BECHTEL SAIC COMPANY LLC

ROOT CAUSE ANALYSIS REPORT

For

CAR BSC-01-C-001
and
CAR BSC-01-C-002

Revision 1
August 8, 2001

Stephen Metta — Date 8/8/01

John Hosmer — Date 8/8/01

REVISION SUMMARY

Rev 0: Initial Issue August 2, 2001

Rev 1: Page 12 revised August 8, 2001, as noted by Revision Bar

The TRW contract was not revised to reflect the decision to remove the QA function. The BSC contract has conflicting requirements with respect to QAP requirements. Based upon the above information, Section 4.4 was revised to clearly define the Quality Assurance Root Cause.

EXECUTIVE SUMMARY

Senior Bechtel SAIC Company, LLC (BSC) management and BSC corporate management chartered an independent team to perform a root cause investigation and analysis of Corrective Action Report (CAR) BSC-01-C-001 (model validation) and CAR BSC-01-C-002 (software process) in accordance with AP-16.4Q, *Root Cause Determination*.

The team investigated and analyzed the problems described in both CARs, evaluated previous CARs and corrective actions taken, and determined CAR specific root causes. The team also identified common and generic root causes that were not identified in earlier corrective actions.

The team reviewed historical and current documents and conducted approximately 93 interviews with management and employees at BSC, U.S. Department of Energy (DOE), U.S. Nuclear Regulatory Commission (NRC), National Laboratories, and U.S. Geological Survey (USGS).

Interviewees were open, and willing to share issues and solutions. Consistent themes from the interviews revealed the following:

- employees are committed to the success of the Project,
- employees are willing to change for the success of the Project,
- employees have positive first impressions of the BSC management team and their approaches, and,
- current Project behaviors are biased towards:
  - activity versus results,
  - schedule versus quality, and
  - blame versus accountability.

MODEL VALIDATION CORRECTIVE ACTION REPORT

The team concluded that the following six root causes contributed to the failure of the model validation process to consistently produce acceptable model validation. The root causes were lack of:

- clear criteria and expectations, for model validation,
- clear roles, responsibilities, authority, and accountability (R2A2) for model validation,
- a resource loaded schedule and integrated baseline schedule that specified model validation,
- a BSC Quality Assurance (QA) Program for self identification of problems,
- effective M&O ownership for the modeling and analysis procedure, and

- effective training on the Analysis and Model Report (AMR) process.

The team recommended 10 Corrective Actions for the modeling validation CAR.

SOFTWARE PROCESS CORRECTIVE ACTION REPORT

The team concluded that three root causes resulted in the failure of the software process to consistently produce acceptable software.

The three root causes are lack of:

- clear roles, responsibilities, authority and accountability (R2A2) for software development,
- an adequately developed and implemented software management procedure, and
- clear communication of changes to the procedure and its requirements to software users and developers.

The team recommends eight Corrective Actions to address the three root causes of the software process CAR.

COMMON AND GENERIC CAUSES

In addition to root causes for the individual CARs, the team identified five common root causes that applied to the model validation and software process CARs. The common causes are:

- ineffective project management,
- lack of clear roles and responsibilities, authority and accountability (R2A2) within BSC, DOE and interfaces (DOE, BSC, USGS and the National Labs),
- low expectations for an effective issues management process,
- lack of an effective procedure development, change and ownership process, and
- low expectations for training.

The fundamental generic cause, which is inherent to both CAR conditions, and the above common causes are:

Management (DOE, M&O, USGS and the National Labs) has not succeeded in setting expectations and implementing a consistent accountability model that will create the environment (culture) necessary for success in a complex technical project.

Seventeen recommended Corrective Actions address the common and generic causes. The team believes that effective management and monitored implementation of the recommended

Corrective actions will resolve the issues identified by the two CARs and prevent similar problems in the future.

Proper resolution of the identified causes will produce a different outcome from previous root cause evaluations because:

- current management team has accepted responsibility for the issues identified in the CARs,
- recommended corrective actions are more specific, broader in nature, and address in plain language the underlying conditions that allowed the specific issues to occur,
- common causes and a fundamental generic cause were identified, and
- new corrective actions not addressed in the previous CARs include,
  - developing a critical mass of leadership experience in complex technical cultures and change management in BSC & DOE, and
  - establishment of clear values/expectations with linkage to rewards and consequences (accountability).

These conclusions were not addressed in previous corrective actions and contributed to the earlier CARs' failure to resolve the identified issues. Resolving these common and generic causes will improve program culture and ensure proper resolution of the issue in the CARs.

The root cause team recommends that BSC management develop and track performance measures for all recommended corrective actions and that Bechtel corporate management conduct a quarterly, independent review of the performance measures. These measures should provide the feedback necessary to evaluate the effectiveness of the recommended corrective action implementation. If pre-determined performance goals are not achieved, additional management attention or corrective actions can be initiated. The performance measures also should be shared with the entire population of Project employees (BSC, DOE, USGS, National Labs and subcontractors) to explain the Projects' expectations in meeting critical goals.

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1. PROJECT BACKGROUND

1.1 PROJECT HISTORY

In 1982, the United States Congress passed the Nuclear Waste Policy Act (NWPA) to set national policy on the issue of high-level nuclear waste disposal. Congress based this law on the scientifically supported premise that a deep burial, retrievable storage concept was the best way to dispose of nuclear waste.

The NWPA made the U.S. Department of Energy (DOE) responsible for locating, building, and operating an underground geologic repository for the permanent disposal of high-level nuclear waste, and spent nuclear fuel.

In December 1987, Congress amended the NWPA and directed DOE to study only Yucca Mountain in Nevada to determine whether the site would be suitable for a potential repository. The Act specifies studies will stop immediately if Yucca Mountain is found unsuitable.

In November 1992, work began at Yucca Mountain on the Exploratory Studies Facility (ESF). The ESF is seven miles of tunnel, consisting of a north entrance ramp, a main drift, a south ramp, and an east west cross drift. Alcoves house test facilities 1000 - 1,200 feet below the mountain ridge.

Based upon completed work, the site recommendation report will be submitted to the Secretary of Energy, who will then recommend appropriate action to the President. If the site receives Presidential approval, DOE will seek a license from the U.S. Nuclear Regulatory Commission (NRC) to begin construction. The State of Nevada will have an opportunity to submit a "notice of disapproval" (veto) after the Presidential decision. Work would continue only if a majority vote in Congress overturns the State disapproval.

1.2 OWNERSHIP/CONTRACTOR HISTORY

The DOE's Office of Civilian Radioactive Waste Management (OCRWM) is the owner, licensee and operator of the Yucca Mountain Project.

Before 1990, DOE directly contracted with various agencies to perform required work. In 1990, the Management and Operating Contractor (M&O) philosophy was adopted and TRW Corporation was awarded a single 10 year M&O contract to develop the scientific basis for determining the suitability of Yucca Mountain as a repository. The M&O under TRW was a team of scientific and technical companies with seven major subcontractors and as many as 14 more lower tier subs.

In 2000, DOE rebid the contract and awarded the new contract to Bechtel SAIC Company, LLC (BSC). BSC brought a "single company" and unified project management approach to the contract. BSC was awarded the new contract November 14, 2000, and assumed control February 12, 2001, after a 90-day transition.

During the transition, BSC became a 1,050-person organization retaining approximately 73 percent of the previous M&O workforce. Between February and July, BSC attempted to align the values of the 14 previous contractors with BSC's expectations.

Significant scope and schedule issues that have occurred since February 12 include:

- redesign of the suite of documents to be included in the comprehensive bases for the site recommendation;
- requirement to address the NWTRB concerns related to remaining uncertainties in the process models,
- consideration of lower-temperature operating modes,
- effects of coupled processes, and
- NRC Key Technical issues.

Additionally, BSC received two CARs; BSC-01-C-001 on May 3, 2001, and BSC-01-C-002 on June 12, 2001. Under procedure AP-16.1Q, *Management of Conditions Adverse to Quality*, BSC is required to develop the root causes for these CARs and present Corrective Actions to prevent recurrence.

1.3 REGULATORY HISTORY

There are presently two federal agencies, the NRC and the U.S. Environmental Protection Agency (EPA), that regulate the Project.

The NRC has a requirement to determine whether there is sufficient completion confidence in the site recommendation scheduled for delivery by December 1, 2001. Additionally, the NRC will regulate the Project under NRC regulations if the Project moves from the scientific site characterization phase to the design, build, and operational phases.

The EPA sets standards for individual whole body dose limits and groundwater radiation levels and provides permits. The EPA has issued regulation 40 CFR 197 concerning groundwater expectations for the Project.

Additionally, the Nuclear Waste Technical Review Board (NWTRB) oversees the Project as an independent body, appointed by the President, as a result of the NWPA 1987 amendment. The NWTRB evaluates the "technical and scientific validity of activities undertaken to characterize Yucca Mountain for its suitability as a location for a repository".

1.4 PROCEDURE HISTORY

Procedures were decentralized prior to February 1999. A systematic review of procedure adherence was performed after several "Conditions Adverse to Quality" documents were issued, in 1998. The Process Validation and Reengineering (PVAR) effort was initiated as a uniform management response to these CARs. The PVAR effort centralized procedures, initiated new

procedures, and combined Q-related procedures under DOE ownership. Some procedures were deleted. One new procedure was AP-SI.1Q, *Software Management.* AP-3.10Q, *Analysis and Models* was issued prior to PVAR. These procedures govern the processes addressed in BSC-01-C-001 and BSC-01-C-002.

AP-3.10Q has undergone two major revisions and five interim change notices (ICNs) since it was issued in February 1999. The first revision moved major portions into other new procedures. The subsequent revisions have attempted to correct repeated deficiencies discovered by DOE OQA, as well as additional requirements for process improvement and QARD revisions.

AP-SI.1Q, issued in February 1999, has undergone three major revisions and five ICNs.

DOE defines program quality requirements in the *Quality Assurance Requirements and Description* (QARD) document. Administrative procedures (APs) enable implementation of the QARD requirements. DOE owns many APs; AP-3.10Q is owned by BSC and DOE owns AP-SI.1Q. The BSC has the option to write further implementing procedures, but to date few, have been written.

1.5 NUCLEAR CULTURE HISTORY

An attempt to define and transition the culture to that of a commercial nuclear operating plant (nuclear culture) was started with TRW Senior Management offsite meeting in April 1998, subsequent to the issue of the super CARs. This effort was followed in October 1998 by all-hands meetings with TRW management and DOE management. Among the initiatives that resulted from this effort were a Uniform Human Resources Accountability Process in November 1998, a Lessons Learned Program in January 1999, completion of PVAR in June 1999, and a Project-wide Commitment Management System in August 1999.

1.6 QUALITY

Quality program ownership has utilized a variety of approaches throughout the life of the Project. At the inception of the TRW contract, TRW had a quality assurance (QA) department with the role of ensuring that work was performed within the framework of the QARD and assisting the various contractors in implementing the QA program. Each lab had its own QA program, and DOE's Office of Quality Assurance (OQA) audited the M&O and suppliers.

Around 1995, DOE determined that it would be more effective to provide all quality functions within DOE and dissolved the M&O QA contractual function. Until the BSC contract in 2001, DOE provided these functions through a private company directly contracted to OQA. Under the BSC contract, the independent audit and surveillance function continues in OQA, as well as some programmatic functions. However, BSC has a QA department that provides quality-engineering support to BSC, USGS and the National Labs, performs vendor audits and surveys, self-assessments, and performs quality control.

2. PROBLEM AND CHARTER

2.1 PROBLEM STATEMENT

AP-3.10Q requires originators to validate models used on the Project. Despite this requirement and numerous QA-identified model validation problems between 1999 and 2001, the OQA Audit M&O-ARP-01-01 2/23/01 identified two additional Analysis and Model Reports (AMRs) that used a nonconforming validation method.

The OQA issued Suspected Trend Investigation Report (STIR) BSC-01-004 indicating a suspected trend, which represents a significant condition adverse to quality. OQA subsequently issued CAR BSC-01-C-001 to address the model validation deficiencies

Procedure AP-SI.1Q, *Software Management*, requires software used on the Project to be qualified. Deficiencies were identified in 1998 on the implementation of AP-SI.1Q and addressed in CAR-98-C-006. After closure of CAR-006, several deficiencies were identified indicating CAR-006 Corrective Actions had not been effective. Additional software process problems have been the subject of numerous employee concerns generated during the TRW exit interview process. CAR-BSC-01-C-002 was written to address these issues.

2.2 CHARTER

The charter for this root cause analysis was to investigate and analyze the events that resulted in CAR BSC-01-C-001 on model validation and CAR BSC-01-C-002 on software process. Determine the causal factors (root and contributing) in accordance with AP-16.4Q for each CAR, and submit the results of this investigation in a report to include recommended corrective actions addressing the causes.

As discussed in Section 3, the team defined the following problem statements:

- **Modeling** – Validation of some Yucca Mountain Project models was unacceptable to the U.S. Department of Energy following Analysis and Model Reports submittal.

- **Software** – The Yucca Mountain Project software process* does not consistently produce acceptable software.

  * The software process includes requirements management, configuration management, software quality assurance, project planning and tracking, subcontract management, testing and validation, documentation, and coding.

3. INVESTIGATION METHOD

The Cause Evaluation for CARs BSC-01-C-001 and BSC-01-C-002 proceeded according to the method described in this section.

3.1 EVALUATION TEAM

3.1.1 Independent Team

Bechtel Corporate and BSC senior management chartered an independent team to perform a root cause investigation of CARs BSC-01-C-001 and BSC-01-C-002. No organizational or time boundary was placed on the evaluation.

3.1.2 Team Qualifications

The following individuals comprise the Yucca Mountain Project Root Cause Evaluation team. Resumes of all individuals are included as Addendum A.

	Team Member	Company
1)	Christina Caprio	BSC
2)	Dana Cooley	Beckman & Associates, Inc.
3)	Jim Cross	Beckman & Associates, Inc.
4)	Dale Dexheimer	Bechtel National
5)	Cynthia Eubanks	Bechtel Jacobs Company LLC
6)	John Hosmer, Deputy Team Lead	Marathon Consulting Group, Inc.
7)	Greg Huddleston	Bechtel Jacobs Company LLC
8)	Jim King	Bechtel Jacobs Company LLC
9)	Richard Laing	BXWT Idaho, LLC
10)	Robert McCook	BXWT Idaho, LLC
11)	Stephen Metta, Team Lead	Bechtel Nevada
12)	Lisa Pascoe	BSC
13)	Jorge Schulz	Bechtel National
14)	Robert K. Smith	BXWT Idaho, LLC
15)	Tommy Wall	DESI
16)	Larry Zajac	Bechtel Nevada

Ken Beall (BSC) and Bill Watson (BSC, Modeling and Software CAR Owner) provided Project interface and support.

Experts and experience provided by the Root Cause Team includes:

- nuclear power plan management experience,
- commercial nuclear power plant troubled plant list experience,
- root cause expertise,

- DOE project experience,
- project management expertise, and
- systems, software, and analysis expertise,

3.2 PROCEDURE

To provide an investigation of the circumstances and a timely report, members of the team were provided an introduction to the TapRooT® process and the requirements of Root Cause Determination as explained in Procedure AP-16.4Q. A team member, certified in TapRooT®, led the training. A correlation between the root cause and standard TapRooT® Cause Code is found in Addendum G.

Kepner Tregoe (K-T) techniques were used to supplement TapRooT®. K-T is identified in DOE-NE-STD-1004-92, DOE guideline for root cause analysis, as an additional methodology. A team member certified in K-T led this methodology.

3.3 TEAM PROCESS

3.3.1 Process

Team members were provided orientation and training classes, including TapRooT®, and introductory materials (e.g., procedures, history, etc.). General briefings provided an opportunity for team members to direct questions to a variety of key BSC and DOE personnel. This provided the team with an introduction to the basic problems and conditions represented by the two CARs. A set of structured interview questions were developed and utilized by two-person teams that interviewed personnel at DOE, NRC, BSC, USGS and the National Laboratories (Lawrence Berkeley, Lawrence Livermore, Los Alamos, and Sandia). The team conducted 93 confidential interviews.

Event timeline and facts were analyzed in accordance with the flow chart provided in Addendum B.

3.3.2 Interview Population

The key element of the investigation was the information collected by the teams during the detailed confidential interviews. A list of the individuals interviewed by team members, including their title and organization, is included as Addendum C.

3.3.3 Documents Reviewed

Members of the team reviewed relevant documents. A list of the documents reviewed is included as Addendum D.

3.3.4 Time Lines

The points of specific events and their impact on other activities relating to the CARs were annotated on each item and analyzed. From a root cause analysis there were no substantial time related issues identified.

3.3.5 Pareto Analysis Conclusions

Pareto analysis operates on the premise that an organization should focus its problem-solving resources on a relatively small number of areas with high potential for payback. The team, using its own data and input from others, developed detailed Pareto charts showing the areas where model validation and software process deficiencies have been most concentrated (see Addendum E & F). A brief summary appears below.

