ENCLOSURE

SUMMARY OF THE TECHNICAL EXCHANGE ON DRAFT "STAFF TECHNICAL POSITION ON INVESTIGATIONS TO IDENTIFY FAULT DISPLACEMENT AND SEISMIC HAZARDS AT A GEOLOGIC REPOSITORY"

February 20, 1991 Rockville, Karyland

On February 20, 1991, staff from the U.S. Nuclear Regulatory Commission (NRC), the U.S. Department of Energy (DOE), the State of Nevada, and affected-unitsof-local government conducted a technical exchange for the purpose of discussing NRC's draft staff technical position (STP) on investigations to identify fault displacement and seismic hazards at a geologic repository. The agenda is enclosed (attachment 1). In describing its draft STP, the NRC staff discussed how it responded to the comments received on the 1989 draft technical position (TP). The NRC staff briefed the participants on its strategy for the development of tectonics guidance. Attachment 2 is a list of the attendees.

In its opening presentation, the NRC staff described its strategy for undertaking guidance in the area of tectorics. The staff described what the major elements of the guidance program were; both planned and under development. In the next presentation, the staff noted the differences between the current draft STP and the 1989 draft TP entitled "Methods of Evaluating the Seismic Hazard at the Geologic Repository." During this presentation, it was noted that there were two principal differences between the current STP and the draft TP previously noticed in the <u>Federal Register</u> for public comment. The first principal difference was that the current draft STP no longer required 10 CFR Part 100, Appendix A-type investigations for faulting and seismicity; the second principal difference was the draft STP introduced the concept of "faults susceptible to displacement." The NRC presentation concluded with a discussion of how the staff responded to the comments that were received on the earlier draft TP in the current STP. Each presentation (see viewgraphs in attachment 3) was followed by questions and discussion.

Following the NRC presentations, representatives from DOE, the State of Nevada, and the Edison Electric Institute (EEI) provided preliminary comments on the draft STP. In its presentation, DOE noted that the draft STP had addressed several of its major concerns and pointed out new concerns (see viewgraphs in attachment 4); however, others still persist such as definition of the term "geologic setting," and the relationship between the identification of faults susceptible to displacement and subsequent design basis development. With regard to this latter issue, both DOE and the State of Nevada expressed interest in deferring finalization of the STP until a subsequent STP on the analysis of fault displacement and seismic hazards at a geologic repository has been issued for review and comment. DOE recommended combining the two.

EEI noted that the guidance provided by a STP is not obligatory and is subject to change. Therefore, it recommended that NRC consider issuing this guidance in the form of a regulation which is both durable and legally binding on all parties to any licensing proceeding.

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Overall, the draft STP investigations to identify fault displacement and seismic hazards at a geologic repository was considered by those in attendance to be substantially improved. NRC noted that it would consider the new comments received at the meeting in a revised draft STP. At the meeting, NRC decided that following revision, the availability of the revised draft STP would be noticed in the <u>Federal Register</u> for public comment for a second time.

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Michael P. Lee, Project Manager Repository Licensing and Quality Assurance Project Directorate Division of High-Level Waste Management U.S. Nuclear Regulatory Commission

Priscilla Bunton Regulatory Integration Branch Office of Systems and Compliance Office of Civilian Radioactive Waste Management U.S. Department of Energy

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ATTACHMENT 1



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UNITED STATES NUCLEAR REGULATORY COMMISSION WASHINGTON, D. C. 20555

FEB 1 3 1991

AGENDA

NRC-DOE TECHNICAL EXCHANGE ON DRAFT FINAL NRC STAFF TECHNICAL POSITION (STP) ON INVESTIGATIONS TO IDENTIFY FAULT DISPLACEMENT AND SEISMIC HAZARDS AT A GEOLOGIC REPOSITORY

February 20, 1991 8:30 am - 5:00 pm

U.S. Nuclear Regulatory Commission One White Flint North 11555 Rockville Pike Rockville, Maryland 20852 Room 6B11

- PURPOSE: To discuss NRC's draft final STP on investigations to identify fault displacement and seismic hazards at a geologic repository. In addition, NRC will brief DOE on the staff's strategy for tectonics guidance.
- SCOPE: In presenting its draft final STP, NRC will discuss how it has responded to the comments received on the earlier draft technical position. NRC will in particular explain how this STP and other work under development in its tectonics guidance program will address the need for guidance in the areas identified by DOE.

