It reaches firm and final conclusions and is supported by analysis. The Board may take official notice of the adoption decision, and thereby make it admissible evidence supporting this contention.

1. <u>A statement of the contention itself</u>

   No reply necessary based on NRC Staff's Response.

2. <u>A brief summary of the basis for the contention</u>

   No reply necessary based on NRC Staff's Response.

3. <u>A demonstration that the contention is within the scope of the hearing</u>

   No reply necessary based on NRC Staff's Response.

4. <u>A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain</u>

   No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

   See above.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

   No reply necessary based on NRC Staff's Response.

REPLY – NEV-NEPA-22 – NO-ACTION ALTERNATIVE

Staff begins with a long discussion regarding compliance with 10 C.F.R. §§ 2.326 and 50.109(a), which is addressed below.

Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008*, U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory PAPO Board),* LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326, much less a requirement that a contention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument.

However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by making clear that DOE's No-Action Alternative is neither available, nor appropriate, nor reasonable, and that if this deficiency were to be remedied, the disclosure of overall impacts in the FEIS would be materially different. Detailed support for these assertions was provided in Sections 5 and 6 (Petition at 1133-1135). Indeed, NEV-NEPA-22 demonstrates precisely and conclusively that DOE's peculiar choice of a No-Action Alternative is *not* "an appropriate baseline against which to evaluate the proposed action" (see Answer at 1462). *See* also *California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the procedure

required by law"), and *Oregon Environmental Council v. Kunzman*, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be set aside if undertaken 'without observation of procedure required by law'"). *See also* Section II.H, *supra.* Accordingly, this contention satisfies the requirements of 10 C.F.R. § 2.326.

Nevada has in fact supported its contention with the affidavits of Mr. Steven Frishman, and Mr. Robert Halstead. This alone suffices to defeat Staff's argument, particularly in light of the fact that Staff admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. § 51.109 "specifies what must be contained in a supporting affidavit . . . ." (Answer at 1463). Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in each affidavit. Staff improperly attempts to equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. Each of these affidavits are more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits the expert witnesses from adopting the statements contained in Section 5 as their own opinions. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The factual support contained in Section 5 of this contention, including all documentation cited, was identified by the expert witnesses. The text of Section 5 (and for the most part the statements contained in Sections 1, 2 and 6), which included reasoned bases and explanations, conclusions reached, and specific challenges to corresponding analyses in DOE's FEIS, was drafted, reviewed, and approved by the expert witnesses who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the

specific contention that the expert adopts. Nevada decided against having expert affidavits incorporate numerous paragraphs from multiple contentions to avoid burdening its Petition with hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each was assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial. Staff's Answer cites nothing in support of its position that either the contention or the attachment to the affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

NRC Staff complains that since more than one affiant subscribed to Section 5, it cannot tell which parts of the paragraph are associated with which expert. No support is proffered that would require as much. Moreover, NRC Staff does not explain why a question regarding whether each expert adopted all or only a part of a Section 5 bears on admissibility of the contention, as opposed to admission of expert testimony at a hearing on the merits. In this contention, each expert wholly adopted all of Section 5, which obviously means that all of the Section 5 is adopted as the testimony of each of the expert.

Staff asserts (Answer at 1464) that "[n]either the contention nor the affidavits explains the personal knowledge or facts upon which [the affiants] based his opinion." Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent with the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the Case Management Order of June 20, 2008. In addition, clearly each of the above-identified expert witnesses has adopted Section 5 of this contention as their own opinions in their affidavits. Moreover, each expert

witness has attached to their affidavit a curriculum vitae that addresses in great detail their qualifications, experience, and expertise. When coupled together, these documents and statements clearly and unequivocally demonstrate that, based on the expert's personal knowledge and professional credentials, the facts and opinions set forth in Section 5 are those of the expert. Staff's Answer fails to identify any support for its assertion to the contrary. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§ 2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore NRC Staff's effort to defeat admissibility of this contention must be rejected.

1. A statement of the contention itself

   No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

   No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

   No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

   No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

   See above.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

   No reply necessary based on NRC Staff's Response.

REPLY – NEV-NEPA-23 – AIRCRAFT CRASH SCENARIOS – AGING FACILITY

1. A statement of the contention itself

No reply necessary based on NRC Staff's response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

NRC Staff contends (Answer at 1471) that "Nevada has made no showing that the consequences from the aircraft accidents suggested in NEV-NEPA-23 would be any greater than those already considered by DOE in the sabotage analysis," and therefore "Nevada has not raised an issue that is material to the findings the NRC must make . . . ." To the contrary, Nevada specifically alleged that if DOE had accurately identified the number of overpacks at the Aging Facility that could be impacted by a hypothetical sabotage scenario involving a large commercial jet aircraft crash, and if DOE had accurately assessed the severity of damage from such a crash including the amount of radioactive material that would be released, "the disclosure of overall radiological impacts would be **materially different** . . . ." (Petition at 1136, 1141) (emphasis added). In addition, Nevada alleged that if DOE had completed the requisite analyses properly, "damage would release **greater amounts of radioactive material than analyzed by DOE**." *Id.* (emphasis added). Nevada also alleged that if proper consideration had been given by DOE to the type of aircraft and their impact speeds that are reasonable to assume would crash at Yucca Mountain in a sabotage scenario, the consequences "the potential for a failure of the overpack and release of radiological materials . . . **would [be] increased**" over that described in the EIS.

Id. at 1140 (emphasis added). Clearly NRC Staff is in error, and thus its argument challenging compliance with 10 C.F.R. § 2.309(f)(1)(iv) fails.