Model Validation

BSC-01-C-001 described an OQA assessment of 36 AMRs. OQA cited 16 of the AMRs for model validation that did not meet AP-3.10Q. The data identified that:

- five discussed model input confidence only,
- three required validation to support Total System Performance Assessment (TSPA) but did not present any,
- three relied on bounding/conservatism that was not adequate,
- three acknowledged the need for model validation but did not present any, and
- two failed OQA review for "miscellaneous" reasons.

Six organizations prepared 56 of the 73 modeling AMRs. Of these developers, all except Lawrence Berkeley National Laboratory (LBNL) had failure rates between 58 and 71 percent. LBNL was unique in having a highly effective compliance support group, and may have benefited from more extensive field data available to support many of its models.

Engineered barrier system, waste package, and waste form-related models were more likely to fail validation. Unsaturated zone models appeared easier to validate, possibly because of the availability of field data. Peer review, although seldom used, were always successful.

Software Process

The currently identified YMP software population consists of 828 items, of which 462 do not meet the requirements of AP-SI.1Q. Additional software items are currently under review, which could increase the population.

Approximately 333 of the 366 qualified software items had installation issues, primarily dealing with the inability to load on a clean environment. The Pareto analysis revealed that a principal reasons for this was: essential software was not provided by the developer to SCM, some of which included commercially purchased products. An important example of this was LabVIEW Version 4.1, which accounted for 16 failures, (i.e., installation problems).

The unqualified code inventory consists of 285 Single Use Routines/Macros (SURM) used in AMRs and 133 other software items that must be qualified before License Application and 44 software items to be qualified before Site Recommendation.

4. MODEL VALIDATION ROOT CAUSES AND CORRECTIVE ACTIONS (CAR-BSC-01-C-001)

The team concluded that six root causes produced or allowed the following problem:

> *Validation of some models was unacceptable to the U.S. Department of Energy following Analysis and Model Report* submittal.

Each cause is described in the following sections, supported by relevant problem dimensions that were derived from document reviews, presentations to the team, and interviews. Root causes are listed in order of their importance.

4.1 ROOT CAUSE NO. 1: CRITERIA AND EXPECTATIONS

During the period of AMR development and submittal, there was a lack of clear M&O or DOE expectations for model validation. Also, the available regulatory requirements were vague for portions of the validation process. As a result, M&O personnel did not define clearly acceptable model validation elements in the controlling procedures, work plans, or model documentation.

This root cause explains how:

- model validation was affected, but calculations and analyses were not,
- model validation rejections occurred after AMR submittal, despite planning, checking, approval, and self-assessment by M&O, USGS and the National Labs,
- models validated with field or laboratory data or by peer review generally succeeded,
- 40 of 73 AMRs requiring model validation failed DOE OQA review, and
- numerous changes to AP-3.10Q in 26 months did not prevent the problem.

4.2 ROOT CAUSE NO. 2: ROLES, RESPONSIBILITIES, AUTHORITY, AND ACCOUNTABILITY

The M&O did not adequately define, assign, and communicate R2A2 for model validation. As a result, DOE OQA filled a void and assumed an inappropriate line approval role. In addition, the M&O issues management program did not effectively address and resolve previously identified problems, which allowed issues to remain unresolved.

This root cause explains how:

- OQA stepped in to fill a void as the model validation coach, evaluator, and approval authority,
- model validation rejections occurred after AMR submittal, despite planning, checking, approval, or self-assessment, by the M&O, USGS and National Labs, and
- numerous changes to AP-3.10Q in 26 months did not prevent the problem.

4.3 ROOT CAUSE NO. 3: PROJECT PLANNING AND WORK MANAGEMENT

During AMR development, the M&O did not use a resource-loaded or an effective integrated baseline schedule that encompassed model validation, checking, packaging, and delivery. Consequently, production activities were not managed to assure adequate schedule time and resources would be provided to complete validation work with adequate attention to quality. M&O management did not understand the National Laboratories culture, and the M&O lacked the necessary skills to facilitate change to achieve acceptable model validations. The M&O did not establish a team-oriented project management culture, which would have assisted in facilitating change. As a result, model validation did not fully meet AP-3.10.Q requirements for scientific documentation.

This root cause explains how:

- numerous changes to AP-3.10Q in 26 months did not prevent the problem,
- model validation rejections occurred after AMR submittal, despite planning, checking, approval, and self-assessment by the M&O and the National Labs, and
- the integrated schedule was not managed, thus contributed to failed model validation.

4.4 ROOT CAUSE NO. 4: QUALITY ASSURANCE

Implementation of the Quality Assurance program by DOE and the M&O was ineffective. As a result, self-identification of problems (self-assessment) and issues management (corrective action) programs were ineffective.

This root cause explains how:

- the M&O self-assessments, QA processes, and workers did not identify, or manage validation problems before the OQA found them,
- model validation rejections occurred after AMR submittal, despite planning, checking, approval, and self-assessment by the M&O, the National Labs and OQA, and
- DOE, its OQA contractor, and the M&O operated in a stressed environment when the M&O failed to perform QA on its own activities.

4.5 ROOT CAUSE NO. 5: PROCEDURE OWNERSHIP AND CHANGE

There was no effective functional department or project management owner for AP-3.10Q. As a result, the feedback and change implementation process, as well as training, did not meet the needs of AMR authors and model developers. Interpretation of the procedure was performed in an ad hoc manner. Models that had bounding data or had peer reviews generally passed the validation review because these methods for validation were more clearly defined.

This root cause explains how:

- modelers who sought OQA coaching were often more successful at validation because of OQA's assumption of line program ownership,
- numerous changes to AP-3.10Q in 26 months did not prevent the problem, and
- models validated with field or laboratory data or by peer review generally succeeded.

4.6 ROOT CAUSE NO. 6: TRAINING

Verbal interpretation that differed from the procedure validation requirements were sometimes expressed during training. As a result, classes generated awareness, but did not build competence in model validation. Training did not measure effectiveness (e.g., retention or proficiency).

This root cause explains how:

- model validation rejections occurred after AMR submittal, despite planning, checking, or approval process,
- model validation was affected, but calculations and analyses were not, and
- modelers who sought OQA coaching were often more successful at validation.

4.7 RECOMMENDED ACTIONS – MODEL VALIDATION

1. (Remedial) Ensure timely completion of the Model Validation Review.
2. (RC-1, RC-2, RC-3) Establish a functional manager who owns the modeling process in BSC. The owner will:

   - establish binding technical and quality requirements for AP-3.10Q implementation,
   - define model validation acceptance criteria for both engineering and scientific models,
   - establish a single timely communication and feedback process (for completed AMRs and questions during AMR development),
   - implement an effective disagreement escalation and resolution process, and
   - establish minimum training and experience requirements for model developers.

   The owner must be (Note: this may require several qualified persons):

   - technically qualified in modeling,
   - able to understand interpret NRC model validation expectations,
   - able to build an effective working relationship with NRC staff,
   - knowledgeable of QA program requirements, and

- competent in project management skills.

3. (RC-5) Review and revise AP-3.10Q to incorporate results of the Model Validation Review cited above. Provide specific go/no-go model validation criteria as well as a decision process for use when bounding criteria are impossible to provide in advance.

4. (RC-5) Establish and charter a model development and application users group whose members include the affected organizations. Its purpose should be to ensure model developers and users are involved in process development and consistent application of requirements.

5. (RC-1) Establish a website to capture modeling/interpretation guidance for access by affected individuals and groups. The web site should contain:

   - compliance information and guidance,
   - frequently asked questions and answers, and
   - lessons learned and good practices pertaining to the modeling process.

6. (RC-6) Define, design and deliver additional training necessary to implement AP-3.10Q. Include modelers, reviewers, checkers, managers, QA personnel, and contractors involved with modeling. Use the Systematic Approach To Training (SAT) process (or equivalent), including proficiency evaluation.

7. (RC-1, RC-3, RC-5) Functional owner should conduct mentoring and assistance visits with model developers at several stages of model development. Communicate the need for changes and assist in their accomplishment. Involve a mix of Subject Matter Experts (SME) committed to success. Report questions and their resolution on the website.

8. (RC-3) Establish and enforce an integrated, resource-loaded baseline schedule for remaining AMR preparation and delivery, that explicitly provides adequate schedule duration's and resources.

9. (RC-4) At regular intervals, perform focused self-assessments of the model development, validation, and approval process.

10. Establish a set of performance indicators, and perform assessments that will measure the effectiveness of corrective actions and the effectiveness of the modeling process.

5. SOFTWARE PROCESS ROOT CAUSES AND CORRECTIVE ACTIONS (CAR-BSC-01-C-002)

The team concluded that three root causes produced or allowed the following problem:

> *The software process* does not consistently produce acceptable software.*
>
> * The software process includes requirements management, configuration management, software quality assurance, project planning and tracking, subcontract management, testing and validation, documentation, and coding.

Each cause is described in the following sections, supported by relevant problem dimensions that were derived from document reviews, presentations to the team, and interviews. Root causes are listed in order of their importance.

5.1 ROOT CAUSE NO. 1: ROLES, RESPONSIBILITIES, AUTHORITY, AND ACCOUNTABILITY

The M&O and DOE did not adequately define, assign, and communicate R2A2 for software management. As a result, the DOE (procedure owner) and the M&O:

- developed the procedure with minimal user involvement,
- did not adequately enforce the procedure, and
- permitted an ineffective M&O differing opinion resolution process.

In addition, the M&O issues management program has not been effective in addressing and resolving previously identified problems to insure corrective actions are effectively implemented and to avoid repetitive issues.

This root cause explains how:

- there is a single AP-level procedure without any lower-tier implementing procedures,
- software cannot be installed by SCM but can be installed at the creating laboratory by the author,
- some software developers do not fully document software,
- the process required interpretations of AP-SI.1Q, and these were inconsistent,
- SCM has not obtained a licensed copy of Commercial Off-The-Shelf (COTS) software due to license restrictions,
- because of a lack of enterprise architecture, that controls the number of platforms and operating systems, SCM does not have the software and hardware necessary to qualify some codes,

- all support files and file addresses necessary to compile or execute some programs were not provided to SCM,

- numerous different computer system configurations currently exist within the core scientific community supporting the Project (11 platforms and 37 operating systems), thus contributing to the number of software codes that fail, and

- some users obtain a software copy from another employee, or use their personal copy that is not an SCM official version

5.2 ROOT CAUSE NO. 2: SOFTWARE PROCEDURE

The M&O and DOE did not adequately develop and communicate software management procedure AP-SI.1Q. As a result, the procedure:

- lacked an approach to software process that considers differences between commercial business software production and scientific research code development,

- used a graded approach to code classification that did not adequately consider the differences between routines, macros, single-use codes, and major applications in a scientific research environment,

- was used to develop the process, rather than define a developed process,

- was not effectively understood. (The procedure differed from what is normally used in a scientific research environment.),

- was implemented without being validated with affected users AP-SI-1Q (Rev. 3),

- was implemented without a readiness review,

- did not clearly define and identify points-of-contact for procedures interpretation, and

- did not consider all unconsolidated comments and did not communicate feedback for all comments AP-SI-1Q (Rev. 3).

This root cause explains how:

- SCM follows software installation process verbatim but cannot install software while authors successfully complete the installation process,

- the software process is not clearly defined, as indicated by the software procedure being changed in a significant way approximately every 3 months,

- SCM received some inadequate software documentation,

- SCM rejects software because of significant digit round-off differences when compiled on different operating systems,

- SCM has not obtained a licensed copy of COTS software because of license restrictions,
- the process required interpretations of AP-SI.1Q, and these were inconsistent,
- developers do not provide all support files and addresses necessary to execute a program by SCM,
- some users obtain a software copy from another employee, or use their personal copy that is not a SCM official version,
- software failures occur even when users get a source code copy from SCM, and
- SCM rejection occurs if software is developed by the Project, but not if software is developed for other projects and imported into the Project.

5.3 ROOT CAUSE NO. 3: COMMUNICATIONS, FEEDBACK, AND TRAINING

The M&O and DOE did not adequately communicate procedure changes and requirements, provide feedback to commentors, or adequately train users of the software procedure. As a result:

- software acceptance criteria were not communicated to users,
- training on revision changes and full process training, including the need for software process controls, was inadequate,
- points-of-contact for procedures interpretation, were not clearly defined and identified,
- the procedure revision process did not consider and communicate feedback on all comments for AP SI.1Q, Revision 3, and
- the issues management program (problem identification and resolution) has not been effective in correcting previously identified problems, which allowed repeated problems to occur.

This root cause explains how:

- some software developers do not fully document software as interpreted by SCM,
- SCM follows software installation process verbatim but cannot install software while authors successfully complete the installation process,
- the software process is not clearly defined, as indicated by the source, type, and frequency of software procedure changes,
- SCM rejects software because of significant digit round-off differences when compiled on different operating systems,

- the process required interpretations of AP-SI.1Q, and these were inconsistent,
- all support files and file addresses necessary to compile or execute some programs are not provided to SCM,
- some users obtain a software copy from another employee, or use their personal copy that is not a SCM official version,
- some software failures occur when users get a source code copy from SCM, and
- failures occur if software is developed by the Project, but not if software is developed for other projects and imported into the Project.

5.4 RECOMMENDED ACTIONS - SOFTWARE PROCESS

1. (RC-1, RC-2, RC-3) Establish a functional manager as owner of the software process in BSC. The owner will:

   - establish binding requirements for software procedure(s) implementation,
   - benchmark the Project software procedure against other DOE M&O software procedures,
   - establish a timely communication and feedback process incorporating both positive and negative feedback to software developers,
   - implement an effective disagreement escalation and resolution process, and
   - establish minimum training and/or experience requirements for software developers.

   The owner (or designees) must be:

   - technically qualified in software development,
   - knowledgeable of the scientific investigation process,
   - knowledgeable of QA program requirements, and
   - competent in project management skills.

2. (RC-2, RC-3) Subdivide AP-SI.1Q, then implement the QARD Supplement I, Software requirements in a series of implementing procedures that:

   - use a graded approach in the software process to establish the major applications, routines, and macros that must be qualified,
   - use a graded approach in the software process that considers differences between business software engineering design and scientific research code development,
   - conduct user validation before implementation,
   - perform a readiness review before implementation,
   - are consistent with the Carnegie Mellon University Software Engineering Institute Capability Maturity Model,

- clearly identify points-of-contact for questions concerning the procedure, and
- address maintenance/operational/implementation and retirement.

Areas the software process owner should consider when subdividing AP-SI-1Q include: requirements management, configuration management, software quality assurance, project planning and tracking, subcontract management, testing and validation, documentation, coding, and software development.

3. (RC-3) Produce a web site to capture software process guidance for access by all affected individuals and groups. The web site should contain:

   - compliance information and guidance,
   - frequently asked questions and answers,
   - software development/installation/compliance checklist (e.g., NWI-CM-001Q), and
   - lessons learned and good practices pertaining to the software process.

4. (RC-3) Establish a software users' group with a defined charter, whose members include the National Laboratories, USGS, and BSC. The software users' group should create software-coding guidelines as appropriate for each computer language used. The users group should understand and make recommendations to control the number of platforms and operating systems.

5. (RC-1, RC-2, RC-3) Following Corrective Action No. 2, establish a short term team of subject matter experts from the user group and trainers to visit software development locations to communicate the reasons for procedure change and assist in change management. Team members must be:

   - a mix of subject matter experts from the affected organizations,
   - available after the initial implementation to follow-up and mentor the software developers,
   - committed to success, and
   - fully supported by senior management.

6. (RC2, RC-3) Ensure that effective documentation and compliance staff support is available to the software developers to assist with documentation requirements and installation dry runs. Conduct a lessons learned forum among compliance support groups from the National Laboratories, USGS, and BSC to establish and implement best practices.

7. (RC-1) Establish an enterprise architecture that controls the number of platforms and operating systems the Project needs to support. This needs to be supported and acceptable to the scientific, and engineering interest on the Project.

8. Establish a set of performance indicators, and perform assessments that will measure the effectiveness of corrective actions and the effectiveness of the modeling process.

6. COMMON AND GENERIC CAUSES

As described in Sections 4 and 5, the evaluation team identified specific causes for the model validation and software process CARs. The team also evaluated these causes to identify common causes, (i.e., those causes which are common to both CARs), and generic causes, (i.e., those causes that may be applicable across the Project). Figures 1 and 2 display the relationships between the specific model validation and software process causes discussed in Sections 4 and 5, and the common and generic causes.

6.1 COMMON CAUSES

6.1.1 Common Cause No. 1: Ineffective Program Management

Several key elements of an effective and efficient program management structure for the scope and magnitude of the Project were found to be missing or inconsistently applied across the Project. Primary areas of concern were:

- lack of appropriate contract management and compliance by DOE and the M&O with contractual requirements (i.e., flowdown, change impact, communication),
- inconsistent use of integrated resource-loaded schedules and integrated baseline schedules, with effective change control,
- lack of lower level resource-loaded schedules with accurate depiction of process steps, and realistic duration's necessary to perform work consistently,
- inactive or stagnant middle management (i.e., unwilling to change, unable to remove barriers, uninvolved with the work), and lack of a critical mass of change management leaders, and
- lack of fundamental understanding that product quality should be built in vs. inspected in.