AGEN	<u>IDA TOPIC</u> Opening Remarks	DISCUSSION LEADER NRC, DOE, NV
¢	NRC Strategy for Tectonics Guidance (30 minutes) Discussion	NRC All
•	Draft Final STP (90 minutes) - Introduction - Faulting - Seismic Hazards	NRC
	Discussion	A11
C	NRC Staff Resolution of Public Comments (30 minutes) Discussion	NRC All
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C	Comments by DOE, the State of Nevada, and/or EEI/UWAST	E DOE, State, EEI
¢	Open Discussion	A11
•	Final Remarks	NRC, DOE, State, EEI

ATTACHMENT 2

ATTENDEES AT THE FEBRUARY 20, 1991 TECHNICAL EXCHANGE ON DRAFT "STAFF TECHNICAL POSITION ON INVESTIGATIONS TO IDENTIFY FAULT DISPLACEMENT AND SEISMIC HAZARDS AT A GEOLOGIC REPOSITORY"

DOE

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- P. Bunton
- A. Simmons
- L. Desell
- S. van Camp
- M. Mozumder

SAIC+

- J. King
- C. Plum
- E. Ziegler-Commbs
- T. Grant

Weston

- H. Minwalla
- W. Haslebacher

Sandia National Laboratory A. DuCharme

<u>Clark County, Nevada</u> E. von Tiesenhausen

State of Nevada

D. Tillson C. Johnson

C. QUIIISUI

<u>University of Nevada-Reno</u> S. Wesnonsky

Edison Electric Institute

- M. Bauser
- J. Smith

M. Lee P. Justus M. Nataraja K. McConnell R. Ballard B. Ibrahim K. Stablein D. Gupta J. Trapp ACNW++ C. Abrams P. Pomeroy W. Hinze CNWRA+++ G. Stirewalt R. Hofmann L. McKague NWTRB* L. Reiter

NRC

National Academy of Science R. Andrews I. Alterman K. Fox

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<u>USGS</u>** K. Fox W. Langer G. Roseboom R. Wallace

+ Scientific Applications International Corporation

- ++ Advisory Committee on Nuclear Waste
- +++ Center for Nuclear Waste Regulatory Analyses
- * U.S. Nuclear Waste Technical Review Board
- ** U.S. Geological Survey

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STRATEGY FOR TECTONICS GUIDANCE ON FAULTING AND SEISMIC HAZARDS, TECTONIC MODELS AND APPLICATION TO DESIGN



PHILIP S. JUSTUS

GEOSCIENCES & SYSTEMS PERFORMANCE BRANCH DIVISION OF HIGH-LEVEL WASTE MANAGEMENT

FEBRUARY 20, 1991

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STRREST FOR TECTONICE BUIGANCE -
OBJECTIVES OF DHLWM GUIDANCE
HELP ENSURE DOE'S PROGRAM IS SUFFICIENT TO
 IDENTIFY AND ADDRESS LICENSING ISSUES EARLY
• PROVIDE APPROPRIATE INPUT TO ASSESSMENTS
PROVIDE BASELINE DATA
DEVELOP COMPLETE LICENSE APPLICATION
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BTRÆRET FOR TOCTONIED ENIMANCS 4
TOPICS FOR WHICH TECTONICS GUIDANCE IS BEING DEVELOPED
1. INVESTIGATION OF FAULT DISPLACEMENT AND SEISMIC HAZARDS [TOPIC FOR TODAY'S TECHNICAL EXCHANGE]
2. ANALYSIS OF FAULT DISPLACEMENT AND SEISMIC HAZARDS
3. USE OF TECTONIC MODELS
TOPIC UNDER CONSIDERATION
4. APPLICATION OF FAULT DISPLACEMENT AND SEISMIC HAZARD TO REPOSITORY DESIGN
NRC/BOX #1/5#/#1

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1. STP - INVESTIGATIONS OF FAULT DISPLACEMENT AND SEISMIC HAZARDS [TOPIC FOR TODAY'S TECHNICAL EXCHANGE]

SCOPE OF STP

- Methodology to Identify Fault Displacement and Seismic Sources
- Methodology to Identify Faults Susceptible to Displacement
- Response to DOE Request for Guidance