Nevertheless, Nevada wants to make clear that, based upon the factual allegations contained in the Petition (at 1138-41), Nevada maintains that DOE has not properly considered the amount of radioactive material that would be released from the crash of a large commercial jet aircraft such a crash and the resultant overall radiological impacts. Nevada is not asking this Licensing Board to second guess DOE, but instead to look at the information and explanations proffered by DOE (in light of much contrary information) and determine whether DOE's assumptions and positions are indeed reasonable. To the degree that NRC Staff is of the opinion that these impacts are not sufficiently serious, such arguments address the weight and relevance of the facts alleged in the contention. Such arguments go to the merits of the contention and not its admissibility.

In fact, counsel for DOE and NRC Staff have previously admitted that environmental contentions involving transportation impacts (such as presented in this contention) are proper for consideration in this very proceeding. *See Nuclear Energy Institute, Inc. v. EPA*, 373 F.3d 1251, 1313 (D.C. Cir. 2004) (where the Court made its decision "on the assurances of counsel for both NRC and DOE at oral argument that Nevada will be permitted to raise its substantive challenges to the FEIS in any NRC proceeding to decide whether to adopt the FEIS"). Long-standing NRC case law instructs Licensing Boards to address environmental impacts associated with related transportation activities away from the licensed premise. *See Kansas Gas & Electric Co. (Wolf Creek Nuclear Generating Station, Unit No. 1)*, CLI-77-1, 5 NRC 1 (1977), 1977 NRC LEXIS 197, *16-17. *See also Detroit Edison Co. (Greenwood Energy Center, Units 2 and 3)*, ALAB-247, 8 AEC 936 (1974). Licensing Boards should "heed the rule generally applicable for major

Federal action in which two (or more) agencies are involved," namely that both agencies "must evaluate the environmental consequences of the entire project" and both agencies "must determine independently whether NEPA has been satisfied." *Tennessee Valley Authority (Phipps Bend Nuclear Plant, Units 1 and 2)*, ALAB-506, 8 NRC 533 (1978), 1978 NRC LEXIS 18, *28.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Although not presented as a response within an enumerated subsection of 10 C.F.R. § 2.309(f)(1), NRC Staff also challenges the admissibility of this contention on the grounds that Nevada's pleading fails to satisfy the requirements of 10 C.F.R. §§ 2.326 and 51.109.

- First, NRC Staff argues that "Nevada has not explicitly addressed the § 2.326 criteria," and the summary found in the Petition (at 1136) is not sufficient to demonstrate significance or materiality (Answer at 1467).

- Second, NRC Staff argues that "Nevada has not complied with the requirement in 10 C.F.R. §§ 2.326(a)(3), 2.326(b) and 51.109(a)(2) to file a supporting affidavit." *Id*. at 1469.

- Third, NRC Staff asserts that the list attached to the affidavit filed by Mr. Horstman in support of this contention "is neither signed nor initialed by Mr. Horstman and there is no other indication that Mr. Horstman reviewed the list, and therefore had knowledge of the contents of the list, prior to it being filed." *Id.*

- Fourth, "[n]either the contention itself nor Mr. Horstman's affidavit specifies which statements in the contention are attributable to Mr. Horstman . . . ." *Id* at 1469-70.

- Fifth, "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Mr. Horstman based his opinions." *Id*. at 1470.

Nevada replies to all of these arguments in turn below.

Contrary to NRC Staff's assertion, nowhere in the Case Management Order of June 20, 2008, *U.S. Dep't of Energy (High-Level Waste Repository, Pre-Application Matters, Advisory*

PAPO Board), LBP-08-10, 67 NRC 450 (2008), is there found any discussion of 10 C.F.R. § 2.326 much less a requirement that a petition in intervention must separately address the particular criteria contained in Section 2.326. This alone suffices to defeat NRC Staff's argument. However, Nevada recognizes that the NRC Hearing Notice for this proceeding, in addressing the standards to be applied to the admissibility of environmental contentions, directed the Licensing Board to apply the reopening procedures and standards in Section 2.326 "to the extent possible." 73 Fed. Reg. 63,029, 63,031 (Oct. 22, 2008), Section III.B. That regulation requires the contention to "address a significant safety or environmental issue" and to "demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially." 10 C.F.R. §§ 2.326(a)(2) and (a)(3). Nevada has met both of those standards in this contention by making clear that DOE:

> fails to accurately identify the number of overpacks damaged, fails to accurately assess the severity of the damage from such a crash, and fails to accurately analyze the amount of radioactive material that would be released from such a crash [i.e., a large commercial jet aircraft in a hypothetical sabotage scenario]. These deficiencies are significant, and if they were to be addressed in a satisfactory manner, the disclosure of overall radiological impacts would be materially different, and thus the FEIS and SEIS cannot be adopted by the NRC.

(Petition at 1136). Nevada provided specific facts in support of these conclusions in Section 5 of its contention. *See id.* at 1138-41. *See California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982) ("[t]he adequacy of an EIS depends upon whether it was prepared in observation of the procedure required by law"), and *Oregon Environmental Council v. Kunzman*, 817 F.2d 484, 492 (9th Cir. 1987) ("agency action may be set aside if undertaken 'without observance of procedure required by law'"). *See also* Section II.H, *supra.* As the only basis for NRC Staff's assertion that these pleadings do not satisfy the requirements of Section 2.326, NRC Staff claims that Nevada "has not demonstrated that any such impact would exceed the impact from the sabotage scenario

already evaluated" (Answer at 1468). Nevada has already made clear, *supra*, that based upon several statements contained in the contention NRC Staff is wrong in this conclusion. Accordingly, this contention satisfies the requirements of 10 C.F.R. § 2.326.