6.1.2 Common Cause No. 1: Recommended Corrective Actions

1. Assess the management and supervisory capabilities of the current BSC organizations (Suggest: DOE consider a parallel management and supervisor capabilities assessment) with emphasis on:

   - management skills (plan, organize, schedule, contract implementation, people development),
   - performance,
   - capability to change and lead change, and
   - nuclear culture and culture change experience.

2. Where deficiencies are identified in the above assessment, develop and implement a plan to train, mentor, and/or replace Project management staff. (Suggestion: Many

troubled complex high-risk technical facilities and DOE facilities have used organizational development consultants to facilitate this process.)

3. Train BSC and DOE organizational staff on the requirements of the current contract, set the expectation that the contract will be followed, and hold the management accountable.

6.1.3 Common Cause No. 2: Lack of Clear Roles, Responsibilities, Authority and Accountability (R2A2) within BSC, DOE and at the Interfaces (DOE, BSC, USGS and the National Labs)

The lack of a clear definition and communication of R2A2 within and among the organizations associated with the Project was a common cause contributing to the issues associated with both CARs. Missing elements include the clear definition of roles, responsibilities, authority, and accountability within the organizations, as well as at the interfaces between the organizations.

6.1.4 Common Cause No. 2: Recommended Corrective Actions

See actions identified under Section 6.2, Generic Causes.

6.1.5 Common Cause No. 3: Low Expectations for an Effective Issue Management Process

The issue management process for the Project has not been utilized as a tool to ensure early management and employee identification and correction of issues and concerns. Key elements of an effective issues management program that were missing at the Project include:

- a proactive approach for self-identification of problems,
- an appropriately low threshold for initiation of root cause analysis,
- corrective action effectiveness and verification follow-up, and,
- a mature issues management trending program.

Benchmark information from other DOE facilities and commercial nuclear facilities (1,000 - 1,400 person project staff) indicate:

- 1,000 – 1,500 self-identified issues per year, and
- 50 – 100 root cause analyses performed.

6.1.6 Common Cause No. 3: Recommended Corrective Actions

1. Develop a BSC quality assurance plan that implements the existing contract allowing management assessments and independent assessments, and change the contract to allow BSC to perform surveillance's.

2. Benchmark issues management programs at DOE facilities and/or commercial nuclear facilities to identify best practices and revise, as appropriate, the issue management program (IM). As a minimum:

   - set a lower threshold for initiation of root cause evaluations, management directed self-assessment and employee self identification of issues.
   - establish a senior manager to conduct daily screening and assignment of responsibility for employee self identified issues,
   - create performance measures for root cause evaluations, self assessments and employee issues identification, set goals and trend, and
   - conduct an effectiveness review of the revised IM program and performance measures six months after implementation.

3. Communicate and train the Project staff on the issue management program requirements and management expectations for implementation, and

4. Continue development of an effective issues management trending program for the identification of potential issues.

6.1.7 Common Cause No. 4: Lack of an Effective Procedure Development, Change and Ownership Process

The process for development, modification, and maintenance of procedures to support the Project is ineffective. R2A2 associated with work-specific procedures and the overall procedure program are unclear between DOE and BSC. Primary areas of concerns are:

- appropriate ownership of procedures has not been established,

- appropriate ownership of the procedure development and change process has not been established, and,

- an effective set of procedures that promote employee accountability have not been developed.

6.1.8 Common Cause No.4: Recommended Corrective Actions

1. Transfer to BSC ownership of all APs for which BSC, the National Laboratories, and USGS perform the work, including AP-5.1Q, *Plan and Procedure Preparation, Review, and Approval.*

2. Appoint a BSC functional manager to own each AP including AP-5.1Q.

3. Benchmark procedure programs at DOE facilities and/or commercial nuclear facilities to identify best procedure development and control practices.

4. DOE and BSC define and agree to a procedure change process with the following attributes:

- involves the procedure owner and appropriate team members during procedure development and change. The owner has the final authority for comment incorporation unless escalation to management occurs,
- is efficient (allowing for employee participation) and provides a short turnaround for non-intent changes (i.e., one day) and a 30-calendar day turnaround for intent changes as its goals, and
- Revise AP-5.1.Q to meet these attributes.

5. Communicate and train BSC, DOE, USGS, and the National Labs personnel on the procedure program requirements and management expectations for implementation.

6.1.9 Common Cause No 5: Low Expectation for Training.

Communication of requirements and expectations through effective and meaningful training is not occurring at the Project. Key elements of a training program, which are absent, include the following:

- measurement of training effectiveness,
- utilization of job task analyses to identify and develop appropriate training, and,
- appropriate management and SME involvement in the development and presentation of training.

6.1.10 Common Cause No. 5: Recommended Corrective Actions

1. Benchmark commercial nuclear facilities (INPO accredited training programs) and DOE nuclear Category-1 facilities with emphasis on the following attributes:

   - training effectiveness measurements (testing),
   - job task analysis as a tool for training identification, development and processes, and
   - establish expectations for management and subject matter experts to be involved in training.

2. Revise training processes, and management expectations, within BSC as required, to reflect the best practices.

6.2 GENERIC CAUSE: EXPECTATIONS AND ACCOUNTABILITY

Management (DOE, BSC, USGS, and the National Labs) has not succeeded in setting expectations and implementing a consistent accountability model that will create the environment (culture) necessary for success in a complex technical project.

Examples of missing elements include:

- rigor and discipline,

- team behavior,
- passion for finding and fixing Project problems,
- a self critical management team,
- effective procedures that allow employee accountability (follow procedures, stop work and change procedure if it cannot be followed),
- setting and communicating of clear management expectations,
- accountability system with consequences (positive and negative reinforcement) linked to management expectations,
- management team that holds its own members accountable to one another, and
- a set of clear performance indicators that are used by management and employees.

As a result, project employees are currently biased towards:

- activity versus results,
- schedule versus quality, and
- blame versus accountability (victim stage of accountability).

6.3 RECOMMENDED ACTIONS FOR THE PROJECT LEADERSHIP TEAM

1. Within a facilitated session, DOE and BSC senior managers should present their organizations' current R2A2's, including interfaces. The R2A2's of and between organizations should be agreed upon and communicated.

2. Conduct facilitated management off–site sessions with participation, as applicable, from DOE, BSC, the National Laboratories, and USGS. In these off-site sessions, document, sign, and communicate a high-level set of common:

   - Project values,
   - consistent rewards and consequences, and
   - processes to hold each other accountable.

3. Establish a set of performance indicators to track progress toward implementing the recommended common and generic corrective actions. Set goals, monitor, trend, conduct assessments and take management actions when progress fails to achieve expectations. Communicate goals and progress to all personnel. Report results quarterly to Bechtel corporate management. Bechtel corporate management should challenge the Projects' performance and conduct field evaluations to validate the performance.

Figure 1 - MODEL VALIDATION ROOT, COMMON, AND GENERIC CAUSES

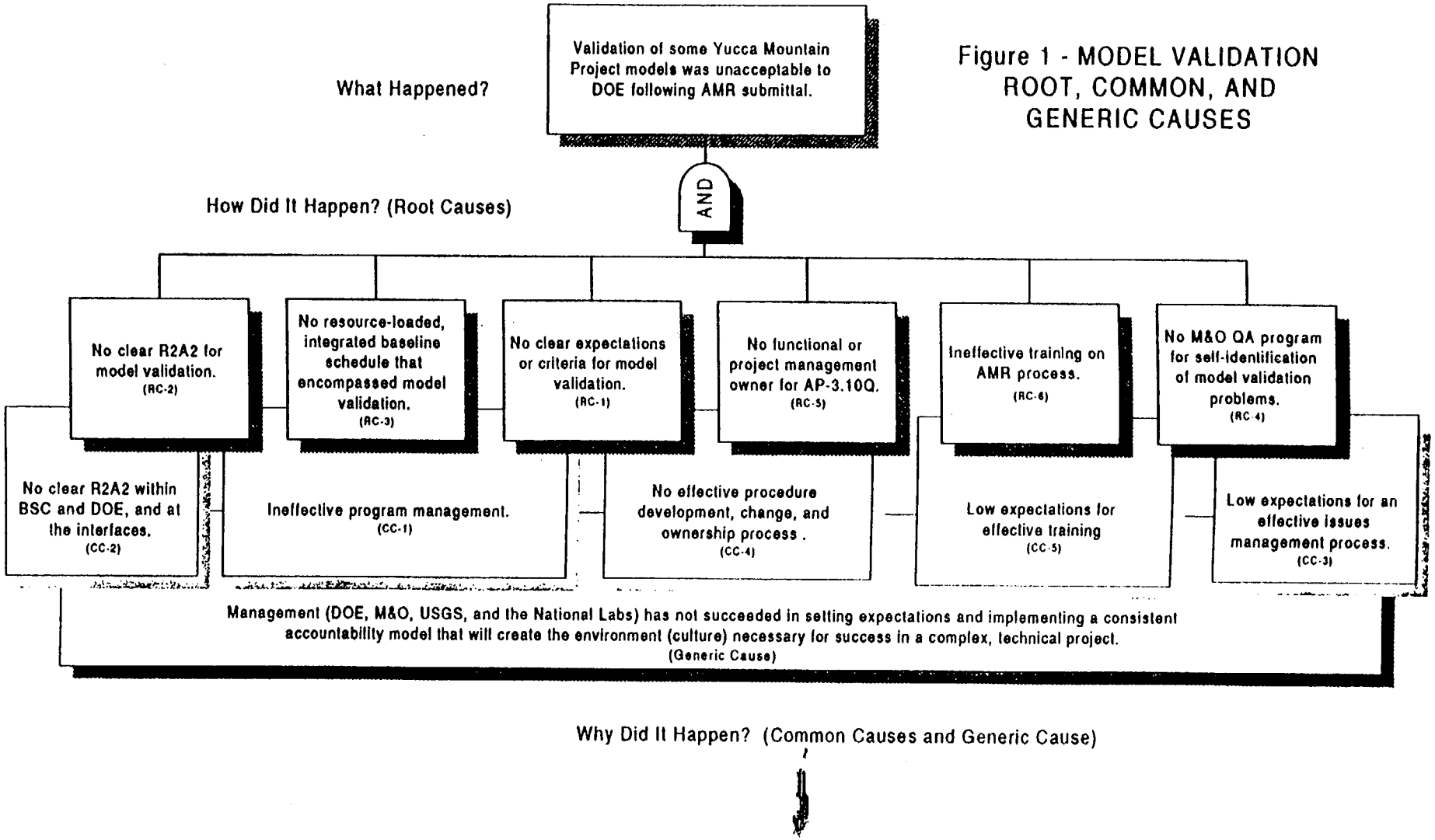
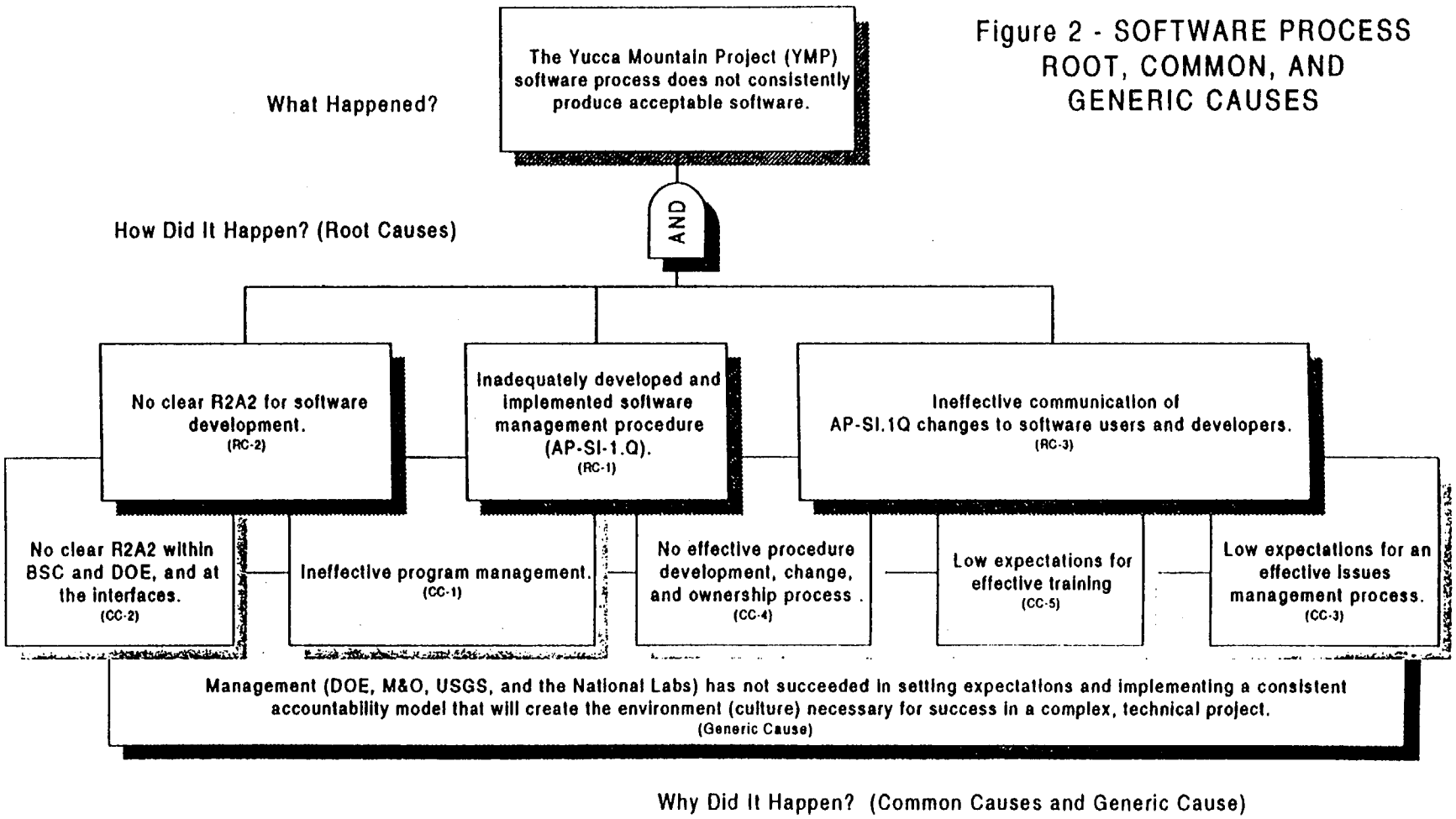


Figure 2 - SOFTWARE PROCESS ROOT, COMMON, AND GENERIC CAUSES



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ADDENDUM A

RESUMES

ADDENDUM A

RESUMES

	NAME	ORGANIZATION
1)	Christina M. Caprio	BSC
2)	Dana E. Cooley	Bechman & Associates, Inc.
3)	James Cross	Beckman & Associates, Inc.
4)	Dale Dexheimer	Bechtel National
5)	Cynthia M. Eubanks	Bechtel Jacobs Company LLC
6)	John Hosmer	Marathon Consulting Group, Inc.
7)	Greggory L. Huddleston	Bechtel Jacobs Company LLC
8)	James E. King	Bechtel Jacobs Company LLC
9)	Richard "Rick" O. Laing	BWXT Idaho, LLC
10)	Robert H. McCook	BWXT Idaho, LLC
11)	Stephen Metta	Bechtel Nevada
12)	Lisa V. Pascoe	BSC
13)	Jorge Schulz	Bechtel National
14)	Robert K. Smith	BWXT Idaho, LLC
15)	Tommy Wall	DESI
16)	F. Larry Zajac	Bechtel Nevada

ADDENDUM A

RESUMES

Christina Maria Caprio

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Las Vegas, NV 89117
(702) 240-2682 (home) (702) 295-3870 (work)
caprio_lv@mindspring.com (e-mail)

Education:

B.S., Physical Science (Chemistry, Geology, and Environmental Science),
Cum Laude, Washington State University

Employment History:

Bechtel – SAIC LLC (BSC)/Science Applications International Corporation (SAIC)
12/98 – Present

Information Compliance Deputy Manager
Manage and track the scopes, budget, and schedules, and provide the vision for four departments: Software Configuration Management, Software Quality Assurance, Capability Maturity Model (CMM), and Software Training. Ensure Zero Accident Policy is understood and abided by conducting walk-arounds. Ensure employee representation in the Hazard Elimination Action Team (HEAT), which conducts the safety inspections for the Yucca Mountain Project. Ensure Self-Assessments are conducted. Ensure Lessons Learned are disseminated and understood in an efficient and effective manner.

Business Process Re-Engineer
Analyze business and technical work processes to improve effectiveness, and efficiency, which improves customer relations. Evaluate safety and quality requirements and ensure all requirements are met in procedures as well as in implementation of the procedures. Develop the requirements for, train users on, and ensure requirements are properly coded for an issue/commitment tracking system for the Department of Energy (DOE) that consolidates all program issues into one location, so funding and prioritization for issue management can be properly allocated. Lessons Learned, Self Assessment, Root Cause, Condition, and Safety coordinator for the department. Continued serving as a HEAT co-lead.