PRINCIPAL PART 60 REQUIREMENTS

- -60.21(c)(1)(ii) Analysis of Geology and Geophysics
- -60.122(A)(2) Adequate Investigation
- -60.131(b)(1) Protect SSCIS Against Natural Phenomena

STATUS

- Final STP FY91 (4th Qtr)

NRC/905 42/28/91

2. STP - ANALYSES OF FAULT DISPLACEMENT AND SEISMIC HAZARDS

SCOPE OF STP

- Acceptable Analysis Methodology
- Response to DOE's Request for Guidance
- Deterministic Supplemented by Probabilistic
- Consider Issue of Setback

PRINCIPAL PART 60 REQUIREMENTS

- -60.112 Meet EPA Standard
- -60.113 Meet Subsystem Performance Objectives
- -60.122(a)(2) Analyses Not to Underestimate Effects
- -60.131(b)(1) Maintain Safety Functions

STATUS

- Draft for Public Comment FY92

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	GUIDANCE ON APPLICATION OF FAULT DISPLACEMENT
	AND SEISMIC HAZARDS TO DESIGN
	SCOPE UNDER CONSIDERATION
	 Acceptable Methods of Compliance With Design Criterion - 60.131(b)(1)
	 Acceptable Methods of Compliance With Certain Portions of 60.113(A), (B)
	PRINCIPAL PART 60 REQUIREMENTS
	-60.21(c)(3) Analysis of Design
	-60.111 Preclosure Protection From Releases
	-60.131(a) General Design Criteria for GROA
	-80.131(b)(1) Maintain Essential Safety Functions
	-60.113(A),(B) Maintain Essential Safety Functions

STATUS

- Under Consideration

NRC/BOX #1/11/11

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STRAFEST FOR TECTONICS SUIDANCE BACKUP 1 **REGULATIONS REQUIRING ASSESSMENT OF TECTONICS** 10 CFR PART 60 SITING CRITERIA (60.122) FAVORABLE/POTENTIALLY ADVERSE CONDITIONS DESIGN CRITERIA (60.130-135) MAINTAIN SAFETY FUNCTION/MEET HEALTH AND SAFETY GOALS, AND WASTE ISOLATION PERFORMANCE OBJECTIVES (60.111-113) RELEASE TO UNRESTRICTED AREAS WITHIN PART 20 LIMITS AND APPLICABLE EPA STANDARDS (60.111) RETRIEVABILITY (60.111) **OVERALL SYSTEM (60.112)** GWTT, SCC, GRADUAL RELEASE (60.113)

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HRC/DOX #2/39/91

STRATIST FOR TECTONICS SUIDANCE BACKUP 2 **REGULATIONS REQUIRING ASSESSMENT OF TECTONICS 10 CFR PART 60** TECHNICAL ASSESSMENTS (60.21) DESCRIPTIONS/ASSESSMENTS OF GEOLOGY AND GEOPHYSICS PERFORMANCE CONFIRMATION PROGRAM (60.140-141) **REPOSITORY'S INFLUENCE ON TECTONIC PROCESSES** AND EVENTS CONFIRM GEOTECHNICAL DESIGN PARAMETERS BY **GEOLOGIC MAPPING, SEISMIC MONITORING**

NAC/BOS \$2/29/91

BACKUP 3A			
DOE REQUEST FOR GUIDANCE ON TECTONICS ITEMS (2/27/90) FAULTING HAZARD			
 IDENTIFICATION OF SIGNIFICANT QUATERNARY FAULTS 			
 CRITERIA FOR DETERMINING WHICH FAULTS OR FEATURES TO CHARACTERIZE 			
SUBSURFACE FAULT GEOMETRIES			
FAULT SEGMENTATION			
FAULT LENGTHS AND WIDTHS			
FAULT SLIP RATES			
DISPLACEMENT ASSOCIATED WITH DISCRETE FAULTING EVENTS			
SUBSIDIARY FAULTING			
NAC/DAS #1/80/81			