Nevada has in fact supported its contention with the affidavit of Mr. Hugh Horstman (Petition, Attachment 12). This alone suffices to defeat NRC Staff's argument, particularly in light of the fact that NRC Staff admits that neither 10 C.F.R. § 2.326 nor 10 C.F.R. § 51.109 "specifies what must be contained in a supporting affidavit . . ." (Answer at 1469). Moreover, Nevada has satisfied the requirements of the Case Management Order of June 20, 2008, by including numbered paragraphs and pages in each affidavit. NRC Staff improperly attempts to equate the detail required in an affidavit at the admissibility stage of an NRC adjudicatory proceeding with a summary judgment proceeding in federal court. Mr. Horstman's affidavit is more than sufficient to support the fact and expert opinion contained in Section 5 of this contention and no regulation prohibits Mr. Horstman from adopting the statements contained in Section 5 as his own opinions. Moreover, nothing within 10 C.F.R. § 2.309(f)(1) or the Case Management Order of June 20, 2008 requires a separate statement of supporting facts or opinions in an affidavit when doing so would simply duplicate text in presented in Section 5 of the contention.

The factual support contained in Section 5 of this contention was reviewed and approved by Mr. Horstman who then signed an affidavit specifically adopting Section 5. The affidavit specifically references an attachment that identifies the specific contention that Mr. Horstman adopts. Nevada decided against having expert affidavits incorporate numerous paragraphs from multiple contentions to avoid burdening its Petition with hundreds of affidavits, each associated with one contention. As Nevada's contentions were being developed by its experts, each was

assigned a unique alphanumeric designation, then organized with other contentions into logical subject areas, and at the very last minute (when all contentions had been fully drafted and approved) a number was assigned that now appears in the Petition. Given this process, it was not practical to circulate new affidavits for signature or initial, especially since many of Nevada's experts lived in European countries where affidavit formalities are more complicated. NRC Staff's Answer cites nothing in support of its position that either the contention or the attachment to Mr. Horstman's affidavit must be signed or initialed. Given the foregoing explanation, it is clear that Nevada has more than satisfied the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v). *See also*, Section II.A, *supra*.

NRC Staff complains that it cannot tell which parts of Section 5 have been adopted by Mr. Horstman. No support is proffered that would require as much. Moreover, NRC Staff does not explain why a question regarding whether Mr. Horstman adopted all or only a part of a Section 5 bears on admissibility of the contention, as opposed to admission of expert testimony at a hearing on the merits. In this contention, Mr. Horstman wholly adopted all of Section 5, which obviously means that all of the Section 5 is adopted as the testimony of Mr. Horstman.

NRC Staff asserts (Answer at 1470) that "[n]either the contention nor the affidavit explains the personal knowledge or facts upon which Mr. Horstman based his opinions." Clearly Section 5 of the contention sets forth numerous facts and expert opinions in support of this contention consistent with the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the Case Management Order of June 20, 2008. NRC Staff has not challenged this contention on that ground. In addition, clearly Mr. Horstman has adopted Section 5 of this contention as his own opinions in his affidavits. Moreover, Mr. Horstman has attached to his affidavit a curriculum vitae that addresses in great detail his qualifications, experience, and expertise. When coupled

together, these documents and statements clearly and unequivocally demonstrate that, based on Mr. Horstman's personal knowledge and professional credentials, the facts and opinions set forth in Section 5 are those of Mr. Horstman. NRC Staff's Answer fails to identify any support for its assertion to the contrary. Nothing more is needed or required in the contention or the affidavit by either 10 C.F.R. §§ 2.326(b) or 51.109(a)(2) at the this stage of the proceeding, and therefore NRC Staff's effort to defeat admissibility of this contention must be rejected.

6. <u>There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted</u>

No reply necessary based on NRC Staff's response.

C. Miscellaneous Contentions

REPLY – NEV-MISC-01 – EROSION AND GEOLOGIC DISPOSAL

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Staff refers here to its answer to NEV-SAFETY-41 addressing compliance with 10 C.F.R. § 2.309(f)(1)(v), and Nevada likewise refers to its reply regarding the sufficiency of Section 5 of NEV-SAFETY-41. Further, because this contention challenges compliance with relevant statutes, Staff's arguments with respect to NEV-SAFETY-41's compliance with 10 C.F.R. § 2.309(f)(1(vi) are not relevant.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

No reply necessary based on NRC Staff's Response.

REPLY – NEV-MISC-02 – ALTERNATE WASTE STORAGE PLANS

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

Staff's argues that there is no factual basis for the proposition that post-retrieval storage at Yucca Mountain would be indefinite or long-term. The very portion of SAR quoted by Staff characterizes storage after retrieval as "long-term." Moreover, as a matter of law, Congress has identified no disposal facilities for high-level waste other than Yucca Mountain, and therefore, if wastes had to be retrieved from Yucca Mountain they would need to be stored someplace for an indefinitely long period. No expert opinion is needed.

The fact that the SAR does not admit that DOE's post-retrieval plans violate the NWPA is not surprising but irrelevant to compliance with 10 C.F.R. § 2.309(f)(1)(v).

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

No reply necessary based on NRC Staff's Response.