Systems Analyst
Work with customers to define the schedule (which includes software control points), scientific approach/technical methods, equipment, error reporting, corrective actions, quality assurance, and affected organizations for a prospective software development project. Define what functions are to be performed to what results, at what location, and for whom in a Requirements Document (RD). Focus is on the software products and what functions are to be performed. Assist in the development of Design Documents, Validation Test Plans and Installation Test Plans with the programmer, to enable implementation and validation of the RD. Coordinate the baseline and control of software with the Configuration Management department. Continued serving as a HEAT co-lead.

Senior Technical Staff

Senior staff to the Support Operations Manager for the Yucca Mountain Project Managing and Operating (M&O) contractor to the DOE. Support Operations consists of Technical Data Management, Configuration Management (including the control and distribution of software), Reference and Document Control, Records, Graphics, Environmental Safety & Health, Information Technology, Institutional & External Affairs, and Document Production & Publication. Provide budget, schedule, scope, and work/process flow analyses. Research symptoms for root-causes, troubleshoot, and implement new processes that ensure efficiency, quality, procedural compliance, as well as better communication to the customer to ensure customer satisfaction. Prepare and update presentations, technical documents, procurements/sub-contracts, and procedures. HEAT co-lead. Prepared resource loaded schedules on when to perform the safety inspections on which areas for the YMP. Lead the safety inspections with a team of people. Recorded results, and reported results to senior management. Followed up with responsible manager to ensure corrections were made in a timely manner (agreed upon date).

Jason Technologies Corporation

5/97 – 12/98

Environmental Scientist

Technical coordinator for the Yucca Mountain Environmental Impact Statement (EIS) Project. Coordinated, tracked work assignments, and reviewed processes for the 15 project leads. Pulled together the detailed Annotated Outline, submitted the Outline to DOE Head Quarters, U.S. Naval Reactors, etc. to review, and incorporated comments. Supported technical analyses and rolled results up into sections that were rolled into the various chapters of the EIS. Responsible for the integration of the summary and working level schedules for the DOE. Included detail tracking and reporting performance progress on a weekly basis to the DOE. Conducted weekly status meetings to the DOE. Assisted in the compiling of project level estimates and the development of change requests. Rolled up BCWS/BCWP and reported rolled up ACWS/ACWP to the DOE on a monthly basis, to meet contractual requirements.

Informatics Corporation

10/96 – 5/97

Project Controls Engineer

Coordinated and facilitated the development of project and multi-year work plan input documents, baseline documents, and program to program interface ties, and the resolution of interface conflicts. Supervised the preparation and verified the accuracy of work schedules. Maintained, updated and managed the Primavera Project Planner (P3) database for 12 schedulers. Analyzed scheduling and planning systems for efficiency. Verified and corrected project budgets, estimated future budgets, durations, scope of work, and resources for the Spent Nuclear Fuel Project for fiscal years 1996 – 2005. Coordinated change requests within the Spent Nuclear Fuel Project. Planned, scheduled and measured work based on multi-year work plans. Conducted weekly staff meetings.

Jason Associates Corporation

5/95 – 10/96

Associate Environmental Scientist

Program Coordinator for the DOE, Richland Operations Office, on the Hanford Remedial Action Environmental Impact Statement (HRA-EIS) and the Comprehensive Land Use Plan (CLUP). Completed monthly reports to the DOE. Provided technical input, analysis support, and review of the Draft HRA-EIS and the CLUP. Maintained communication-support for public hearings and assisted on the development of the HRA-EIS and CLUP Administrative Record. Reviewed Federal and State Statutes and Regulations, and DOE Orders to ensure accuracy of information presented in both documents. Generated groundwater, vegetation, soils and geologic maps in Arc-View and risk isopleths through modeling software (Surfer). Assisted in the running of groundwater models and in the preparation of proposals.

Westinghouse Hanford Company

8/90 – 5/95

Composed and issued public notices regarding Environmental Assessments and Finding of No Significant Impacts to the local newspaper. Maintained the public involvement database, organized public mailings, designed advertisements, and advertised for the Tri-Party Agreement (TPA) and related public meetings. Coordinated and published the bi-monthly *Hanford Update* newsletter through the DOE, the Department of Ecology (Ecology) and the U.S. EPA (EPA). Assisted in the preparation of miscellaneous technical documents as well as Response to Comment documents and Community Relations Plans, relating to waste management, regulatory compliance, and remediation issues. Summarized written comments from the TPA public meetings for transmittal to the DOE, Ecology, and EPA. Planned and implemented logistics for the TPA public meetings. Assisted in the creation of the Hanford Advisory Board (HAB). Communicated with Congressional members as well as stakeholders through the HAB on a weekly basis.

Software and Awards

Proficient knowledge of/Training:

Windows 98
Microsoft Office (MS Powerpoint, MS Excel, MS Word)
Microsoft Project
Primavera Project Planner (P3)
SAIC Project Management I & II
SAIC Systems Engineering
OSHA 10 hour
Taproot Root Cause Analysis

Awards:

SAIC Employee of the Year Award - 1999
M&O Certificate of Appreciation – June 1999; May 2000; June 2000
DOE Certificate of Appreciation – August 1999
Perfect Performance Evaluation Ratings – May 1997 – September 1998; Jan. 1999 – Jan 2000

ADDENDUM A

RESUMES

Dana E. Cooley, P.E. — SeaState Group, Inc.

144 Dante's Drive
Hockessin, Delaware 19707
(302) 234-8188 (Phone)
(302) 234-8084 (Fax)

ROOT CAUSE ANALYSIS CONSULTANT, WORKSHOP FACILITATOR, AND TEAM LEADER

- Determines fundamental problem causes
- Pinpoints organizational weaknesses
- Raises human performance levels
- Strengthens management effectiveness

PROFESSIONAL EXPERIENCE

SeaState Group, Inc., Hockessin, Delaware (see RESULTS below)

President (1996 - Present)

Established a consulting practice whose mission is strengthening problem-solving partnerships among managers, supervisors, and front-line workers. Analyzed issues and generated improvements in nuclear energy processes, event response, and problem analysis. Delivered root cause analysis training workshops at advanced and basic levels. Supported executives and corrective action program managers to improve programs, measure effectiveness, and integrate human performance and leadership initiatives.

Clients include Arizona Public Service Company, Constellation Energy Group (BG&E), FirstEnergy (Duquesne Light), Consolidated Edison, New York Power Authority, Exelon (PECO Energy), PPL Corporation (Pennsylvania Power & Light), PSEG Nuclear, Maine Yankee, Niagara Mohawk, a New England law firm, Fluor Daniel Hanford, and Rodel, Inc.

Public Service Electric and Gas Co., Newark and Hancocks Bridge, NJ

Manager - Quality Performance, Onsite Safety Review Engineer, and Manager - Environmental Licensing (1977 - 1996)

Supported nuclear power plants and other gas and electric energy facilities through every stage of their life cycles: site selection, assessment, and development, initial licensing, plant startup, power ascension, sustained operation, event investigations, and continuous improvement. Led or supported numerous problem solving and process improvement initiatives, including the first comprehensive assessment of Salem and Hope Creek's performance (1993).

Ebasco Services, Incorporated, New York, NY

Environmental Engineering Consultant and Project Leader (1973 - 1977)

U. S. Naval Reserve, Hyattsville, MD and Philadelphia, PA

Commissioned Naval Officer, Engineering Duty (1968 - 1972)

EDUCATION AND DEVELOPMENT

M.S. Environmental Engineering - Drexel University

B.S. Mechanical Engineering (Highest Distinction) - University of Rhode Island

Distinguished Naval Graduate - U.S. Naval Officer Candidate School

Small Group Facilitator Internship Program - The Napier Group

Advanced Management Course - American Management Association

Innovative Problem Solving - Synectics, Incorporated

ADDENDUM A

RESUMES

Management Oversight and Risk Tree (MORT) Certification – Conger & Elsea, Inc.

RESULTS

Public Service Enterprise Group (Salem and Hope Creek Generating Stations)

Reduced voluminous root cause analysis guidance to flow charts and visual reminders. Determined essential content for root and apparent cause analyses and developed "ideal" report templates and investigator prompts meeting all program requirements and CARB needs. Delivered plant-specific, experiential root cause initial and refresher workshops for 56 investigators. (November 1999 – Present)

Niagara Mohawk Power Company (Nine Mile Point Unit 2)

Independently re-evaluated client equipment failure analyses for significant forced outage series originating from reactor recirculation flow control indication malfunctions. Applied Kepner-Tregoe methods to confirm detailed technical causes. Identified problem specification improvements and made recommendations to explore management causes for problem recurrence. (December 2000 – Present)

Consolidated Edison Company of New York (Indian Point 2 and Steam Business Unit)

Analyzed more than 15 significant operational, engineering, and maintenance events to determine root causes. Coached and consulted with engineers, operators, planners, test developers, and others. Supported human performance improvement, root cause analytical process, and collective issue assessment, including condition report and corrective action trending. Developed root cause analysis guide and training lesson plans. Trained 40 new and requalifying root cause investigators. Designed and performed corrective action effectiveness reviews. (February 1997 – present)

Pennsylvania Power & Light Company (Susquehanna Steam Electric Station)

Determined root causes and corrective actions for fire protection program omissions, with sensitivity to employee concerns and an allegation. Recommendations addressed conduct of operations, workforce motivation, contractor control, training and qualification, and change management. (April 1997)

Supported in-depth, quantitative observation of mechanical, electrical, and I&C maintenance by the Independent Safety Engineering Group. Recommended improvements to quality, safety, and efficiency of work planning and execution. (March – April, 2000)

Led multidiscipline root cause investigation team to determine how and why self-assessment activities and management actions did not anticipate and avoid National Academy for Nuclear Training probation for four technical training programs. (May – June 2000)

PECO Energy (Limerick Generating Station)

Determined common themes in 20 departmental and functional self-assessments. Prioritized corrective actions. Ensured accountability and tracking. Evaluated root causes and corrective actions for ~200 condition reports. Wrote case studies for operating experience lessons-learned presentations. Supported Site Vice President's leadership plan based on self-assessments, root cause analyses, and third party evaluations. (August – October, 1996; June – July 2000)

Baltimore Gas and Electric (Calvert Cliffs Nuclear Power Plant)

Developed and delivered targeted root cause refresher workshops for approximately 80 plant (system) engineers and others responsible to find technical, organizational, programmatic, and human performance causes of significant and repetitive equipment failures. Sessions included interviewing sensitively, securing sponsorship, and winning approval for corrective actions. (May – September 1999)

Arizona Public Service Company (Palo Verde Nuclear Generating Station)

Examined significant event and equipment failure root cause analyses and corrective actions. Determined investigator strengths and skill deficiencies. Developed comprehensive investigation manual for operational events and equipment failures, including several electronic "templates," equipment failure guidelines, and a digest of best industry practices. (May – June 1999)

Duquesne Light Company (Beaver Valley Power Station)

Evaluated root cause analysis processes, practices, and results. Interviewed event response team leaders and members to determine skill needs. Designed and delivered unique, 3-day workshops for approximately 30 senior investigators that immersed

them in a realistic, plant-specific case. Evaluated ERT performance in plant event. Developed desktop guide for efficient team mobilization and deployment. (October 1998 – February 1999)

New York Power Authority (Indian Point 3)

Supported QA problem reporting and corrective action audit based on NRC Inspection Manual. Planned investigator retraining and overhaul of root cause analysis reference materials. (June – November 1998)

Fluor Daniel Hanford (U.S. Department of Energy)

Planned and delivered intensive, experiential workshops in root cause analysis basics, investigative interviewing, and mini-MORT. Tailored special session for B&W Hanford Company personnel at the Plutonium Finishing Plant. (May 1997 – February 1998)

Maine Yankee Atomic Power Company

Assistant team leader for root cause analysis of cable separation issues cited in NRC confirmatory action letter. Defined team scope and charter, organized client and consultant members, aligned with separate engineering issue team, applied MORT-based analytical tools. Briefed chief nuclear officer and executive management. (December 1996 – January 1997)

Attorney (Confidential)

Drafted testimony on critical and costly issue for rate case proceedings. Demonstrated that facility's directors, managers, engineers, and operators acted prudently during a series of challenging engineering and human performance occurrences, and showed that they fully met the requirements of the rate-making body. (September – December 1997)

Rodel, Inc.

Designed, developed, and facilitated the initial meeting of a diverse community advisory council. The group's functions include understanding facility operations, developing open and frank lines of communication, and exploring mutual needs in the areas of emergency planning, environmental quality, community relations, and corporate philanthropy. (March 2001)

Startups, Turnarounds, Continuous Improvement (at PSEG)

Established and led the Hope Creek independent safety engineering group (ISEG) for eight years, convincing operations, maintenance, and engineering managers to adopt 275 risk-reducing changes.

Secured executive decisions on repairs and process changes for Chapter 0350 restart of Salem Generating Station. NRC praised the "tough, probing questions" and willingness to "reject presentations that needed more work."

Event Investigations (at PSEG)

Led 12-member team collectively assessing 27 significant Salem/Hope Creek incidents. Management later incorporated team's findings into Salem Watch List recovery plan.

Significant Event Response Team manager who recruited and led intensive multi-disciplined investigations of facility transients. Extracted causal patterns from clusters of lesser events.

Human Performance and Appraisal Issues (at PSEG)

Designed and implemented appeals process for resolving disputes about individual performance rankings. Chaired panel that heard oral statements from affected persons and recommended disposition of appeal.

Investigated and settled challenges of unescorted access denials. Recommended improvements to medical, psychological, and security reviews.

Provided root cause guidance to an internal team investigating significant whistleblower concern.

ADDENDUM A

RESUMES

PROFESSIONAL AFFILIATIONS

Registered Professional Engineer, New York
Tau Beta Pi Engineering Honor Association
American Nuclear Society
Organizational Behavior Teaching Society
Delaware State Chamber of Commerce

2728 Muir Woods Dr
Hampton Cove, Al 35763

Phone 256-536-5107
E-mail Gemcr@home.com

JAMES CROSS

Education

1964 - 1969 University of South Florida Tampa, Fl.
BS Electrical Engineering

Professional experience

2000 – 2001 Independent Consultant
Senior Management Consultant
(303) Performed Due Diligence for a major corporation.
(304) Member of Root Cause Evaluation Team, Yucca Mountain Project

1996 – 2000
President of Generation Group and Chief Nuclear Officer
Duquesne Light Company

Major responsibilities were the day to day safe operation of Beaver Valley Nuclear Plant; operation of four gas turbines and four coal plants and the power supply for company's service area. Total Employees were 1500 with a budget in excess of 500 million. Reported to the Chairman of the Board of Directors of DQE.

- Senior Manager in charge of Beaver Valley Nuclear Units 1 & 2
  Direct management of Quality Assurance, Engineering, Fuel Supply, Operation, Human Resources and Licensing
- Senior Manager in charge of four gas turbines, four coal units and power supply.
  Direct reports included Manger of Fossil Plants and Manager of Power Supply

1994 – 1996
Senior Vice President Nuclear and Chief Nuclear Officer

Major responsibility was the safe operation of Beaver Valley Nuclear Plant. Represented the company with the NRC. INPO, NEI, and the Department of Energy. Developed licensing strategies involving the operation of Beaver Valley. This included many personal meetings with NRC managers in Washington and King of Prussia.

- Senior Manager in charge of Beaver Valley Units 1& 2.
  Direct Management of Quality Assurance, Engineering, Nuclear Fuel Supply, Operation, Licensing, and Human Resources.

1990 – 1994
Senior Vice President of Generation and Chief Nuclear Officer
Portland General Electric

Major responsibilities included the safe operation of Trojan Nuclear Plant, managing plant operation, Quality Assurance, Licensing and Engineering.

- Planned the decommissioning of Trojan Nuclear Plant. Participated in a Red Team Investigation and Report on the Operation of Rocky Flats Facility at the request of The Department of Energy Director.

- Managed the closure of Trojan Nuclear Plant. This included the development of employee benefits and retention programs.
- Coordinated the closure with Bonneville Power Administration and The Department of Energy.
- Testified before the Oregon Public Utility Commission on the closure and decommissioning of Trojan Nuclear Plant.
- Senior Manager In charge of the operation of Trojan Nuclear Plant and the company's representative to the NRC, INPO, NEI and EPRI.

1988 - 1990
Plant Manager of Turkey Point Nuclear Plant
Florida Power and Light Company

Major responsibilities included the day to day safe operation of Turkey Point. In 1987 Turkey Point was placed on the NRC Plant Problem List and the NRC threatened to shut Turkey Point down if plant operation didn't improve. I was brought in to improve operation and get Turkey Point off the Plant Problem List. The Plant was removed from the list within approximately six months. Turkey Point has improved to the point that it is recognized as one of the top performing plants in the country.