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DOE REQUEST FOR GUIDANCE ON TECTONICS ITEMS (2/27/90) SEISMIC HAZARD
MAGNITUDE-FREQUENCY RELATIONSHIPS
NON-POISSONIAN RECURRENCE MODELS
CHARACTERISTIC EARTHQUAKES
MAXIMUM-MAGNITUDE EARTHQUAKES
GROUND-MOTION ATTENUATION RELATIONSHIPS
GROUND-MOTION SITE EFFECTS
 EXCEEDANCE PROBABILITIES FOR GROUND-MOTION PARAMETERS
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BACKUP 3C

DOE REQUEST FOR GUIDANCE ON TECTONICS ITEMS (2/27/90)

TECTONIC MODELS

• ALTERNATE TECTONIC MODELS

HAZARD EVALUATION

- CONSERVATISMS AND NON-CONSERVATISMS IN ANALYSES
- PARAMETER UNCERTAINTIES
- SENSITIVITY OF HAZARD ESTIMATES IN DESIGN

APPLICATION OF HAZARDS TO DESIGN

• ANTICIPATED USAGE OF HAZARD ESTIMATES IN DESIGN

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STAFF TECHNICAL POSITION ON INVESTIGATIONS TO IDENTIFY FAULT DISPLACEMENT AND SEISMIC HAZARDS AT A GEOLOGIC REPOSITORY



INTRODUCTION: PHILIP S. JUSTUS FAULT DISPLACEMENT HAZARD: KEITH I. MCCONNELL SEISMIC HAZARD: ABOU-BAKR K. IBRAHIM GEOSCIENCES & SYSTEMS PERFORMANCE BRANCH DIVISION OF HIGH-LEVEL WASTE MANAGEMENT

FEBRUARY 20, 1991

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STP INVESTIGATIONS INTRODUCTION

1 CHRONOLOGY OF DEVELOPMENT OF STP ON FAULTING/SEISMIC HAZARD INVESTIGATIONS PUBLIC COMMENT DRAFT TP ISSUED **AUGUST 1989** DOE/NRC TECHNICAL EXCHANGE ON DRAFT **DECEMBER 1989** TP ON METHODS OF EVALUATING THE SEISMIC HAZARD AT A GEOLOGIC REPOSITORY DOE/NRC TECHNICAL EXCHANGE ON **JUNE 1990 TECTONICALLY SIGNIFICANT FAULTS** DOE/NRC TECHNICAL EXCHANGE ON STP ON **FEBRUARY 20, 1991 INVESTIGATIONS TO IDENTIFY FAULT** DISPLACEMENT AND SEISMIC HAZARD AT A GEOLOGIC REPOSITORY NRC/DOB #8/88/91





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FAULT DISPLACEMENT HAZARD INVESTIGATIONS



KEITH I. MCCONNELL GEOSCIENCES & SYSTEMS PERFORMANCE BRANCH DIVISION OF HIGH-LEVEL WASTE MANAGEMENT

FEBRUARY 20, 1991

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FAULT DISPLACEMENT HAZARD INVESTIGATIONS (OUTLINE OF PRESENTATION)
1. NEED FOR THE POSITION
2. DEFINITION OF "SUSCEPTIBLE" FAULT
3. WHAT THE CONCEPT PROVIDES
4. WHAT THE CONCEPT DOES NOT NECESSITATE
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	THE CONCEPT OF 'SUSCEPTIBLE' FAULT IS INTRODUCED TO:
1.	TAKE ADVANTAGE OF PAST REGULATORY EXPERIENCE IN USING EXPLICIT CRITERIA FOR IDENTIFYING FAULT HAZARDS;
2.	OUTLINE THE BASELINE INFORMATION RELATIVE TO FAULT INVESTIGATIONS UNDER CRITERIA LISTED IN 10CFR60.122(a)(2) AND 60.131(B)(1);
3.	IDENTIFY THE ENTIRE QUATERNARY RECORD AS THE PERIOD OF GEOLOGIC TIME THAT SHOULD BE CONSIDERED;
4.	INDICATE THAT FAULTS WITH AN UNCERTAIN QUATERNARY RECORD SHOULD BE INVESTIGATED;
5.	FORM A UNIFORM BASIS FOR DESIGN CONSIDERATIONS.
6.	ELIMINATE CONFUSION RESULTING FROM THE INTRODUCTION OF MULTIPLE TERMS FOR FAULTS OF SIGNIFICANCE (VIEWGRAPH 3A);
7.	ADDRESS AMBIGUOUS AND POTENTIALLY INADEQUATE FAULT-RELATED CHARACTERIZATION PARAMETERS IN THE SCP (VIEWGRAPHS 3B AND 3C).