REPLY – NEV-MISC-03 – LA REFERENCES

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's Response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

Staff's argument here that Nevada failed to adequately identify the 196 references or every affected SAR subsection is undercut completely by its failure to challenge NEV-MISC-03 for non-compliance with 10 C.F.R. § 2.309(f)(1)(i), and its concession (Answer at 1556) that "[t]he 196 references noted are commonly understood by the NRC, DOE, and the public to be the 196 references that were submitted with the license application . . . ." Staff seems to argue that Nevada was required to demonstrate SAR inadequacy on an SAR subsection-by-subsection basis. This argument just points to Nevada's dilemma. Nevada's contention (at 1150) states that "[i]t is clear from Nevada's contentions addressed to the SAR, specifically Sections 5 of those contentions, that Nevada's experts usually found it impossible to review the safety conclusions in the cited subsections of the SAR, especially those in Chapter 2, without considering scientific

facts and analyses in the referenced documents, and sometimes also scientific facts and analyses in documents referenced in the references." Therefore, at the least, NEV-MISC-03 adequately supports the propositions that (1) the subsections of the SAR addressed by these Nevada's contentions are incomplete and inadequate without incorporation of the references pursuant to 10 C.F.R. § 63.23, (2) without such incorporation, no safety findings based solely on the SAR can be made, and (3) the LA is deficient on its face, at least with respect to these subsections.

But as Nevada pointed out, Nevada's safety contentions addressed to the SAR do not include an exhaustive compendium of all references that must be included in the SAR. Doing so would require an in-depth, expert review of every subsection of the SAR, which is beyond the reasonable capability of any intervenor. However, Nevada's contentions are sufficiently numerous and detailed to support the reasonable inference that the completeness deficiencies found in the cited SAR subsections likely permeate the entire SAR.

Staff's mischaracterizes Nevada's argument to be that the application must be capable of evaluation by an intervenor; the contention is clear that the application must be sufficiently complete to support all of the necessary *Commission* compliance and safety findings, and Nevada cited to NRC regulations to support its contention. Staff assumes that it can consider information regardless of whether that information is incorporated by reference in the Application, and this goes to the merits of Nevada's contention. The fact that these references are publicly available and that parties may refer to all of the references in this proceeding is irrelevant if the application itself is deficient and cannot be granted.

REPLY – NEV-MISC-04 – AGING FACILITY ROLE UNDER NWPA

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's Response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

Nevada offers sufficient support for its material dispute with DOE. See II.C. above. As Nevada's contention states (Petition at 1153-54), according to the application the pertinent functions of the aging facility are to provide "capability to place commercial SNF in a location where it can be aged to appropriate thermal power levels, providing passive heat removal to preclude exceeding waste form temperature limits" and to provide "capability to uncouple receipt of commercial SNF from emplacement of commercial SNF by creating a location to temporarily place commercial SNF until the waste emplacement process can accommodate it." SAR Section 1.2.7.1.1 at 1.2.7-4. A facility designed to accept SNF that cannot be disposed of without violating limits, and to "uncouple receipt of commercial SNF from emplacement of commercial SNF" is, by its own terms, not any integral part of repository operation. Moreover, in its answer

to NEV-MISC-05, DOE concedes that its aging facility has "independent utility" (DOE Answer at 1860). Nevada does not insist that all incoming waste be disposed of immediately, but only that no waste be received that is unqualified for disposal and that will not be disposed of within a reasonable period. In short, Nevada insists only that a storage facility be reasonably coupled to efficient repository disposal operation.

An MRS is designed to serve as a back-up to the repository program in case that program is delayed, but that is just what DOE's aging facility is designed to do – provide nuclear facility licensees some back-up relief from delays in licensing Yucca Mountain by allowing as much of their spent fuel as possible to be removed as early as possible from facility sites and stored at Yucca Mountain. Moreover, while "long-term" storage is not defined, if SNF is left on the aging pad because of problems with either the SNF or Yucca Mountain, the storage *would* be long-term because a second repository or other facility would be many years away.

REPLY – NEV-MISC-05 – ROLE OF AGING FACILITY

1. A statement of the contention itself

No reply necessary based on NRC Staff's Response.

2. A brief summary of the basis for the contention

No reply necessary based on NRC Staff's Response.

3. A demonstration that the contention is within the scope of the hearing

No reply necessary based on NRC Staff's Response.

4. A demonstration that the contention is material to the findings NRC must make to license Yucca Mountain

No reply necessary based on NRC Staff's Response.

5. A concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

No reply necessary based on NRC Staff's Response.

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

The essence of NEV-MISC-05 is that even if the Nuclear Waste Policy Act and the Commission's regulations permitted the construction of an on-site aging facility that genuinely served the purposes ascribed to it by DOE, DOE's explanation for this aging pad is pretextual, leaving as the only explanation for DOE's proposal the desire to build a prohibited, retrievable storage facility in Nevada. This is a material issue, for if Nevada's pretextual claim is upheld on the merits, there would be a violation of the NWPA, just as the contention explains.

Nevada's contention is adequately supported by legal argument, citations to the application and other relevant DOE documents, and the affidavit. *See also* II.C. above. Staff's argument that Nevada's contention rests on bald and conclusory statements is itself based on bald and conclusory statements.

IV. CONCLUSION AND PRAYER FOR RELIEF

Based on the foregoing, the Department of Energy's License Application should be denied.