- Direct reports were Operations Manager. Radiation Protection Manager, Plant Engineering Manager, Maintenance Manager, Licensing Manager, and The Manager of Training.
- Develop the Operation Improvement Plan, which detailed the areas needing improvement and the specific plans, objectives and schedules for achieving the necessary improvements. Presented the plan to the NRC and managed its implementation for the successful removal of Turkey Point from the NRC list.
- Won the Deming Award for Quality. Turkey Point was the first plant outside of Japan to be judged for and win the Deming Award for Quality.

1983 - 1988
Site Director, Plant Manager, Manager of Operations
Middle South Utilities

Major responsibilities varied during my employment at Middle South Utilities. I was initially hired as the Manager of Operations during the initial startup of Grand Gulf Nuclear Plant. I was soon promoted to the Plant Manager to oversee the initial startup of the plant. Eventually I was promoted to Site Director and reported to the senior vice President and Chief Nuclear Officer.

- Managed the initial startup of Grand Gulf.
- Testified at NRC Commission Meetings involving the initial Full Power License for Grand Gulf.
- Direct reports as Plant Manager included Operations Manager, Chemistry Manager, Radiation Protection Manager, and Maintenance Manager.
- Direct reports as Site Director were Plant Manager, Engineering Manager, and Training Manager.

1972 – 1983
Assistant Plant Manager, Engineering Manager and Instrument Engineer
Tennessee Valley Authority

I was hired as an Instrument and Controls Engineer in the Design Engineering Department. Soon I was transferred to the Operations Department, which operated the plants in the TVA system. I was assigned as an Instrumentation and Controls Engineer, responsible for assisting the plants in trouble shooting and repair of control system problems that the plant was unable to solve. I was promoted to Engineering Manager at

Watts Bar Nuclear Plant. This position managed the Instrument and Controls Section, the Reactor Engineering Section, and the Chemistry Section.

Within 2 years I was promoted to Assistant Plant Manager.

1970 - 1972
Instrument and Controls Engineer
Florida Power Corporation

Major responsibilities included the design of an oil conversion for two large coal units, and the initial design review of Crystal River Unit 3 nuclear plant.

DALE T. DEXHEIMER

POSITION	Radiation Protection Supervisor
EDUCATION	BS, Applied Mathematics and Nuclear Engineering Physics, University of Wisconsin
PROFESSIONAL DATA	Registered Professional Nuclear Engineer, California Vice-chairman, ASTM Subcommittee on Radiation Protection Methodology Member, Health Physics Society Former Member, ANS National Planning Committee

SUMMARY

23 years:	Engineering supervisor
2 years:	Engineering group leader
2 years:	Senior engineer
4 years:	Engineer

EXPERIENCE

Mr. Dexheimer is currently assigned to Bechtel National's SF office as an engineering supervisor of radiation protection in the Special Projects Group. He is responsible for the supervision and technical direction of design and analyses in Health Physics and shielding design, occupational radiation exposure reduction, equipment qualification evaluations, and post accident shielding assessments. He also supports onsite and offsite radiological dose analyses for normal and post accident conditions. In addition he is responsible for high energy particle accelerator and medical treatment facility radiation protection design. Projects supported include conventional BWR's and PWR's, and advanced U.S. and foreign reactor designs using light water as well as high temperature gas cooled and liquid metal design concepts.

He is also responsible for technical and computer development programs (mainframe and IBM-PC) in the radiation protection area. He is corporate sponsor for radiological computer codes: SHIELD-SG, SOURCE2, RADGAS3, ORIGEN, G-33, SHIELD-LIB, SKYSHINE, MCNP, and BRENDA. He coordinates with other engineering disciplines and industry groups to review nuclear operating experiences and design advances to recommend plant or system design improvements to enhance plant maintainability, availability, operability, and reducing occupational radiation exposures in newer plant designs.

Project support in the shielding and radiation protection areas has included the development of primary and secondary radiation shields for LWR, MHTGR and LMR reactor types. That included design of both bulk and penetration shields, including coordination with structural, HVAC designers to ensure adequate cooling and integrity of near vessel shields and vessel supports. Heat generation and neutron irradiation effects, e.g. NDT shift, in the reactor vessel supports structures for selected vessel and support materials were determined and evaluated with other design groups.

Mr. Dexheimer developed multi-discipline ALARA design implementation and review programs and coordinated ALARA reviews on major LWR design projects to reduce occupational radiation exposures. This included the incorporation of system, equipment and plant design feature to reduce personnel time in radiation areas as well as reduce radiation levels. Maintenance and operations features were evaluated to reduce time in radiation areas or to provide remote servicing capability. In addition, radiation source reduction techniques and enhanced shielding designs were evaluated.

Mr. Dexheimer also developed and managed major project penetration shielding cost reduction programs. Further, he performed reviews and studies on decommissioning commercial nuclear power plants including evaluation of plant and equipment decontamination, radioactivity inventories, and personnel exposure estimates and reduction.

Previously, Mr. Dexheimer served as nuclear engineering group leader responsible for supervising engineers in the design and analysis of radiation shielding, radioactivity inventories, equipment qualification evaluations, and preparation of safety analysis report sections. This involved application of industry standard and Bechtel developed radiation analysis computer codes such as ORIGEN, ANISN, QAD, G-33, SKYSHINE, SHIELD-SG, SOURCE2 and RADWASTE.

Mr. Dexheimer's earlier assignments with Bechtel have included preparing shielding design specifications and radiation zoning and access control drawings, directing technical development programs for shielding analysis, and developing methods for radiation transport and radioactivity inventory assessments including neutron activation.

CYNTHIA M. EUBANKS
Badge No.: 15603
Work Phone: (865)576-7763
Home Phone: (865)583-0554
UID: eub@bechteljacobs.org
Functional Department: Engineering & Construction Services

Grade: 28
Classification: QA Mgr. Programs

SUMMARY

Manager with approximately 25 years experience defining and implementing management systems. Responsible for managing technical and administrative staffs in the definition and implementation of policies, procedures, and information management systems associated with issues management, occurrence reporting, lessons learned, corrective action programs, and records management programs.

EXPERIENCE

June 2000 – Present

Manager, Records Management and Document Control
Bechtel Jacobs Company, LLC, Oak Ridge TN
Program manager responsible for the definition and implementation of the Records Management and Document Control program across all Bechtel Jacobs Company organizations and projects. Responsibilities include the following:

- Plan, direct and coordinate all functions within the scope of records management.
- Develop procedures, guidance documents, and awareness materials to define requirements for implementation of the Records Management Program.
- Ensure the management, development, implementation, and oversight of the Office and Administrative Services Subcontract Records Management Program Scope of Work.
- Provide essential communications to the Department of Energy, project management and other organizational departments for records management program activities.
- Provide record management resources to effectively support projects and management programs in the following areas:
  - Identify and implement record management requirements for Project Document Control Centers (PDCC)
  - Development and implementation of subcontract submittal program.
- Develop and/or improve systems, including automated document management systems and electronic record retention and procedures related to record management where necessary.
- Review, improve, and maintain the M & I Management Action Tracking process.

April 1998 – June 2000

Manager, Performance Evaluations, Performance/Quality Assurance Organization,
Bechtel Jacobs Company, LLC, Oak Ridge, TN
Program manager for the definition and implementation of the Bechtel Jacobs Company, LLC Issues Management Program elements. This includes the corporate Occurrence Reporting Program, Lessons Learned Program and Corrective Action Program. Responsibilities include the following:

- Develop procedures, guidance documents, and job-aids to define requirements for implementation of the Issues Management Program, Lessons Learned Program, Occurrence Reporting Program and associated elements
- Define and implement information system requirements for the Issues/Corrective Actions Tracking System (I/CATS), the Lessons Learned System, and the I Care – We Care System
- Interface with DOE-ORO and DOE-HQ to ensure Bechtel Jacobs Company internal systems and processes are consistent with the requirements of the DOE systems (i.e., DOE Occurrence Reporting and Processing System (ORPS), DOE Noncompliance Tracking System (PAAA-NTS), and DOE Corrective Action Tracking System (CATS))

Primary Subcontract Technical Representative (STR) for Quality Assurance (QA) Support Services subcontract at all Bechtel Jacobs Company locations (approximately $4M budget per year).

- Compile input from Project and Functional management on the type and scope of QA support needed
- Ensure Work Releases are prepared and processed in accordance with contractual requirements, SmartQV and accrual information is compiled and maintained
- Ensure subcontract submittals are reviewed and comply with contractual requirements
- Coordinate day-to-day subcontract administration with Secondary STRs
- Facilitate process improvement initiatives between Subcontractor and Secondary STR's

Representative and facilitator for DOE-wide Lessons Learned Working Group (SELLS); Chair of DOE-wide Occurrence Reporting Special Interest Group (OR SIG).

1993 – March, 1998

Manager, Issues Management Support Staff (IMSS), Quality Services Organization
Lockheed Martin Energy Systems, Inc., Oak Ridge, TN

Responsible for the definition and implementation (including management of supporting staff, procedure development, training, supporting information systems) of the Issues Management Program and associated programmatic elements (Occurrence Reporting Program, PAAA Reporting, Lessons Learned Program, Corrective Action Program, ESAMS tracking system) for all LMES facilities. Responsible for definition, analysis and reporting of corporate contract performance measures.

1991 - 1993

Quality Systems Manager, Quality Organization
Lockheed Martin Energy Systems, Inc., Oak Ridge, TN

Responsible for development and implementation of Energy Systems-wide corrective action tracking system and Lessons Learned Program. Responsible for compilation and analysis of performance measures, programmatic and company-wide.

1985 – 1991

Quality Management Systems Group Leader, Y-12 Quality Organization
Martin Marietta Energy Systems, Inc., Oak Ridge, TN

Responsible for development and implementation of quality systems to support weapons and non-weapons programs. Responsible for administration of weapons sampling plans. Develop and report programmatic performance measures. Conduct trending analysis of analytical information to identify adverse trends and opportunities for improvement.

1980 – 1985

Industrial Engineer, Commercial & Industrial Programs
Tennessee Valley Authority, Chattanooga, TN

Responsible for analyzing energy usage performance for commercial customers to identify areas for improvement. Responsible for performance work improvement analyses within organizational areas.

1976 – 1980

Statistician, Gas Centrifuge Program

Union Carbide (predecessor to Martin Marietta Energy Systems, Inc.), Oak Ridge, TN
Responsible for performing statistical analyses on processes associated with the gas centrifuge program.

ACCOMPLISHMENTS:

Recent Areas of Involvement across DOE:

- Contractor Representative to Executive Committee, DOE Lessons Learned Working Group (SELLS) (1998 – 2000)
  - Facilitator for all DOE-wide meetings of SELLS (1995 – 2000)
  - Previous Contractor Co-Chair (1997-1998)
  - Task team lead for development of DOE Lessons Learned Technical Standard
  - Provide awareness sessions to DOE and contractor groups on DOE Lessons Learned Program
- Previous Chair, DOE Occurrence Reporting Special Interest Group Steering Committee (OR SIG)
  - Task Team Lead, Development of Occurrence Reporting Guidance Document
  - Task Team Lead, Development of Short Form Reporting Proposal and Implementation Plan
  - Co-lead, task team for improvements to near-miss reporting
  - Conducted numerous workshops at OR SIG meetings on corrective actions, lessons learned, integration of occurrence reporting with issues management programs, trending of occurrence information
- Member, DOE Performance Based Management Special Interest Group Steering Committee (PBM-SIG)
  - Task Team Lead for development of initial PBM-SIG Handbook (later became a DOE Guidance Document)
  - Co-lead for development of revised PBM-SIG Handbook
  - Facilitator for PBM-SIG workshops and meetings

Awards:

- Bechtel Jacobs Company Distinguished Service Award (1999, 2000)
- DOE Certificate of Appreciation, DOE-EM Headquarters (2000)
- DOE Hammer Award for efforts associated with DOE Lessons Learned Program (1997)
- Lockheed Martin Energy Systems Values Award for I Care – We Care Program (1997)
- Lockheed Martin Energy Systems President's Aware for I Care – We Care Program (1997)
- Recipient of special recognition award from Don Pearman, DOE-FM for contributions to DOE Lessons Learned Program (1996)
- Lockheed Martin Energy Systems Operations and Support Awards Night Recipient (1996)
- Lockheed Martin Energy Systems Special Achievement Award (1996)
- Lockheed Martin Energy Systems Operations and Support Awards Night Recipient (1992)
- Y-12 Plant Award of Excellence (1992)
- Martin Marietta Energy Systems Special Achievement Award (1991)
- DOE Award of Excellence (1990)
- Martin Marietta Energy Systems Operational Performance Awards Night Recipient (1987)
- Numerous letters of commendation for support and performance

Clearance:

Active Department of Energy "Q" Clearance

Education:

University of Tennessee, Knoxville
B.A. degree in Mathematics, (1976)
M.S. degree in Industrial Engineering and Statistics, (1983)

Specialized Training:

1985	Kepnor Tregoe Process Consultant/Facilitator
1995	TapRoot Incident Investigation Training; qualified instructor
1996	Advanced Management Program, LMES/UTK
1997	Business Process Re-engineering
1999	Principles of Accident Investigation/MORT

References:

Available upon request

JOHN HOSMER

SUMMARY

Mr. Hosmer has extensive experience with three major utilities and a large international engineering and construction firm, Bechtel. Member of senior executive turnaround team at two utilities hired to improve troubled Plants performance while building and leading engineering team Performance improvement. Recognized for turnaround, team building, project management, technical problem solving, and business development skills. Mr. Hosmer is an energetic doer capable of "out of the box" thinking in creating a vision and finessing implementation. Overseas and military officer experience.

EDUCATION

M.B.A., California State University, Long Beach, California - 1983
M.S. Chemical Engineering, Purdue University, West Lafayette, Indiana - 1968
B.S. Chemical Engineering, Purdue University, West Lafayette, Indiana - 1967

EXPERIENCE

1998-Present Marathon Consulting Group

Senior Vice President, responsible for business development and execution of personal and group consulting engagements. As an individual consultant, prepared corporate restructuring plan for large public utility facing deregulation. Independently assessed the market and challenged a proposed joint venture for a large engineering and construction firm. Additionally, lead configuration management assessments and developed procedures and training and was the senior mechanical and nuclear member of a design review board.

1994-1998 Unicom Corporation

As Vice President, was a member of senior executive turnaround team hired to improve troubled plant performance while building an in-house engineering organization and leading performance improvement in support of 12 operating nuclear generation stations. Within 6 months, developed and implemented common tools, processes, organizations, and performance measures. Improved technical quality cost and schedule performance 10 to 20% annually, saving $20 million annually. Shifted work performed in house from 40 to 80% and permanently reduced contractor costs $80 million annually. Successfully completed complex "fixed cost" steam generator replacement and core shroud repair projects. Optimized the engineering work control system and product processes.

1988-1994 Florida Power and Light

As Director, Nuclear Engineering, was a member of senior executive turnaround team, hired to improve troubled plant performance while separating fossil and nuclear engineering and developing a cost effective engineering support team for 4 operating nuclear generation stations. Within 1 year, set strategic direction and separated fossil and nuclear engineering while implementing a cost-effective engineering model. Shifted work in-house from 30 to 95% and reduced contractor reliance by $200 million annually. Performance as measured by regulatory agencies improved to a 1. Successfully completed complex 1 year dual unit outage at Turkey Point station.

1987-1988 Tennessee Valley Authority

As Engineering Manager, hired to lead the Performance turnaround of the Sequoyah nuclear station engineering department during the last year of a 3 year restart effort. Within 1 month, developed and implemented management control tools and performance measures that focused the organization on restart. Developed a self confident organization by coaching and directing the organization on complex technical negotiations with station management and the regulatory agencies. Completed restart successfully in 1 year while down sizing the organization from 3000 to 360 personnel saying $240 million annually.

1973-1987 Bechtel Power Corporation

As Chief Mechanical & Nuclear Engineer during 1985-1987, directed the organization transition from a domestic new construction market to a domestic Operating Plant market and an international new construction market. Redistributed Personnel overseas and to domestic job sites while downsizing the organization by 500 People with no adverse legal action. Optimized "lessons learned" processes to prevent reoccurrence of repetitive design error. Senior company technical official accountable for technical Policy, technical processes, personnel development, business development and recruiting during a Period of significant market size reduction and market shift.

As Project Manager during 1984-1985, developed "Out of the box" restart strategy for Southern California Edison's San Onofre facility. Booked the job and project managed the 700 person construction engineering and procurement work force to successful restart. "Out of the box" strategy resulted in a 7 month $30 million project that prevented premature retirement of the unit and saved $270 million and 2.5 years of schedule.

As Chief Environmental & Nuclear Engineer during 1983-1984, accountable for technical policy, technical processes, personnel allocation and development, and business development during an industry growth period.