AND \$100 (MENERT ALLAS) 3A
TERMS USED TO DEFINE FAULTS OF SIGNIFICANCE TO A REPOSITORY
1. POTENTIALLY ACTIVE FAULT (DRAFT STUDY PLAN 8.3.1.17.4.6);
2. POTENTIALLY ACTIVE GEOLOGICAL STRUCTURES (DRAFT STUDY PLAN 8.3.1.17.4.6);
3. SIGNIFICANT LATE QUATERNARY FAULTS (SCP; STUDY PLAN 8.3.1.17.4.2) (Slip-rate >0.001mm/yr over last 100ka);
4. LATE QUATERNARY FAULTS (STUDY PLAN 8.3.1.17.4.2) (?);
 POTENTIALLY SIGNIFICANT QUATERNARY FAULTS (CHARACTERIZATION PARAMETER - SCP) (Slip-rate >0.001mm/yr; or offset of materials less than 100ka);
 SIGNIFICANT QUATERNARY FAULTS (DESIGN PARAMETER - SCP) (> 1m offset of Quaternary material; or > 100m offset of Tertiary rocks).

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AMIBIGUITIES IN THE APPLICATION OF "CHARACTERIZATION PARAMETERS"

- "A PHYSICAL PROPERTY OR CONDITION (EITHER MEASURABLE OR CALCULABLE) WHOSE VALUE IS TO BE DETERMINED IN THE SITE PROGRAM IN ORDER TO OBTAIN, COMPUTE, OR EVALUATE A PERFORMANCE PARAMETER FOR A DESIGN OR PERFORMANCE ISSUE" (SCP, 1988).
- "...A PRELIMINARY ESTIMATE OF FAULT SIGNIFICANCE," (SCA RESPONSE DOCUMENT)
- ... THE MINIMUM AMOUNT OF OFFSET FOR GIVEN AGE MATERIALS THAT THE FIELD INVESTIGATIONS SHOULD BE GEARED TO DETECT." (SCA RESPONSE DOCUMENT)

MULT DISPLACEMENT HALARD

EXAMPLES OF POTENTIALLY INADEQUATE CHARACTERIZATION PARAMETERS

PRECLOSURE:

- Quaternary slip-rates of > 0.001 mm/yr or that measurably offset materials less than 100,000 yrs;
- Surface locations of faults in repository with > 1 m offset of Quaternary materials;

POSTCLOSURE:

faults that penetrate the repository with total offset of
 > 10 m.



WHAT THE CONCEPT OF 'SUSCEPTIBLE' FAULT PROVIDES:

- 1. PARALLELISM WITH FAULT HAZARD CONCEPTS USED IN SITING AND LICENSING OTHER NUCLEAR FACILITIES;
- 2. SPECIFIC CRITERIA FOR DETERMINING WHICH FAULTS ARE OF POTENTIAL IMPORTANCE Specific criteria for determining which "susceptible" faults need characterization;
- 3. A SINGLE SET OF IDENTIFICATION CRITERIA FOR PRE- AND POSTCLOSURE FAULT HAZARD ASSESSMENT;
- 4. CONFIRMS THE ENTIRE QUATERNARY PERIOD AS THAT PART OF GEOLOGIC TIME THAT MUST BE EXAMINED;
- 5. FLEXIBILITY TO DOE TO DEMONSTRATE THAT CERTAIN CLASSES OF 'SUSCEPTIBLE' FAULTS DO NOT NEED CHARACTERIZATION; (e.g., limiting characterization of faults outside of the controlled area);
- 6. BASIS FOR FUTURE CONSIDERATION OF "SETBACKS";
- 7. A CLEAR AND UNIFORM BASIS FOR PERFORMANCE ALLOCATION.