Respectfully submitted,

Honorable Catherine Cortez Masto
Nevada Attorney General
Marta Adams
Chief, Bureau of Government Affairs
100 North Carson Street
Carson City, Nevada 89701
Tel: 775-684-1237
Email: madams@ag.nv.gov

(*signed electronically*)
Martin G. Malsch *
Charles J. Fitzpatrick *
John W. Lawrence *
Egan, Fitzpatrick & Malsch, PLLC
12500 San Pedro Avenue, Suite 555
San Antonio, TX 78216
Tel: 210.496.5001
Fax: 210.496.5011
mmalsch@nuclearlawyer.com
cfitzpatrick@nuclearlawyer.com
jlawrence@nuclearlawyer.com

*Special Deputy Attorneys General

Dated: February 24, 2009

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Atomic Safety and Licensing Board

Before Administrative Judges:

ASLBP BOARD 09-876-HLW-CAB01 William J. Froehlich, Chairman Thomas S. Moore Richard E. Wardwell	ASLBP BOARD 09-877-HLW-CAB02 Michael M. Gibson, Chairman Lawrence G. McDade Nicholas G. Trikouros	ASLBP BOARD 09-878-HLW-CAB03 Paul S. Ryerson, Chairman Michael J. Farrar Mark O. Barnett

In the Matter of	)	
	)	
U.S. DEPARTMENT OF ENERGY	)	**Docket No. 63-001-HLW**
	)	
(High Level Waste Repository)	)	**February 24, 2009**

CERTIFICATE OF SERVICE

I hereby certify that the foregoing State of Nevada's Reply to NRC Staff's Answer to Nevada's Petition to Intervene as a Full Party has been served upon the following persons by the Electronic Information Exchange.

U.S. Nuclear Regulatory Commission
Atomic Safety and Licensing Board Panel
Mail Stop - T-3 F23
Washington, DC 20555-0001

CAB 01
William J. Froehlich, Chair
Administrative Judge
E-mail: wjf1@nrc.gov
Thomas S. Moore
Administrative Judge
E-mail: tsm2@nrc.gov
Richard E. Wardwell
Administrative Judge
E-mail: rew@nrc.gov

CAB 02
Michael M. Gibson, Chair
Administrative Judge
E-mail: mmg3@nrc.gov
Lawrence G. McDade
Administrative Judge
E-mail: lgm1@nrc.gov
Nicholas G. Trikouros
Administrative Judge
E-mail: NGT@NRC.GOV

CAB 03
Paul S. Ryerson, Chair
Administrative Judge
E-mail: psr1@nrc.gov
Michael C. Farrar
Administrative Judge
E-mail: mcf@nrc.gov
Mark O. Barnett
Administrative Judge
E-mail: mob1@nrc.gov
mark.barnett@nrc.gov

Anthony C. Eitreim, Esq., Chief Counsel
Email: ace1@nrc.gov
Daniel J. Graser, LSN Administrator
Email: djg2@nrc.gov
Lauren Bregman
Email: lrb1@nrc.gov
Sara Culler
Email: sara.culler@nrc.gov
Joseph Deucher
Email: jhd@nrc.gov
Patricia Harich
Email: patricia.harich@nrc.gov
Zachary Kahn
Email: zxk1@nrc.gov
Erica LaPlante
Email: eal1@nrc.gov
Matthew Rotman
Email: matthew.rotman@nrc.gov
Andrew Welkie
Email: axw5@nrc.gov
Jack Whetstine
Email: jgw@nrc.gov

U.S. Nuclear Regulatory Commission
Office of the Secretary of the Commission
Mail Stop - O-16 C1
Washington, DC 20555-0001
Hearing Docket
Email: hearingdocket@nrc.gov
Andrew L. Bates
Email: alb@nrc.gov
Adria T. Byrdsong
Email: atb1@nrc.gov
Emile L. Julian, Esq.
Email: elj@nrc.gov
Evangeline S. Ngbea
Email: esn@nrc.gov
Rebecca L. Giitter
Email: rll@nrc.gov

U.S. Nuclear Regulatory Commission
Office of Comm Appellate Adjudication
Mail Stop - O-16C1
Washington, DC 20555-0001
OCAA Mail Center
Email: ocaamail@nrc.gov

U.S. Nuclear Regulatory Commission
Office of the General Counsel
Mail Stop - O-15 D21
Washington, DC 20555-0001
Karen D. Cyr, Esq.
General Counsel
Email: kdc@nrc.gov
Mitzi A. Young, Esq.
Email: may@nrc.gov
Marian L. Zobler, Esq.
Email: mlz@nrc.gov
Andrea L. Silvia, Esq.
Email: alc1@nrc.gov
Daniel Lenehan, Esq.
Email: dwl2@nrc.gov
Margaret J. Bupp, Esq.
Email: mjb5@nrc.gov
Nina E. Bafundo, Esq.
Email: neb1@nrc.gov
Kevin Roach, Esq.
Email: kevin.roach@nrc.gov
Joseph S. Gilman, Paralegal
Email: jsg1@nrc.gov
Karin Francis, Paralegal
Email: kfx4@nrc.gov
OGCMailCenter
Email: OGCMailCenter@nrc.gov

Hunton & Williams LLP
Counsel for the U.S. Department of Energy
Riverfront Plaza, East Tower
951 East Byrd Street
Richmond, VA 23219
Kelly L. Faglioni, Esq.
Email: kfaglioni@hunton.com
Donald P. Irwin, Esq.
Email: dirwin@hunton.com
Michael R. Shebelskie, Esq.
Email: mshebelskie@hunton.com
Pat Slayton
Email: pslayton@hunton.com

U.S. Department Of Energy
Office of General Counsel
1551 Hillshire Drive
Las Vegas, NV 89134-6321
George W. Hellstrom
Email: george.hellstrom@ymp.gov

U.S. Department of Energy
Office of General Counsel
1000 Independence Avenue, S.W.
Washington, DC 20585
Martha S. Crosland, Esq.
Email: martha.crosland@hq.doe.gov
Nicholas P. DiNunzio, Esq.
Email: nick.dinunziok@rw.doe.gov
James Bennett McRae
Email: ben.mcrae@hq.doe.gov
Mary B. Neumayr, Esq.
Email: mary.neumayr@hq.doe.gov
Christina C. Pak, Esq.
Email: christina.pak@hq.doe.gov