As Project Manager during 1981-1983, assigned to manage the first major project in Bechtel Asian joint venture company, PECL, in Taipei, Taiwan. Project scope included the Yenliao nuclear station bid evaluation and initiation of engineering and construction. Completed $10 billion power plant bid evaluation on budget and 1 month ahead of schedule. Award as recommended was accepted by Taipower, the President of Taiwan and the legislature. Engineering and construction was initiated on schedule.

1973-1981 Various Technical Management Assignments

1969-1973 United States Navy

Officer on operating fleet ballistic missile nuclear submarine USS Woodrow Wilson. Successfully completed 5 Patrols and passed 2 Operational Reactor Safeguards Exams.

AFFILIATIONS

American Nuclear Society
Professional Engineer - CA, FL, IL

ADDITIONAL MANAGEMENT DEVELOPMENT

Deming Statistical Training and Deming Medal Winner at FPL
Advanced Business Concepts, Stanford, California - 1983

3343 White Eagle Drive
Naperville, IL 60564
Residence: 630-904-0632
Office: 630-922-3299

PERSONAL RESUME - BECHTEL EMPLOYEE

NAME: Gregory Lynn Huddleston DATE: June 20, 2001

BECHTEL APPROVED CLASSIFICATION	Project Manager
WORKING TITLE	Facility Manager
ORGANIZATION	BechtelJacobs Company LLC, Oak Ridge East Tennessee Technology Park (ETTP) Office
LOCATION	Oak Ridge, Tennessee
BIRTHDATE	09/23/61
CITIZENSHIP	USA
ORIGINAL EMPLOYMENT DATE	11/04/91
RE-EMPLOYMENT DATE(S)	N/A
SPOUSE'S NAME	N/A
CHILDREN'S BIRTHDATES	N/A
MILITARY SERVICE & RANK	N/A

PHOTO DATE

PROFESSIONAL LICENSES AND SOCIETIES

American Society for Quality Control

EDUCATION AND PERSONAL DEVELOPMENT PROGRAMS

Degree, Certificate, etc.	School	Major (or Subject)	Date
B.S	Lincoln Memorial Univ.	Chemistry	08/83
Certificate		OSHA 40-hour Hazardous Waste Training	04/92
Certificate		OSHA 8-hour Update	07/93 08/94 08/95
Certificate		Data Sufficiency and Decision Making for Site Remediation	05/93
Certificate		Quality Assurance Audit Techniques for Nuclear Industries	11/92
Certificate		Dale Carnegie Training	11/94
Certificate		DOE Quality Award Examiner Training	05/96 05/97

OTHER SIGNIFICANT INFORMATION (Refer to Instructions before completing)

PERSONAL AND FAMILY:
OUTSIDE ACTIVITIES:

GEOGRAPHIC PREFERENCE:
OTHER:

WORK HISTORY

DATES FROM	DATES TO	COMPANY, DIVISION OR DEPARTMENT, LOCATION AND SUPERVISOR	POSITION HELD, SUMMARY OF RESPONSIBILITIES AND SIGNIFICANT ACCOMPLISHMENTS
12/84	10/86	IT Corp. Middlebrook Pike Alyce Moore	**Organic Prep Group Leader** Responsible for supervision of Organic Sample Prep for both first and second shift. Duties included daily scheduling and tracking of samples for extraction; monitoring production of the group; new method validation; job performance reviews; training of new employees and assisting management with interviews for the section; close interaction with GC and GC/MS section heads; monitoring QA/QC for the group, including nonconformance memos.
10/86	08/88	IT Corp. Middlebrook Pike Tom Wilson	**GC/MS Operator** Operation of Finnigan GC/MS models 4000, 4500 and OWA-30 for EPA methods 624, 625, EPA CLP SOW and Volatile Organic Sampling Train (VOST). Inserted the correct frequency of QA/QC into the daily analysis and first level data review.
08/88	02/89	IT Corp. Mixed Waste Laboratory, Oak Ridge, TN Dr. D. Stagg and S. Mills	**Senior Organic Chemist** (Acting Organic Supv.) Responsible for Training new personnel in organic prep, GC, and GC/MS for EPA methodology for organic analysis of low level radioactive samples and wastes. Verified the frequency and accuracy of all organic QA/QC activity. Implemented new procedures and method validations for QAPjP's. Issued Standard Operating Procedures for daily organic routines, created and maintained special Fortran 77 compilations for the Finnigan GC/MS systems and special requirements for Sampling and Analysis Plans; repair of GC/MS instrumentation and the health and safety training of organic personnel.

02/89	11/91	Martin Marietta, K-25 Analytics Div. Dave Canada	**K-25 Operation of GC/Mass Spec.** Responsible for volatile organic analysis on Finnigan and Hewlett Packard GC/MS systems; start-up and implementation of NPDES and RCRA methods for regulatory compliance; training new personnel for volatile analysis; assisted the Project Management Group in verifying and validation of organic performance evaluation samples for laboratory certification to meet HAZWRAP and certain Navy contract requirements.
11/91	07/92	BNI, FUSRAP. Data Management John Darby/Jim McCague	**Environmental Chemist** Responsible for validation of chemical laboratory data for supporting environmental decisions. Functioned as a technical contact for the analytical laboratory. Assisted Quality Assurance Dept. in performing audits as a Technical Specialist.
07/92	08/94	BNI, FUSRAP. Quality Assurance Janice Allison	**Sr. Quality Assurance Engineer** Performs office and field audits and surveillances of projects, subcontractors, and vendors as an audit team lead. Reviews procedures, plans, contracts, and guidance documents for administrative and technical compliance. In addition, federal laws, state and local standards, statutes and ordinances are reviewed for applicability and implementation for the project. Interfaces on a daily basis with the project staff. Drafts quality sections for procedures and regulatory documents. Working knowledge of NQA1 and DOE Orders and EPA regulations as they apply to the project. Monitors project activities including, environmental sampling, remediation, nonconforming conditions, and corrective actions taken and reports to project management. Acts as alternate for Project QA Manager as needed.
11/93	08/94	BEI, Private Environmental Projects Quality Assurance Bret Peacock	**Project Quality Assurance Engineer** Implements the Quality Assurance program for the project. Manages and coordinates the project quality program activities. Maintains client liaison and communication for QA activities. Advises management of QA problems and progress. Reviews and approves quality related procedures. Reviews and reports on the impacts of new or revised regulatory requirements to the QA

			program. Assigns work to and supervises the activities of assigned QA engineers. Identifies and reports conditions that require corrective actions by management and follows up to ensure completion.
08/94	03/98	BNI, FUSRAP Quality Assurance Don Krisha	**Project Quality Assurance Supervisor** Managed the FUSRAP Quality Assurance (QA) Department providing independent oversight in reviewing the implementation of federal, state, and local requirements. Responsibilities included all QA/QC activities at 46 sites in 14 states. Interfaces continuously with various client representatives, project and company management, related contractors, and subcontractors. Provides direction for the Audits and Surveillance Program, the Corrective Actions Program, and in the development and review of the Controlling and Implementing FUSRAP Programs and procedures. Utilizes managerial and technical knowledge of multiple disciplines in overseeing and assisting in self-assessments. Prepares reports, budgets, and QA Department controlling documents that are used throughout FUSRAP. Working knowledge of the Malcolm Baldridge criteria, ISO 9001, NQA-1, 10CFR 830.120, along with the associated Price-Anderson Amendments Act (PAAA) requirements, DOE Orders, environmental laws and regulations, and the USACE HTRW requirements. Led the effort which resulted in the program receiving the Tennessee Quality Award and the DOE Energy Quality Award.
04/98	12/00	BechtelJacobs, ETTP Project Performance and Quality Assurance **Steven M. Houser**	**ETTP Project Quality Assurance Manager** Responsible for oversight of subcontracted Quality Engineers, continuous interface with DOE Site Office, verification and oversight of field activities. Verification of 10 CFR 830.120 implementation. Ensuring that appropriate quality elements are included in subcontracts, specifications, statements of work, and work authorizations documents. Project contact for all external assessments. Responsible for the investigation and resolution of project Occurrences. Project procedure and Lessons Learned contact. BJC Point of Contact for the EH Investigation of the ETTP Gaseous

			Diffusion Plant. Most recently, led and coordinated the BJC ETTP EH Corrective Action Plan which included reviewing and verifying the adequacy of root cause analysis. knowledgeable of various root cause analysis techniques such as MORT. Barrier Analysis. Cause and Effect. and TapRoot™.
12/00	Present	BechtelJacobs. LLC K-25 Building Facility Manager Gil Drexel	**Facility Manager** Responsible for the original gaseous diffusion process building with an annual budget of approximately $6.5M. The K-25 Building occupies a foot print of approximately 40 acres and has been shut down since the early sixties. Surveillance and Maintenance are the primary activities. Responsible for the implementation of the K-25 BIO and the Radiation Criticality Accident Alarm TSR. Responsible for ensuring that the facility condition protects classified information and HEU materials while maintaining a safe working environment and nuclear criticality controls._ Serve as a secondary Subcontract Technical Representative (STR)

Name:	**JAMES E. KING, P.E.**
Title:	**Engineering Manager, Project Manager**
Education:	Master of Engineering, 1963, Structural Engineering and Engineering Mechanics, University of Florida, Gainesville B.S., 1962, Civil Engineering, Drexel University, Philadelphia, Pennsylvania
Special Training:	Six Sigma Training, Bechtel, 2000 Project Manager Course, Jacobs, 1997 Radiation worker Training, Bechtel Jacobs, 1998
Registration:	Professional Engineer, 1972, Colorado
Clearance:	DOE Q Clearance (Active) DOD Top Secret Clearance (Inactive)

Employment History:

Bechtel Jacobs Company LLC Manager of Projects, Site Manager	03/98 to date
Jacobs Engineering Group Inc. Project Manager	06/90 to 03/98
Westinghouse Materials Co. of Ohio Manager, Environmental Projects Project Manager Manager, Engineering Services	04/86 to 06/90
Rockwell International Corp., Rocky Flats Plant Project Administrator	06/83 to 04/86
Charter Oil Company, Multi-Mineral Division Director of Project Operations	03/79 to 06/82
Wyoming Minerals Corporation, subsidiary of Westinghouse Electric Corporation, Nuclear Fuels Division Project Manager, New Facilities Manager, Plant Design	06/74 to 03/79
Various Mineral Processing Firms Design Engineer	1962 to 1974

Mr. King has over 35 years of experience as a Project Manager in the design, construction, permitting, and operation of innovative projects in mining, chemical processing, nuclear fuel and nuclear weapons manufacturing facilities.

He has managed major line item projects at DOE nuclear weapons and fuel processing plants; and directed the review and preparation of operating procedures to assure conformance to DOE Orders, and federal and state regulations. Mr. King has conducted extensive research, design, and operation of in situ uranium recovery processes and related groundwater remediation processes, and has managed the research, development, and reduction to practice of an in situ oil shale process.

In addition to his technical assignments, Mr. King provided marketing support for Jacobs and Bechtel, participating in several large proposals. He was a primary author of technical sections; participated in oral interviews with the client; and was responsible for developing cost estimates and pricing.

Mr. King is currently with Bechtel Jacobs Co. LLC as the Manager of Projects and site manager at the DOE Portsmouth Gaseous Diffusion Plant, a uranium enrichment facility. Bechtel Jacobs serves as the landlord for uranium enrichment facilities leased to the U.S. Enrichment Corporation. Both DOE and the Nuclear Regulatory Commission regulate portions of this facility. Mr. King led a phase-in team at the onset of the contract to restructure the organization and implement the M&I concept. Subsequently he led the development of scopes and detailed estimates for preparation of bid packages for subcontracting work that was previously self performed. Bid packages included waste management, radiation control, groundwater monitoring, engineering, nuclear criticality safety, site operations and maintenance, and administrative services. Mr. King negotiated directly with the Ohio and US EPA to develop working relationships for expedited review and approval of regulatory documents. He also served as the Bechtel Jacobs representative to the Portsmouth Emergency Operations Center and directed recovery activities for Bechtel Jacobs during a critical transformer rupture emergency.

Assignments with Jacobs Engineering Group have included:

Project Manager for the Army Corps of Engineers project to remediate POL facilities at a remote Air Force Base in the Aleutian Islands. Directed permitting, design, logistics and construction to correct environmental problems at the Base.

Project Director, Operable Unit 3, DOE's Fernald Environmental Management Project (FEMP), at the Fernald Feed Material Production Center (FMPC) in Ohio. Supervised a project team of more than 400 personnel from varied disciplines in the remediation of all former uranium processing facilities, comprising over 200 buildings, structures and related waste storage and shipping facilities with an annual budget of $52 million. Developed staffing plans and negotiated staffing needs with functional managers. Acquired and directed consultants, remedial design and construction contractors performing decontamination and decommissioning (D&D) activities, waste storage and shipping activities, and related permitting and health and safety activities. Activities included:

- preplanned the entire remedial program at inception, for Operable Unit 3, resulting in a reduction in overall schedule of three years and a savings of $300 million
- devised innovative regulatory strategies to speed remediation and cut costs. This plan was approved by DOE and the EPA and is being implemented. In conjunction with the DOE and EPA, restructured the field characterization program for Operable Unit 3, resulting in a cost savings of $16 million in one fiscal year over the previously validated budget

- Program Manager at the DOE Pantex Plant in Amarillo, Texas, a nuclear weapons assembly facility. This project was a task order contract to provide engineering and technical services for support of environmental, safety, and health requirements to the operating contractor at the Pantex facility. Directed preparation of all task order proposals and estimates, acquired and assigned staff from Jacobs or teaming subcontractor organizations, and supervised technical, cost and schedule performance and reporting. Tasks included:

- drafted environmental restoration and waste management program documents for low-level and mixed wastes, hazardous and sanitary wastes; and classified, TRU, and TRU/mixed wastes.
- prepared and updated Safety Analysis Reports for the Pantex facility to bring them in line with revised DOE Orders.
- staffed and supervised a team in a complete waste inventory of over 300 Pantex site buildings, developed a sitewide environmental database, developed waste flowsheets for each process, and developed a waste minimization program.

- reviewed Pantex Plant operating contractor's waste management program for compliance with DOE Orders, and assessed Pantex compliance to the Orders with recommendations to be implemented for full compliance
- directed preparation of work plans, sampling plans, quality control plans, and health and safety plans for soils investigation at two buildings at the Pantex Plant used for high explosive machining, filtering, and disposal.

Prior to joining Jacobs, Mr. King was Manager, Environmental Projects with Westinghouse at DOE's Fernald FMPC. He managed a $360 million major environmental improvement line item consisting of 90 subprojects. He was responsible for developing budgets, staffing plans, and for engaging numerous design and construction subcontractors who were performing the work. Subprojects included refurbishment of existing manufacturing and waste handling facilities, stormwater systems, and new air and water quality facilities. Other assignments at the site included:

Manager, Engineering Services. Managed a department of 40 people with responsibility for staffing and resource assignment to provide technical support to project and production activities. Developed estimates for all modification work on site. Led an in-house staff to review all designs and modifications to operations, to assure conformance with DOE Orders, state and local codes, and safety regulations.

Project Manager. Managed the construction, operational readiness, start-up, and turnover of a uranium hexafluoride conversion facility.

As Project Administrator with Rockwell International at the DOE Rocky Flats Plant, an operating nuclear weapons manufacturing facility, Mr. King was responsible for managing design and construction contractors for numerous research, line item and GPP projects sitewide. He also directed a team of project engineers with responsibility for all engineering and construction projects in the 400 area (uranium processing).

As Director of Project Operations with Charter Oil Co.'s multi-mineral division, Mr. King directed the planning, design, and construction of process facilities for a large integrated in situ oil shale mining project on the western slope of Colorado. This $1.6 billion project consisted of oil and nahcolite processing equipment located both above and below ground. His activities included:

Obtained and supervised consultants who developed conceptual and preliminary designs for the project, which included complete process flowsheets and P&IDs, cost estimates, environmental impact assessments, and management and subcontracting plans for this project.

Obtained consultants who performed design and construction of all surface and underground processing equipment for the existing U.S. Bureau of Mines 2,200-foot deep by 8-foot diameter test shaft, which was developed into a research stope.

Directed design and construction of a corporate research center and pilot plant which included a 12-foot diameter by 35-foot high test retort and associated oil and gas processing equipment, piping, oil/gas coalescers, separation equipment, thermocouples, gas chromatographs, and analytical equipment. A complete analytical facility was built which included Fischer assay capabilities.

As Project Manager and Design Manager with Wyoming Mineral Corporation, a Westinghouse Nuclear Fuels Division, Mr. King supervised scientists, consultants and engineering firms conducting research, design, and operation of an in situ uranium recovery process. He also designed a groundwater restoration system using reverse osmosis and evaporation processes.

Earlier, Mr. King was an Engineer in the minerals and chemical processing industry, responsible for wastewater treatment and handling and process plant equipment design and installation.

----------RICHARD O. LAING ----------

1005 Ada Avenue
Idaho Falls, Idaho 83402

Home: 523-5473
Office: 526-2678

EXPERIENCE:

July 1986 to present: Idaho National Engineering and Environmental Laboratory

Current contractor October 1999 to present: Bechtal, BWXT Idaho
Contractor October 1994 –September 1999: Lockheed Martin
Contractor July 1986 to October 1994: EG&G Idaho, Inc.