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WHAT THE CONCEPT OF 'SUSCEPTIBLE' FAULT DOES NOT NECESSITATE:
1. CONSIDERATION OF "CAPABLE" FAULTS FROM 10CFR100, APPENDIX A;
2. DETAILED CHARACTERIZATION OF ESSENTIALLY ALL FAULTS WITHIN THE SITE AREA. [STP DOES NECESSITATE THAT ALL FAULTS IN THE CONTROLLED AREA THAT ARE SUSCEPTIBLE TO MOVEMENT BE CONSIDERED AND ADDRESSED];
3. SUSCEPTIBLE FAULT, AS USED IN THIS STP, IS NOT A SITE SUITABILITY TOOL.
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TYCE SHEE - STP IN APPRENTING OF SHILL SUFFACING & SHORE INCLUDE

VIBRATORY GROUND MOTION INVESTIGATIONS



ABOU-BAKR K. IBRAHIM

GEOSCIENCES & SYSTEMS PERFORMANCE BRANCH DIVISION OF HIGH-LEVEL WASTE MANAGEMENT

YEBRUARY 20, 1991

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VIBRATORY GROUND MOTION INVESTIGATIONS	
1. LIST ALL HISTORICALLY REPORTED SEISMIC EVENTS	
• DATES, AND EPICENTER COORDINATES	
• DEPTH, DISTANCE, AND ORIGIN TIME	
• MAGNITUDES OR HIGHEST INTENSITY	
 FOR EVENTS WITH ACCELERATION > .1G AT THE SITE, PROVIDE DURATION AND FREQUENCY CONTENT 	
 SOURCE PARAMETERS (e.g., FOCAL MECHANISM, SEISMIC MOMENT, AND STRESS DROP) 	
PLOT THOSE EVENTS WITHIN 200 MILES	
 IDENTIFY WHETHER THE EVENT IS AN EARTHQUAKE, UNE, OR CAVITY COLLAPSE 	
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	VIBRATORY GROUND MOTION INVESTIGATIONS
	2. CORRELATE EARTHQUAKE EPICENTERS WITH GEOLOGICAL STRUCTURES
	• IDENTIFY METHODS AND ACCURACY USED TO LOCATE EARTHQUAKES
•	PROVIDE RATIONALE FOR THOSE WHICH CANNOT BE ASSOCIATED
	3. IDENTIFY GEOLOGIC STRUCTURES SIGNIFICANT FOR EARTHQUAKE POTENTIAL
	• BURIED OR EXPRESSED AT THE SURFACE
	• INDUCED BY LOADING
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TECH EXCH - STP ON INVESTIGATION OF FAULT DISPLACEMENT & SEISNIC HAZARDS

RESPONSE TO COMMENTS ON DRAFT TECHNICAL POSITION



ABOU-BAKR K. IBRAHIM GEOSCIENCES & SYSTEMS PERFORMANCE BRANCE DIVISION OF HIGH-LEVEL WASTE MANAGEMENT

TEBRUARY 20, 1991

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RESPONSE TO COMMENTE 3
NRC RESPONSE TO APPENDIX A COMMENTS
• STAFF DOES NOT ADVOCATE THE APPLICATION OR IMPLEMENTATION OF 10 CFR PART 100, APPENDIX A FOR REPOSITORY
CURRENT STP NO LONGER DEFERS TO 10 CFR PART 100, APPENDIX A
ANALYSES AND DESIGN CONSIDERATIONS REMOVED FROM CURRENT STP AND DEFERRED TO SUBSEQUENT GUIDANCE DOCUMENTS
• STAFF WILL PROVIDE AND WILL TAKE INTO CONSIDERATION APPLICABLE DETERMINISTIC AND PROBABILISTIC APPROACHES FOR THE SEISMIC DESIGN OF THE REPOSITORY

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NRC RESPONSE TO THE INVESTIGATIONS, ANALYSES, AND DESIGN COMMENTS		
• RELEVANT COMMENTS DEALING WITH THE INVESTIGATIONS OF FAULT DISPLACEMENT AND SEISMIC HAZARDS ARE CONSIDERED AND ADDRESSED IN THIS STP		
A COMMENT RESOLUTION PACKAGE WILL BE PUBLISHED WITH THE FINAL STP		
• COMMENTS DEALING WITH ANALYSES AND SEISMIC DESIGN WILL BE DEFERRED TO SUBSEQUENT GUIDANCE DOCUMENTS	•	
NRC/DOB 08/80/81		

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U.S. DEPARTMENT OF ENERGY PRELIMINARY COMMENTS ON FINAL DRAFT NRC STAFF TECHNICAL POSITION ON INVESTIGATIONS TO IDENTIFY FAULT DISPLACEMENT AND SEISMIC HAZARDS AT A GEOLOGIC REPOSITORY