U.S. Department of Energy
Office of Counsel
Naval Sea Systems Command
Nuclear Propulsion Program
1333 Isaac Hull Avenue, SE
Washington Navy Yard, Building 197
Washington, DC 20376
Frank A. Putzu, Esq.
Email: frank.putzu@navy.mil

Yucca Mountain Project, Licensing Group, DOE/BSC
1251 Center Crossing Road, M/S 423
Las Vegas, NV 89144
Jeffrey Kriner, Regulatory Programs
Email: jeffrey_kriner@ymp.gov
Stephen J. Cereghino, Licensing/Nucl Safety
Email: stephen_cereghino@ymp.gov

Yucca Mountain Project, Licensing Group, DOE/BSC
6000 Executive Blvd., Suite 608
North Bethesda, MD 20852
Edward Borella, Sr Staff,
Licensing/Nuclear Safety
Email: edward_borella@ymp.gov
Danny R. Howard, Sr. Licensing Engineer
Email: danny_howard@ymp.gov

U.S. Department of Energy
Office of Civilian Radioactive Waste Mgmt
Office of Repository Development
1551 Hillshire Drive
Las Vegas, NV 89134-6321
Timothy C. Gunter
Email: timothy_gunter@ymp.gov

U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, DC 20585
Eric Knox, Associate Director, Systems
Operations and External Relations, OCRWM
Email: eric.knox@hq.doe.gov
Dong Kim, LSN Project Manager, OCRWM
Email: dong.kim@rw.doe.gov

Morgan, Lewis, Bockius LLP
1111 Pennsylvania Ave., NW
Washington, DC 20004
Lewis Csedrik, Esq.
Email: lcsedrik@morganlewis.com
Jay Gutierrez, Esq.
Email: jguiterrez@morganlewis.com
Charles B. Moldenhauer, Associate
Email: cmoldenhauer@morganlewis.com
Brian P. Oldham, Esq.
Email: boldham@morganlewis.com
Thomas Poindexter, Esq.
Email: tpoindexter@morganlewis.com
Alex S. Polonsky, Esq.
Email: apolonsky@morganlewis.com
Thomas A. Schmutz, Esq.
Email: tschmutz@morganlewis.com
Donald Silverman, Esq.
Email: dsilverman@morganlewis.com

Annette M. White, Associate
Email: c@morganlewis.com
Paul J. Zaffuts, Esq.
Email: pzaffuts@morganlewis.com
Clifford W. Cooper, Paralegal
Email: ccooper@morganlewis.com
Shannon Staton, Legal Secretary
Email: sstaton@morganlewis.com

Carter Ledyard & Milburn, LLP
Counsel for Lincoln County
1401 Eye Street, N.W., Suite 300
Washington, DC 20005
Barry S. Neuman, Esq.
Email: neuman@clm.com

Churchill, Esmeralda, Eureka, Mineral
and Lander Counties
1705 Wildcat Lane
Ogden, UT 84403
Loreen Pitchford, LSN Coordinator
for Lander County
Email: lpitchford@comcast.net

Robert List
Armstrong Teasdale LLP
1975 Village Center Circle, Suite 140
Las Vegas, NV 89134-62237
Email: rlist@armstrongteasdale.com

City of Las Vegas
400 Stewart Ave.
Las Vegas, NV 89101
Margaret Plaster, Management Analyst
Email: mplaster@LasVegasNevada.gov

Clark County Nuclear Waste Division
500 S. Grand Central Parkway
Las Vegas, NV 89155
Irene Navis
Email: iln@co.clark.nv.us
Engelbrecht von Tiesenhausen
Email: evt@co.clark.nv.us
Philip Klevorick
Email: klevorick@co.clark.nv.us

Nuclear Waste Project Office
1761 East College Parkway, Suite 118
Carson City, NV 89706
Bruce Breslow
Email: breslow@nuc.state.nv.us
Steve Frishman, Tech. Policy Coordinator
Email: steve.frishman@gmail.com

Eureka County and Lander County
Harmon, Curran, Speilberg & Eisenberg
1726 M. Street N.W., Suite 600
Washington, DC 20036
Diane Curran, Esq.
Email: dcurran@harmoncurran.com

Nevada Nuclear Waste Task Force
P.O. Box 26177
Las Vegas, NV 89126
Judy Treichel, Executive Director
Email: judynwtf@aol.com

Talisman International, LLC
1000 Potomac St., N.W., Suite 300
Washington, D.C. 20007
Patricia Larimore
Email: plarimore@talisman-intl.com

Nuclear Energy Institute
1776 I Street, NW, Suite 400
Washington, DC 20006-3708
Michael A. Bauser, Esq.
Associate General Counsel
Email: mab@nei.org
Anne W. Cottingham, Esq.
Email: awc@nei.org
Ellen C. Ginsberg, Esq.
Email: ecg@nei.org
Rod McCullum
Email: rxm@nei.org
Steven P. Kraft
Email: spk@nei.org
Jay E. Silberg
Email: jay.silberg@pillsburylaw.com
Timothy J.V. Walsh
Email: timothy.walsh@pillsburylaw.com

White Pine County
City of Caliente
Lincoln County
P.O. Box 126
Caliente, NV 89008
Jason Pitts
Email: jayson@idtservices.com

Nuclear Information and Resource Service
6930 Carroll Avenue, Suite 340
Takoma Park, MD 20912
Michael Mariotte, Executive Director
Email: nirsnet@nirs.org