Advisory Engineer/Scientist: April 1999 - Present: Perform special projects for Director of Quality Systems on complex quality processes including implementation of commercial services program and definition of quality classification for work. December 1999 – April 1999 Acting manager of Quality Assurance Independent Oversight Department. Lead Auditor performing audits on quality assurance and conduct of operations issues for INEEL. October 1994 – December 1999 Perform compliance oversights, audits, and analysis including statistical process control on safety data, for Environmental Management (EM) on EM operations and programs. Provide root cause analysis of deficiencies, accident/injury events and other issues within the INEEL. Designated the LMITCO Root Cause Analysis Champion to the Compliance Review Board - providing root cause analyses on actual and potential problems or events. Serve as principal accident investigator and root cause analyst for the EM Branch and as accident investigator for the INEEL and DOE complex. Investigations and analysis include: Procedure non-compliance at ATR, Standard Waste Box quality event at RWMC, Cesium 137 source event at RWMC, Idaho Chemical Processing Plant Old Waste Calcining Facility contamination event, Mercury Retort operation propane spill, Mercury Retort operational shutdown, and Mercury Retort FRAC Tank fire. Provide safety and operational trend analysis to Environmental Management (EM) Vice President and General Manager. Provide leadership and guidance on safety and health issues related to Federal, DOE, DOE-ID and ASME NQA-1 requirements and regulations. Served as EM VPP coordinator; championed the organization and implementation of the DOE VPP within EM including teaching Total Safety Culture and SAM IV. Conduct independent technical and management assessment Operational Readiness Reviews for EM programs to assure compliance to regulations and operability. Recent ORR assessments include the Waste Storage Facility - 635 and the Transuranic Storage and Retrieval Enclosure at the RWMC. Review and provide technical comments on EM and LMITCO safety and health documents.

Provided technical safety expertise to the DOE on nuclear and non-nuclear operational efforts on Safety Analysis Reports (SARs), Technical Safety Requirements (TSRs), Unreviewed Safety Questions (USQ), and Operational Readiness Reviews (ORR). Project Leader and instructor on the DOE HQ TSR Course to DOE facilities/sites throughout the U.S. Developed and presented the TSR Generic Rules sections on Limiting Control Setting (LCS)/Limiting Conditions for Operations (LCO) and Surveillance Requirement (SR), TSR LCO/LCS specific Surveillance Requirements, TSR Administrative Controls, and TSR Review and Approval processes.

Engineering Specialist – Environmental Management: December 1991 - October 1994: Provide technical nuclear and non-nuclear waste management and environmental remediation/operations expertise in the development of the DOE HQ TSR Course. Provided technical nuclear and non-nuclear expertise to the Independent Safety Review Committee on the operations, documentation, and D&D of facilities and operations at the Idaho National Engineering Laboratory (INEL). Specific facilities reviewed included the Radioactive Waste Management Complex (RWMC), Waste Storage Facilities (WSF), Stored Waste Examination Pilot Plant (SWEPP), Test Area North (TAN), Waste Experimental Reduction Facility (WERF), Waste Reduction Operations Complex (WROC), and Waste Experimental Development Facility (WEDF). Provided technical review comments on SARs, TSRs, USQs, ORRs and other nuclear and non-nuclear safety documents and processes, averaging some 60 documents per year. Provided guidance and training on ORRs including establishment of, and participation on, ORR teams for various facility ORRs including RWMC, TAN Hot Cells, WERF, WSF and others. Provided systems engineering and project management support to the ISRC. Developed training and trained all ISRC members on all initial and refresher reviewer techniques and processes. Analyzed, organized and directed a systematic document review process. Developed and maintained a Program Management Plan, directive and procedures governing document reviews and ORRs for the Environmental Operations department.

Safety and Engineering Manager 3 - Training and Emergency Preparedness Unit: July 1989 -December 1991: Responsible for technical and nuclear training and emergency preparedness for Waste Management and Environmental Restoration Department. Organized a new unit, hired and trained staff, directed development and implementation of a

department wide DOE 5480.20 based technical Training Program Plan and DOE 5500.3A based Emergency Preparedness Plans for RWMC, TAN, WERF, and WROC.

Management Specialist: July 1986 - July 1989: Technical Leader of Environmental Safety and Health Training Unit responsible for nuclear and non-nuclear safety and health training for EG&G. Directed development of performance based technical lesson plans in radiation safety, hoisting and rigging, respirator, and OSHA. Developed then taught Instructional Course Construction and Design, as an adjunct instructor to Idaho State University. Provided management and training consultation to Nuclear Operations. Taught Kepner-Tregoe: Problem Solving and Decision Making, Blanchard and Associate: Situational Leadership, and several other management and leadership courses.

May 1979 - July 1986: American Microsystems Inc., Pocatello, Idaho

Manager - Training: 1984 - 1986: Managed the training and development of this custom integrated circuit manufacturing company. Developed technical and engineering video training tapes on semiconductor fabrication processes. Developed and taught a first line supervisor training course, also taught management and leadership courses based on the Ken Blanchard Situational Leader model and the Development Dimensions International, Interaction Management model. Assisted in the development and implementation of statistical process controls based on Demming and Juran models.

Manager - Fabrication Section: 1979-1984: Managed the testing, assembly and production of custom designed, integrated semiconductor circuits. Responsible for budget, production line flow, equipment evaluation, and personnel training.

August 1973 - May 1979: The Church of Jesus Christ of Latter Day Saints, Salt Lake City, Utah

Principal and Teacher: Provided daily classroom instruction to secondary level seminary students as well as being responsible for all budget, procurement, and equipment and building maintenance needs.

May 1967 - July 1972: United States Marine Corps

Pilot: Squadron pilot in both fixed wing and helicopter. Flight instructor in the Naval Training Command with ancillary duties as personnel officer. Served in Viet Nam 1969-1970, honorable discharge-medical.

EDUCATION:

- 1967 – B.S. Engineering: Industrial Technology with emphasis in aeronautics, Utah State University, Logan, Utah. Teaching certificate in Industrial Education – currently expired.
- Certified Lead Auditor
- Certified U.S. Department of Energy Accident Investigator
- Certified in Environmental, Health & Safety Law (Institute for Applied Management and Law, Inc.)
- Certified instructor in:
  - Problem Solving and Decision Making (Kepner-Tregoe)
  - Situational Leadership (Blanchard Training and Development)
  - Interaction Management (Development Dimensions International)
  - Quality Education System (Philip Crosby Associates)
  - Principle Centered Leadership (Steven Covey Associates)
- Company Courses completed:
  - Systems Thinking
  - TapRoot Root Cause Analysis
  - Cost Account Manger/Project Manager Level I & II
  - Risk Based Prioritization
  - Unit Manager Development Program
- Computer proficient in: Microsoft Office, Word Perfect, Freelance Graphics, and others.

PERSONAL:

Disabled Viet Nam Veteran DOE L Clearance Hobbies: Fishing, Camping, Golfing, Gardening, and Reading

ROBERT H. McCOOK
PO BOX 508
GRACE, ID. 83241
(208) 425-3661

EDUCATION

- DOE 5480.20A, 5480.19, Systematic Approach to Training
-Twenty three years of Naval service with twenty in positions of upper to middle maintenance management/supervision.
-Supply/logistics [stock control/management, OPTAR (financial/budget management), shipping/receiving, shipment routing, expediting, etc.] computer operations, office administration, tool control & management, maintenance control and management.
-Extensive Naval aircraft maintenance technician/manager's courses including: support equipment , airframes/hydraulics, systems troubleshooting, corrosion control/prevention, painting/final finishing, dye penetrant inspection.
-Persuasive Communicating Skills.
-Contract management/administration--University of Dallas: Acquisition & Government Contract Management, DCAS: Quality Assurance in Contract Admin, CNATRA: Production Monitoring in Contract Admin.
-Extensive training in Quality Assurance & Production Monitoring/Evaluation, under Naval Aviation Operations and Maintenance requirements.
-Flight deck fire fighting, accident prevention, first aid, emergency response/rescue.
-Consistent Outstanding performance on all Physical Readiness Tests (PRT) since it's conception.
- Fifty-two credit hours in attendance at ISU- 4.0 GPA to date.

BACKGROUND KNOWLEDGE/EXPERIENCE

* 1 year Training Supervisor Central Facilities Area (CFA) at the Idaho National Engineering and Environmental Laboratory (INEEL)
* 2 Years Conduct of Operations, Conduct of Maintenance & ISMS Subject Matter Expert at INEEL
* 1 year Root Cause Analysis & Critique Leader at INEEL, CFA
* 23 years Maintenance engineer/supervisor/manager-numerous type/models of Naval aircraft
* 5 years maintenance supervisor-habitation/building maintenance upkeep.
* 15 years office administrator/computer operator/mid-upper level manager/supervisor.
* 12 years technical writing/data collection for scheduled maintenance tracking/trend analysis/production output monitoring/product quality evaluating.
* 23 Years interpreting/applying/complying/enforcing-strict military regulations/policies/directives.
* 8 years Quality Assurance Specialist/Inspector/Monitor/Evaluator.
* 20 years developing/evaluating/implementing aircraft maintenance training programs (U.S. , Japanese, and Australian military personnel).
* 3 Years supply/requisitioning/stock control/logistics support/OPTAR (Financial Management).
* 3 Years tool control, procurement & management of program, management of tool bins/room.
* 4 years Hazardous Material Management & Control Officer.
* 10 years emergency airfield (runway) response/fire fighting/rescue--2 years in Supervisory.
* 18 Months retail floor/store management

WORK HISTORY

INEEL- Lockheed/BBWI- Supervisor of training, providing oversight and management of training requirements, development, tracking and delivery to Central Facilities Area personnel in direct support and report relationship to the Site Area Director. Promoted after approx 6 mnths of assignment.

Conduct of Operations, Conduct of Maintenance and ISMS Subject Matter expert: Each area previously filled w/ three employees. Responsible for oversight at the Facility, under the Site Area Director, ensuring compliance w/ contract requirements, DOE orders and company implementing procedures.

Senior Supervisory Watch: Responsible for oversight of operations & maintenance conducted at the Facility through actual production/site visits, reviews of work control documents, RWPs, SWPs, etc and review of compliance w/ ESH&QA requirements and procedures.

Critique Leader: Responsible for conducting/facilitating all critiques held at or involving the Facility and for Root Cause Analysis of the event/incident incurring the critique requirement.

United States Navy- Documented Superior Performer in every assignment/environment with ability to adapt/learn quickly. Selected from top 10% of Naval Enlisted personnel: Commissioned as a Naval Officer.

Office Administrator- Supply Officer/Maintenance Control Officer, supervising 20-525 personnel.

Responsibilities include : Administration/Quality/Organization of department administration routing/work,

financial tracking/management of operational funding (OPTAR), personnel evaluations of performance, supervision of all supply/stock control management, expediting of supply requisitions, scheduling of maintenance production requirements, supply logistics/tracking/support for away from home/ship detachments, expediting repair components between stateside supply centers to Persian Gulf/Japan and in-between, Staffing of Tool Control & management workcenters; ensuring that all production workcenters were properly tooled with quality, but cost effective tools, tool material condition analysis and upkeep.

Contract Administrator/Quality Assurance/Production Specialist- Administer/Inspect/Monitor/Evaluate quality assurance and production processes/procedures implemented by four major corporations (Lockheed (LSSI), Ford Aerospace, Burnside-Ott, Dynacorp) in performance of multi-million dollar government contracts (in compliance with Mil-Q and Mil-I standards/requirements).

Hazardous Material Coordinator- Responsible for management of the overall HAZMAT program, including supervision and training of personnel. Responsibilities included procurement/storage/waste disposal/emergency response and handling.

Structural Mechanic- Responsibilities included Sheet metal/Fiberglass repair, Hydraulic system maintenance and troubleshooting, flight control rigging, weapons system troubleshooting, preventative maintenance management, quality assurance processes/inspections.

Maintenance Manager- Managing/Supervising 50-300 personnel, coordinating/scheduling/ensuring quality of compliance with maintenance requirements, training in the formal (classroom) and on-hands environment. Manage tool/test equipment material condition, procurement, calibration, repair.

Retail-Support Management-Wal*Mart (Chubbuck, Idaho)- Supervising floor personnel, Customer Service Management, Courtesy Desk operations, Financial (Deposit) Verification, Stocking/Cleaning/Floor supervision in closing-preparation for next days business. Advanced rapidly (5 months/with four pay raises) from entry level Floor Associate position to Management.

Bechtel Nevada

RESUME

NAME: Stephen (Steve) Metta DATE: 12/22/00
EMPLOYEE NUMBER: 183824

BN CLASSIFICATION: Senior Manager
BN COMPANY: Bechtel Nevada Corporation
WORKING TITLE: Performance (Quality) Assurance Manager
ORGANIZATION & DEPARTMENT: Performance (Quality) Assurance
LOCATION: Las Vegas Nevada
CITIZENSHIP: U.S. A.
BN HIRE DATE: 1/1/96
ORIGINAL COMPANY SERVICE DATE: 1/96
MILITARY SERVICE & RANK: USCG E-4

PROFESSIONAL LICENSES AND SOCIETIES

Member, American Society for Quality
DOE AQ@ Clearance
DOD Secret Security Clearance (inactive 1990)
Lead Auditor, NQA-1
ISO-9000 Certified Lead Auditor, Q04176

EDUCATION AND PERSONNEL DEVELOPMENT PROGRAMS

DEGREE, CERTIFICATE, ETC.	SCHOOL	MAJOR (OR SUBJECT)	DATE
B.S.	Northrop University, Inglewood, California	Engineering	6/74
	FAA Airframe and Powerplant Teterboro School of Aeronautics Teterboro, New Jersey	Certification	3/70

Company/Professional Sponsored Courses

Effective Management Program .... Project Engineering Program .... Six Sigma...Reactor Installation and Construction .... Welding Supervisor .... Lead Auditor .... Various Nondestructive Testing Courses .... Kepner/Tregoe Problem Analysis and Decision Making .... Cost/Schedule Control System Criteria .... Total Quality Management (Crosby) .... Team Building .... Project Management Program .... Advanced EPA Regulations .... Environmental Expert Witness .... Conduct of Operation .... ISO-9000 .... ISO-14000... Six Sigma.

OTHER SIGNIFICANT INFORMATION:

ACHIEVEMENT LANGUAGE CAPABILITY GEOGRAPHIC PREFERENCE

GEOGRAPHIC PREFERENCE

International: South and North America, and Australia preferred. Will consider Europe, Western Asia, Far East Asia (South Korea, Japan, and Indonesia). National: Southwest preferred. Will consider south and east coast.

Overall experience includes a working knowledge of Uniform Boiler Code .... ASME Boiler and Pressure Vessel Code .... 10 Code of Federal Regulations (CFR) Series .... 40 CFR Series .... 20 CFR Series .... 49 CFR Series .... Uniform Fire Code .... American Welding Society Codes .... NQA-1 and NQA-2 .... ANSI Piping Codes .... American Petroleum Institute Codes .... Department of Energy (DOE) Orders .... International Standard Organization (9000 and 14000 series) .... MIL Specifications and DOD specifications.