PRESENTED AT

NRC-DOE TECHNICAL EXCHANGE

PRESENTED BY DR. JERRY L. KING ASSISTANT PROJECT MANAGER SCIENCE APPLICATIONS INTERNATIONAL CORPORATION



ASCI

FEBRUARY 20, 1991

OUTLINE

- **1. GENERAL COMMENTS**
- 2. WARM FUZZIES

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- 3. MAJOR COMMENTS
- 4. OTHER COMMENTS
- 5. QUESTIONS

GENERAL COMMENTS

- DOE UNDERSTANDS STP APPLIES TO SITE CHARACTERIZATION ONLY, NOT DESIGN-BASIS DEVELOPMENT.
- DOE AGREES THAT A SINGLE APPROACH TO INVESTIGATING PRE- AND POST-CLOSURE SEISMIC HAZARDS IS APPROPRIATE. HOWEVER, DOE INTENDS TO USE DIFFERENT APPROACHES FOR DEVELOPING PRE- AND POST-CLOSURE DESIGN BASES.
- DOE WILL CAREFULLY REVIEW THE FINAL STP BEFORE TAKING ANY DECISION TO ENDORSE. HOWEVER, WITH A FEW EXCEPTIONS, THE DRAFT STP APPEARS TO BE CONSISTENT WITH DOE'S PUBLISHED PLANS FOR SITE CHARACTERIZATION.

WARM FUZZIES

- STP ACKNOWLEDGES BOTH DETERMINISTIC AND PROBABILISTIC ANALYSES OF SEISMIC HAZARDS WILL BE NEEDED. (§1.0, ¶2)
- STP "IN NO WAY SUGGESTS DEFERRING TO APPENDIX A OF 10 CFR PART 100 FOR GUIDANCE" (§1.0, ¶4)
- PART 100 "NOT ADOPTED BECAUSE OF THE INHERENT DIFFERENCES BETWEEN NUCLEAR POWER PLANTS AND A GEOLOGIC REPOSITORY." (§4.0, ¶4)
- NO LIMITS SET ON THE DIMENSIONS OF "SUSCEPTIBLE" FAULTS THAT REQUIRE INVESTIGATION. DOE CAN DEMONSTRATE THAT SAFETY PERFORMANCE WOULD NOT BE ADVERSELY IMPACTED BY DISPLACEMENT ON SMALL FAULTS. (§4.1.2, ¶2)
- "ALL FAULTS THAT ARE SUSCEPTIBLE TO DISPLACEMENT ARE NOT EQUALLY HAZARDOUS. THUS, THE LEVEL OF INVESTIGATION CAN VARY" (§4.2, ¶1)

MAJOR COMMENTS

- THE PROPOSED TERMINOLOGY IS UNACCEPTABLE. "SUSCEPTIBLE FAULT" CONVEYS THE IDEA OF A SIGNIFICANT PROBABILITY OF MOVEMENT, BUT MANY FAULTS WOULD MEET THE PROPOSED DEFINITION, AND YET HAVE AN EXTREMELY SMALL LIKELIHOOD OF MOVEMENT.
- DOE SUGGESTS THAT A GENERIC DESCRIPTION SUCH AS, "CANDIDATE FAULTS FOR CHARACTERIZATION," BE SUBSTITUTED FOR "SUSCEPTIBLE," AND THAT A FAULT SIZE AND DISTANCE CRITERION BE ADDED.
- DOE NEEDS TO KNOW WHETHER THE NRC STAFF INTENDS TO USE "SUSCEPTIBLE" FAULTS IN GUIDANCE ON DESIGN-BASIS DEVELOPMENT AND, IF SO, HOW. STATEMENT (§4.1.2, ¶2) THAT DOE SHOULD CONSIDER FAULTS TO BE "SUSCEPTIBLE" THAT CANNOT CLEARLY BE SHOWN TO NOT BE "SUSCEPTIBLE," DOES NOT APPEAR TO BE AIMED AT SITE CHARACTERIZATION.