Radioactive Waste Watchdog
Beyond Nuclear
6930 Carroll Avenue, Suite 400
Takoma Park, MD 20912
Kevin Kamps
Email: kevin@beyondnuclear.org

Abigail Johnson
612 West Telegraph Street
Carson City, NV 89703
Email: abbyj@gbis.com

National Congress of American Indians
1301 Connecticut Ave. NW - Second floor
Washington, DC 20036
Robert I. Holden, Director
Nuclear Waste Program
Email: robert_holden@ncai.org

Churchill County (NV)
155 North Taylor Street, Suite 182
Fallon, NV 89406
Alan Kalt
Email: comptroller@churchillcounty.org

Inyo County Water Department
Yucca Mtn Nuclear Waste
Repository Assessment Office
163 May St.
Bishop, CA 93514
Matt Gaffney, Project Associate
Email: mgaffney@inyoyucca.org

Mr. Pat Cecil
Inyo County Planning Director
P.O. Box L
Independence, CA 93526
Email: pcecil@inyocounty.us

Environmental Protection Agency
Ray Clark
Email: clark.ray@epa.gov

Nuclear Waste Technical Review Board
Joyce Dory
Email: dory@nwtrb.gov
Intertech Services Corporation
(for Lincoln County)
P.O. Box 2008
Carson City, NV 89702-2008
Dr. Mike Baughman
Email: bigboff@aol.com

Nye County Department of Natural
Resources & Federal Facilities
1210 E. Basin Road, Suite 6
Pahrump, NV 89048
David Swanson
Email: dswanson@nyecounty.net

Lincoln County Nuclear Oversight Prgm
100 Depot Ave., Suite 15; P.O. Box 1068
Caliente, NV 89008-1068
Lea Rasura-Alfano, Coordinator
Email: jcciac@co.lincoln.nv.us

Nye County Regulatory/Licensing Adv.
18160 Cottonwood Rd. #265
Sunriver, OR 97707
Malachy Murphy
Email: mrmurphy@chamberscable.com

Mineral County Board of Commissioners
P.O. Box 1600
Hawthorne, NV 89415
Linda Mathias, Administrator
Office of Nuclear Projects
Email: yuccainfo@mineralcountynv.org

State of Nevada
100 N. Carson Street
Carson City, NV 89710
Marta Adams
Email: maadams@ag.state.nv.us

White Pine County (NV) Nuclear
Waste Project Office
959 Campton Street
Ely, NV 89301
Mike Simon, Director
(Heidi Williams, Adm. Assist.)
Email: wpnucwst1@mwpower.net

Fredericks & Peebles, L.L.P.
1001 Second Street
Sacramento, CA 95814
916-441-2700
FAX 916-441-2067
Darcie L. Houck
Email: dhouck@ndnlaw.com
John M. Peebles
Email: jpeebles@ndnlaw.com
Joe Kennedy, Chairman
Email: chairman@timbisha.org
Barbara Durham
Tribal Historic Preservation Officer
Email: dvdurbarbara@netscape.com

Susan Durbin
Deputy Attorney General
California Department of Justice
1300 I St.
P.O. Box 944255
Sacramento, CA, 94244-2550
Email: susan.durbin@doj.ca.gov

Brian Hembacher
Deputy Attorney General
California Department of Justice
300 S. Spring St
Los Angeles, CA 90013
Email: brian.hembacher@doj.ca.gov

Timothy E. Sullivan
Deputy Attorney General
California Department of Justice
1515 Clay St., 20th Flr.
P.O. Box 70550
Oakland, CA 94612-0550
Email: timothy.sullivan@doj.ca.gov

Brian Wolfman
Public Citizen Litigation Group
1600 20th Street, N.W.
Washington, D.C. 20009

Kevin W. Bell
Senior Staff Counsel
California Energy Commission
1516 9th Street
Sacramento, CA 95814
Email: kwbell@energy.state.ca.us

Jeffrey D. VanNiel
530 Farrington Court
Las Vegas, NV 89123
Email: nbridvnr@gmail.com

Ethan I. Strell
Carter Ledyard & Milburn LLP
2 Wall Street
New York, NY 10005
Email: strell@clm.com

Jennings, Strouss & Salmon, PLC
1700 Pennsylvania Avenue, N.W., Suite 500
Washington DC 20006-4725
Alan I. Robbins
Email: arobbins@jsslaw.com
Debra D. Roby
Email: droby@jsslaw.com

Steven A. Heinzen
Godfrey & Kahn, S.C.
One East Main Street, Suite 500
P.O. Box 2719
Madison, WI 53701-2719
Email: sheinzen@gklaw.com

Douglas M. Poland
Godfrey & Kahn, S.C.
One East Main Street, Suite 500
P.O. Box 2719
Madison, WI 53701-2719
Email: dpoland@gklaw.com

Arthur J. Harrington
Godfrey & Kahn, S.C.
780 N. Water Street
Milwaukee, WI 53202
Email: aharring@gklaw.com

(signed electronically)
Susan Montesi

Attachment 1

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE SECRETARY

In the Matter of | Docket No. 70-3103

Louisiana Energy Services
National Enrichment Facility

CONTENTIONS ON THE CONSTRUCTION PERMIT/OPERATING LICENSE APPLICATION FOR THE NATIONAL ENRICHMENT FACILITY MADE BY NUCLEAR INFORMATION AND RESOURCE SERVICE AND PUBLIC CITIZEN

Pursuant to 10 CFR 2.309 and the notice published by the Nuclear Regulatory Commission ("NRC" or the "Commission") at 69 Fed. Reg. 5873 (Feb. 6, 2004), Petitioners Nuclear Information and Resource Service ("NIRS") and Public Citizen present the following contentions for hearing on the construction permit/operating license application by Louisiana Energy Services, L.P. ("LES"). Each of the contentions asserted herein is within the scope of this licensing proceeding and concerns matters that are material to the determinations to be made in such proceeding, as required by 10 CFR 2.309(f).

Contentions presented herein are organized into the following categories:

1. Impacts upon ground water and water supplies
2. Waste storage and disposal
3. Decommissioning costs
4. Costs of management and disposal of depleted UF_6
5. Need for the facility; impact on national security

2. Waste storage and disposal

2.1 Contention: Petitioners contend that LES does not have sound, reliable, or plausible strategy for disposal of the large amounts of radioactive and hazardous Depleted Uranium Hexaflouride ("DUF_6") waste that the operation of the plant would produce. See NRC Order, 69 Fed. Reg. 5873, 5877 (Feb. 6, 2004).

The factual bases for such contention are set forth below, based upon analyses by Dr. Arjun Makhijani, whose resume is attached.

As background, LES states in its application (ER 4.13.3.1.3 Depleted UF6 Disposition Alternatives) that its "preferred option and a 'plausible strategy' for disposition of the UBCs [uranium byproduct cylinders] is private sector conversion and disposal...." LES goes on to argue (ER 4.13-8) that "ConverDyn, a company that is engaged in converting U_3O_8 material to UF_6 for enrichment, has the technical capability to construct and operate a depleted UF_6 to depleted U_3O_8 facility at its facility in Metropolis, Illinois in the future if there is an assured market. One of the two ConverDyn partners, General Atomics, may have access to an exhausted uranium mine (the Cotter Mines in Colorado) where depleted U_3O_8 could be disposed. Furthermore, discussions have recently been held with Cogema concerning a private conversion facility. Cogema has experience with such a facility currently processing depleted UF_6 in France. These factors support LES's position that this option is the preferred 'plausible strategy' option."

A. Basis: In reality, the ability to construct a UF_6 to U_3O_8 deconversion plant and the possible access to a uranium mine are more wishful thinking than "plausible strategy." As LES itself states, (ER 4.13-15), DOE possesses approximately 700,000 metric tons of depleted UF_6 from operations at its Oak Ridge, Paducah and Portsmouth uranium enrichment plants, which

started piling up as far back as far as 1947. DOE is building its own conversion facilities. That taxpayers must fund the capital costs of these facilities is a strong indication that the private sector does not believe that construction of a conversion facility would make economic sense.

Further, there is the issue of the hazards of transporting DUF_6. If DOE or any other entity were to convert DUF_6 into U_3O_8, it would be far less risky to convert it at the place where it is generated than to transport it for conversion. In case of an accident and puncture of cylinders, even a modest fire would cause rapid volatilization of DUF_6. DUF_6 readily hydrolyzes, i.e., reacts with moisture to form uranyl fluoride and hydrofluoric acid. Hence an accident of this type would release both hazardous and radioactive materials that would be dispersed over considerable areas and that would severely affect motorists present on the road. LES's conversion strategy would be far more plausible if it were proposing to actually build the facility as an integral part of the enrichment plant.

B. Basis: The statement that a ConverDyn partner, General Atomics, "may have access to an exhausted uranium mine...where depleted U_3O_8 could be disposed" represents a grossly inadequate certitude for a "plausible strategy" determination, particularly for a radioactive and hazardous substance which has been accumulating in massive quantities in the U.S. for 57 years without a plausible disposal program. Moreover, officials at Cotter Mines have publicly denied that they would or could accept the LES waste. (See interview by John Fleck, published in Albuquerque Journal, Jan. 7, 2004). Neither has LES made a serious argument, much less demonstrated, that the Cotter Mines site meets technical and environmental criteria for DU disposal.

C. Basis: Similarly, the statement that "discussions have recently been held with Cogema concerning a private conversion facility" (ER 4.13-8) is without substance. LES does

not indicate the outcome of these discussions, whether Cogema actually is interested in this idea, whether Cogema believes construction of a conversion facility would be profitable, and so forth. Holding discussions is hardly the same as a substantive commitment to build and operate such a facility.

D. Basis: The LES application (ER 4.13.3.1.3 Depleted UF6 Disposition Alternatives) states, "The disposition of UBCs by DOE conversion and disposal is described...since it is also a 'plausible strategy,' but is not considered the preferred option." In support of this assertion, LES points to § 3113 of the 1996 USEC Privatization Act (which requires the DOE to take possession and dispose of DU from private uranium enrichment plants *if* the waste is considered by the NRC to be low-level radioactive waste) and to two letters, one from DOE, dated July 25, 2002, and one from NRC, dated March 24, 2003. The DOE letter states, "....the Department acknowledges that Section 3113 *may* constitute a "plausible strategy for the disposal of depleted uranium from the private sector domestic uranium enrichment plant license applicants and operators," but DOE also states that "there has been no formal determination by NRC that depleted uranium is low-level radioactive waste for purposes of Section 3113 of the 1996 USEC Privatization Act. Consequently, DOE is not obligated to accept it for disposal unless and until NRC makes such a determination." (*emphasis added*). DOE's letter adds: "The procedures and costs for this potential service are yet to be determined." Similarly, the NRC letter states, "NRC staff considers that Section 3113 would be a 'plausible strategy' for dispositioning depleted uranium tails *if* NRC determines that depleted uranium is a low-level radioactive waste. In that regard, the staff expects that LES will indicate in its application whether it will treat the tails as a waste or a resource. LES should also demonstrate in its application, given the expected constituents of