MAJOR COMMENTS (CONTINUED)

- "SUSCEPTIBLE" FAULTS ARE DEFINED TO HAVE ONE, SEVERAL, OR ALL OF: (A) QUATERNARY MOVEMENT, (B) SUGGESTIVE ASSOCIATION WITH RECORDED EARTHQUAKES, (C) FAVORABLE STRESS-FIELD ORIENTATION, OR (D) STRUCTURAL RELATIONSHIP TO A FAULT WITH A, B, OR C. IF A FAULT DOES NOT DISPLACE QUATERNARY MATERIAL, IT SHOULD <u>HAVE TO</u> MEET ONE OF THE REMAINING CRITERIA TO BE A CANDIDATE FOR FURTHER CHARACTERIZATION.
- THE STP STATES THAT ALL "SUSCEPTIBLE" FAULTS IN THE GEOLOGIC SETTING SHOULD BE IDENTIFIED (§3.1.1), BUT THAT THE DEGREE OF FURTHER CHARACTERIZATION CAN CONSIDER POTENTIAL IMPACTS ON SAFETY (§4.2). RELEVANCE TO SAFETY (E.G., MINIMUM FAULT LENGTH THAT COULD BE A CONCERN) SHOULD BE FACTORED INTO THE <u>INITIAL</u> EFFORT TO IDENTIFY FAULTS.

MAJOR COMMENTS (CONTINUED)

- THE PROPOSED 200-MI RADIUS FOR CORRELATING EARTHQUAKES WITH STRUCTURES OR SOURCE ZONES IS INAPPROPRIATE:
 - 200 MI WOULD ENCOMPASS THE PACIFIC/NORTH AMERICAN PLATE MARGIN, CLEARLY NOT IN THE GEOLOGIC SETTING OF THE SITE.
 - IN THE WESTERN UNITED STATES, THE MAXIMUM DISTANCE FOR 0.1 g ON COMPETENT GROUND IS ABOUT 100 KM, NOT 200 MI.

OTHER COMMENTS

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- §1.0, ¶2 REFERS TO "THE DESIGN BASIS FOR BOTH THE MAXIMUM VIBRATORY GROUND MOTION AND THE EXPECTED VIBRATORY GROUND MOTION," INFERRING THAT THESE ENTITIES SHOULD BE A BASIS FOR SEISMIC DESIGN. THESE TERMS ARE NOT DEFINED IN THE STP, AND DEVELOPMENT OF THE DESIGN BASIS IS NOWHERE ELSE DISCUSSED. SUGGEST DELETING REFERENCE.
- §4.1 AND §4.2 CONTAIN A NUMBER OF CLARIFYING STATEMENTS THAT WOULD BEST BE MOVED UP TO §3.2:
 - "SUSCEPTIBLE" FAULTS IN CONTROLLED AREA THAT WILL NOT AFFECT PERFORMANCE CAN BE INVESTIGATED IN LESS DETAIL. (§4.2)
 - "SUSCEPTIBLE" FAULTS TOO SMALL TO AFFECT PERFORMANCE REQUIRE NO FURTHER INVESTIGATION. (§4.1.2)
 - RECOGNITION OF PRACTICALITIES OF INVESTIGATING FAULTS IN THE UNDERGROUND FACILITY (§4.2)

OTHER COMMENTS (CONTINUED)

• §3.3(1)(a) STATES THAT TIME HISTORIES SHOULD BE ESTIMATED FOR HISTORICALLY REPORTED EARTHQUAKES THAT COULD HAVE CAUSED AT LEAST 0.1 g AT THE SITE. TIME HISTORIES NEED ONLY BE ESTIMATED FOR POTENTIAL EARTHQUAKES THAT MIGHT CONTROL THE DESIGN BASIS.

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QUESTIONS



- DOES "HISTORICALLY REPORTED EARTHQUAKES" MEAN FELT EARTHQUAKES? [E.G., §3.1.2(4)]
- WHAT DOES "FAULTS THAT COULD GENERATE THE EQUIVALENT OF 0.1 g OR GREATER" MEAN? [§3.3(4)]
- IN §3.3, WHAT IS INTENDED BY "SUSCEPTIBLE' FAULTS ... LOCATED SUCH THAT THERE IS A POTENTIAL FOR VIBRATORY GROUND MOTION TO IMPACT THE UNDERGROUND FACILITY"? THE CASE DESCRIBED IN §4.3, WHERE THE U/G FACILITY ENCOMPASSES "SUSCEPTIBLE" FAULTS?