SKILLS/EXPERIENCE (KEYWORD LIST):

Chemical Industry
Contractor Officer Technical Representative
Field Engineer
Modular Process Systems
NDE
Nuclear Power Industry
Petroleum Industry
Pressure Piping
Project Management
Quality Control
Quality Assurance

WORK HISTORY

DATES FROM	TO	COMPANY OR DEPARTMENT LOCATION AND SUPERVISORS	POSITION HELD, SUMMARY OF RESPONSIBILITIES AND SIGNIFICANT ACCOMPLISHMENTS
6/74	8/79	**General Electric Company Installation and Service Engineering Division**	**Project /Field Engineer**
		Responsible for planning, scheduling, and supervising activities during construction and maintenance outages at several nuclear and fossil power stations. Typical projects included in-service and baseline inspections, spent fuel pool piping modification, reactor pressure vessel safe end and core spray replacement, feedwater sparger modification, reactor pressure vessel move and set, reactor internals installation, high pressure piping spool fabrication, moisture separator reheator installation, heat exchanger replacement, and start-up operations.	
8/79	10/83	**Applied Engineering Company (Subsidiary of Daniel International)**	**Quality Assurance Manager**
		Responsible for the Quality Assurance/Control operations .... developed an integrated Quality Assurance/Control system for materials and processes based on the quality and safety aspects of customer requirements .... provided technical counsel to functional organization on welding and nondestructive evaluations .... evaluated subcontractor performance. Maintained the company ASME certifications (N, NPT, U, UM, H, S, PP). Product line included chemical petrochemical process modules, nuclear power plant components, propane air plants, liquefied natural gas plants, heat recovery units, and piping systems.	
10/83	12/90	**Science Applications International Corporation**	**Task/Program Manager**
		Program Manager assigned to the SAIC Sector QA operation. The focus of this program was to provide corporate Quality overview and support of all SAIC projects within the Space, Energy, and Environment Sector. Task Manager on SAIC=s QA and Safety support contract to the U.S. Army Chemical Stockpile Demilitarization Program (CSDP). Responsibilities involved the development and implementation of CSDP Quality and Safety Management Program for the design, construction, operation, and decommission phases of several CSDP facilities. Also assisted the CSDP with operational readiness reviews, operational verification testing, and support to environmental permitting and transportation. Task Manager on SAIC=s Technical and Management Support Service contract with the DOE=s Office of Civilian Radioactive Waste Management (OCRWM). Responsibilities involved the development and implementation of the Yucca Mountain Project Quality Assurance Program, which set forth controls and requirements that provided reasonable confidence for quality achievement and quality demonstration/verification. Support to the project included a quality assurance overview of the primary project activities, such as repository design, waste package design, site characterization, performance assessment, and environmental monitoring. In addition, served on a steering committee to the DOE Deputy Project Manager to formulate management policies and program direction.	
12/90	12/95	**Reynolds Electrical & Engineering Co., Inc.** **(A division of EG&G)**	**Performance Assurance Manager**
		Responsible for the coordination and implementation of the company=s Quality, Self Assessment, and Conduct of Operation Programs in support of the management and operations contract with the DOE. Major functional responsibilities included Quality Assurance and Control .... Procurement Quality Assurance .... ES&H and Quality Compliance Assessment .... Performance Indicator Programs .... Productivity Program .... Diagnostic Cable Inspection	

Calibration Services .... Welding Operations .... Hazardous Waste Certification. The companies focus was the operation and maintenance contractor at the Nevada Test Site for the DOE. Contractual functions included: facility maintenance .... construction .... mining .... drilling .... engineering .... safety .... environmental restoration .... facility operations.... research and development .... fleet and equipment maintenance .... hazardous waste removal .... medical support.

1/96 Present **Bechtel Nevada Corporation** **Performance Assurance Manager**

Las Vegas, NV

Responsible for the coordination and implementation of the company=s Performance Assurance and Integrated Safety Management Programs in support of the management and operations contract with the DOE. Major functional responsibilities includes Quality Assurance Engineering .... Procurement Quality Assurance .... Performance Assurance .... Compliance Assessment .... Management Systems Integration/Facilitation .... Hazardous Waste Certification .... Suspect Counterfiet Material Program .... PAAA.... Contractual functions includes: facility maintenance .... construction .... mining .... facility operations .... drilling .... engineering .... safety .... environmental restoration .... research and development .... weapons demilitarization .... hazardous waste removal .... medical support .... aviation operations .... research and development activities .... emergency response .... fleet and equipment maintenance. In addition, serve as the BNI Six Sigma Champion for deployment at Bechtel Nevada and the NTS.

Lisa V. Pascoe

WORK HISTORY:

12/00* – Present **Bechtel SAIC Company, LLC, Office Assistant, Las Vegas, NV**
*** Includes first 4 months' service with OfficeTeam Staffing**

- Administrative and secretarial support to Manager of Projects Senior Management staff
- Assigned as administrative support to Root Cause Analysis Team
- Schedule meetings and coordinate all related details
- Arrange travel and prepare expense reports

02/99* – 11/00 **Beau Rivage Casino, Table Games Secretary I, Biloxi, MS**
*** Includes first 6 months' service with Interim Staffing**

- Administrative and secretarial support to Table Games Department management staff
- Process, monitor, and track all employee status change documentation, i.e., attendance, disciplinary actions, commendations, employment leaves, transfers, etc.
- Audit departmental payroll timekeeping reports; coordinate correction of timesheets

11/98 – 01/99 **Arizona Information Systems, Temporary Assignments, Scottsdale, AZ**

- Arizona Biltmore Resort & Spa - Desert Jewel Destinations & Sales Departments
- Pinnacle West Corporation

10/97 – 10/98 City of Phoenix, Public Works Confidential Secretary II, Phoenix, AZ

- Administrative and secretarial support for two Assistant Directors, one Deputy Director
- Provide clerical support to Personnel Officer and staff

11/95 – 08/97 **La Plata County, Human Resources/Finance Tech., Durango, CO**

- Conduct new hire orientations and exit interviews
- Process and data entry all employment and benefits related paperwork
- Liaison between employees and all benefit providers
- Generate, track, data entry and file all employee status change and payroll documentation
- Prepare internal/external position recruitment bulletins and conduct qualifying tests

04/88 – 08/95 **City of Burbank, Police Department Secretary, Burbank, CA**

- Confidential administrative and secretarial support to Division Captain and command staff
- Prepare internal investigations, search warrants, disciplinary actions, commendations, monthly statistical reports and correspondence, and Dictaphone transcription
- Generate, track and process employee status change documentation, i.e. assignment, salary change and evaluation documentation
- Schedule meetings and coordinate all related details
- Police Chief's relief secretary

WORK HISTORY (cont.):

08/85 – 03/88 City of Burbank, Community Development Int. Clerk, Burbank, CA
*** Includes first 2 months' service with Kelly Services Staffing**

- Type, assemble, and delivery staff reports for weekly City Council meetings
- Track, verify accuracy, and process invoices for payment
- Maintain division project and correspondence files
- Maintain and requisition departmental office supplies

EDUCATION:

Graduate, **Herbert Hoover High School,** Glendale, California

SKILLS & ABILITITES:

Computer and Internet literate
Type 70+ wpm
Dictaphone Transcription
Able to maintain discretion and confidentiality
Able to create and maintain working relationships with fellow employees
Able to work with government and elected officials, and the public tactfully and courteously

PROFESSIONAL OR PERSONAL REFERENCES:

Available upon request

NAME:	Jorge Schulz	DATE:	07/01
CLASSIFICATION:			
WORKING TITLE:	Engineering Supervisor		
ORGANIZATION:	BSII		
LOCATION:	San Francisco		
CITIZENSHIP:	USA		
CONTINUOUS SERVICE DATE:	6/26/78		
RE-EMPLOYMENT DATE(S):			
SPOUSE'S NAME:	Kathy		
CHILDREN'S DETAILS:	Ariadne Lucia Schulz, 17 Ferenc Christian Schulz, 13		

PROFESSIONAL LICENSES AND SOCIETIES:

EDUCATION AND PERSONNEL DEVELOPMENT PROGRAMS:

DEGREE, CERT., ETC.	SCHOOL	MAJOR (OR SUBJECT)	DATE
BS	University of Illinois	Physics	1975
MS	University of Illinois	Physics	1976

OTHER SIGNIFICANT INFORMATION:

(Language Capabilities, Assignment Preferences, Computer Skills & Outside Activities)

Language: Spanish, Hungarian

Publications:

S. Golan, M. Levenson, J. Schulz, R. Sher, "Confinement Enhancement of RBMK Reactors by Water Sprays," presented at the "Nuclear Energy and Human Safety" Conference, Nizhny Novgorod, Russia, July 1993.

M. O'Connor, J. Schulz, C. Tan, M Kasjaka, Bechtel and N. Alper, Westinghouse, "AP600 Containment Purge Radiological Analysis," presented a the 23rd DOE/NRC Nuclear Air Cleaning and Treatment Conference, Buffalo, NY, July 1994.

WORK HISTORY

DATES From	To	COMPANY OR DEPARTMENT LOCATION AND SUPERVISOR	POSITION HELD, SUMMARY OF RESPONSIBILITIES AND SIGNIFICANT ACCOMPLISHMENTS
June 1978	Dec. 1984	Engineer, Radiation Analysis Group, San Francisco Chief Nuclear Engineer Staff.	Accomplishments include: • Coordination of the Radiological Analysis Group effort for the preparation of the Skagit Hanford nuclear project accident analysis section of the PSAR and ER. • Calculation of releases for normal plant operation and preparation of the appropriate PSAR and ER sections related to siting of a new nuclear power plant. Also, Mr. Schulz has presented testimony concerning these releases before the state Energy Facility Site Evaluation Council hearing. • Assistance at the Limerick project and the client in evaluating the real-time dose calculation programs developed for compliance with NRC's emergency planning criteria • Performed analyses involving transportation of toxic chemicals and impacts on the control room habitability for six projects: Limerick, Monticello, Prairie Island, S/HNP, Diablo Canyon, and Trojan.
Jan. 1985	Nov. 1987	Senior Engineer, Radiation Analysis Group, San Francisco Chief Nuclear Engineer Staff.	Accomplishments include: • Coordination, development and continual refinement of the Bechtel standard computer program LOCADOSE, NE319, which is used for accident analysis by all Bechtel offices. • Development of the Bechtel computer code TOXGAS, NE314, used by all Bechtel offices for calculating toxic chemical concentrations in the control room.

Nov. 1987	March 1994	Radiological Analysis and Protection Group Supervisor, San Francisco Chief Nuclear Engineer Staff.	Responsibilites include: • Supervision, task assignment, and budget and schedule control for engineers in the RAG RPG. • Supervision of all analyses for nuclear projects in radiological transport, dose assessment, toxic chemical, control room habitability, radiation, shielding and ALARA. • Acquisition, tracking and control of microcomputer equipment and software for the Nuclear and Mechanical staffs. • Development of IBM-PC computer codes and applications for RAG/RPG. • Development of statistical sampling techniques for Diablo Canyon, Limerick, and TVA projects.
March 1994	Dec. 1995	Assistan Chief Nuclear Engineer, SFRO J. Darnell, Supervisor	Responsibilities include: • Personnel, salary, and career administration to approximately 50 nuclear engineers assigned to the San Francisco Regional Office. • Technical oversight of tasks performed by nuclear engineers on projects and on the Nuclear Staff. • Supervision, task assignment, and budget and schedule control for engineers in the RAG/RPG. • Supervision of all analyses for nuclear projects in radiological transport, dose assessment, toxic chemical, control room habitability, radiation, shielding and ALARA.
Jan. 1996	Aug. 1996	BNI Systems Engineering Staff, San Francisco J. Cunliffe, Supervisor	Responsibilities include support to existing and new projects in the areas of radiation analysis, toxic chemical analysis, hazards analysis, probabilistic risk analysis and statistical analysis.

Sept. 1996	Present	BSII Small Project Group, San Francisco R. I. Smith, Supervisor	Responsibilities include support to existing and new projects in the areas of radiation analysis, toxic chemical analysis, hazards analysis, probabilistic risk analysis and statistical analysis. Accomplishments include: • Coordination and performance of radiological analyses to support operating nuclear power plants such as Palo Verde, Diablo Canyon, and San Onofre • Development of the probabilistic dose calculation methodology used to support the Seismic Probability Risk Assessment for the River Protection Project Waste Treatment Plant.

Robert K. Smith

Programmatic Software &
Web Development
Org: 2490 - MS 3564
rs6@inel.gov
(208) 526-5801

935 Koster Ave
Idaho Falls, ID 83404
rxs@srv.net
(208) 522-7151

Education

Bachelor of Science – Systems Analysis - 1972
Miami University, Oxford Ohio

Masters of Business Administration – Organizational Behavior – 1974
Ohio University, Athens Ohio

Professional Memberships

American Society for Quality
Senior Member
Certified Software Quality Engineer 1996 #73
Certified Quality Engineer 1988 #19,162
Member of CSQE Exam Review Committee
Webmaster for Local ASQ Section 603
Institute of Electrical and Electronic Engineers

Special Skills and Abilities

- A strong desire to learn how things work.
- A determination to see things through.
- Excellent Communication Skills.

Work Experience

October 1991 – Present Advisory Engineer/Scientist
Idaho National Engineering and Environmental Laboratory

- Prepared a complete rewrite (revision 5) of MCP-550, Software Management, to meet the requirements of PRD-5092, 19.1 Software Quality Assurance and the anticipated acceptance of DOE Notice 203.1, Software Quality Assurance.
- Quality Assurance and Configuration Management Officer for the Business Systems Improvement Project (BSIP). Responsible for independent reviews and assessments of the project and author of the BSIP Configuration Management Plan.
- Assisted in the writing and revision of Configuration Management Policies and Procedures for the INEEL. Assisted in the creation of MCP-3630, Computer System Change Control, and author of GDE-59, also titled Computer System Change Control.
- Assisted in the preparation for both Corporate and ISMS audits on Configuration Management. Designated as a Configuration Management Subject Matter Expert for the Information Resource Management (IRM) Directorate.

- Provided input for the creation of MCP-3039, Analysis Software Control, for the Special Nuclear Fuels program based on the requirements of NQA-1-1997 and QARD DOE/RW-0333P in response to an ICARE finding.
- Provided updates to MCP-550, Software Management and PRD-171, Information Management.
- Provided Training and Consulting on Software Quality Assurance, Configuration Management, MCP-550, MCP-3630, SEI CMM, ISO 9001 Part 3, and other related topics.
- Responsible for the conversion of the Training Tracking and Reporting (TRAIN) System from Oracle Forms 3.0 to Forms 4.5 (over 50 forms). Assisted in the conversion of TRAIN reports from Oracle Reports 1.1 to 2.5 (over 70 reports).
- As department Software Quality Assurance Specialist wrote and revised PLN-387, department level Software Development Policies and Plans in preparation for an informal assessment per Revision 1.1 of the Carnegie Mellon Software Engineering Institute Capability Maturity Model or ISO 9001 Part 3 registration.
- Assisted in the development and improvement of Financial Management and Project Status Reporting systems for the New Production Reactor (NPR) program.
- Created a Configuration Update and Control application using TCIP/IP File Transport Protocol for the RWMS database system.

June 1988 – October 1991 Senior Assurance Engineer
ITT Aerospace/Communications Division

- Responsible, as Chairman of the ITT Corporate Software Quality Council, for representing North American Software Quality Issues at the corporate level to the ITT Executive Quality Council.
- As Software Quality Assurance Supervisor responsible for four SQA Engineers and all division activities related to software quality assurance, including bids, proposals, plans, and procedures.
- Performed internal assessments per Revision 1 of the Carnegie Mellon University Software Engineering Institute Capability Maturity Model to assist improvements in software development processes. Provided division wide recommendations.
- As Quality Assurance Department Change Agent, required to trace systematic problems across department boundaries, analyze difficulties, identify root causes, and implement solutions. Revised the company corrective action process and provided recommendations for changes to a facet of the procurement process.
- Editor of The X Factor, a quality oriented newsletter.

February 1984 – April 1988 Senior Software Engineer
Singer Company

- One of four Development Team Leaders for a software subcontract with the Air Force Area Reprogramming Capability (ARC) project using DoD Std 2167A and 2168.
- Lead Software/Database review member of and Air Force Source Selection Board IV&V team for the Depot Maintenance Management Information System (DMMIS) project.

- Site Product Assurance Representative responsible for the review and approval of all deliverable documents and software products for an Army contract under Mil-Std-9858.
- Supervised one to four individuals in team leaded and product assurance functions.

November 1979 – February 1984 Senior Systems Analyst
EI International

- Responsible for the design and development of software for nuclear industry applications.
- Responsible for preparing user manuals, proposals, software instructions, and marketing materials.
- Provided major enhancements to a Probabilistic Risk Assessment project with an application to that created fault tree diagrams from the analysis input data.

December 1976 – October 1979 Senior Programmer
Baltimore Gas & Electric Company

- Responsible for software development of a variety of commercial applications related to electrical utilities.

- Responsible for the software maintenance and updates of a bulk power distribution Supervisory Control and Data Acquisition (SCADA) system.
- Enhancements applied to this process resulted in substantial improvements to the SCADA update process.

September 1974 – September 1976 2nd Lieutenant
United States Army

Helped develop a Manpower Information and Project Tracking System for the U.S. Army Material Systems Analysis Activity (USAMSAA) at Aberdeen Proving Grounds, Aberdeen Maryland.

SECURITY CLEARANCE

Q – Inactive (DoD Clearances also Inactive)

Papers and Publications

MCP-550, Software Management – Rev 5, 2001

PLN-387, Software Development Plan – Rev 0 – 2, 2000

GDE-59, Computer Configuration Management – Rev 0, 1998

"Cookbooks, Snake Oil, and Silver Bullets"
ASQ 48th Annual Quality Congress – May 24-26, 1994

"Deciphering the Problem" The Total Quality Review,
Volume 1, No. 4, September/October 1991, pages 181 - 184

"Why Good People Write Bad Code"

ASQ 45th Annual Quality Congress – May 20-22, 1991

"When it's NOT in the Contract" National Security Industrial Association
7th Annual National Joint Conference on Software Quality and Productivity
April 23-24, 1991

"Thirty Day Sequence of Events"
Three Mile Island Unit 2 Technical Report, General Public Utility

Programming Languages and Systems

C – Pascal – Assembler – FORTRAN – COBOL
Windows – UNIX – Oracle SQL, Forms, and Reports

Community Support

Idaho Business Week Company Advisor – Five years from 1994 to 2000
Idaho Association of Commerce and Industry, BSU Boise, Idaho

Community Hero Olympic Torch Bearer – 1996
Atlanta Committee for the Olympic Games

Volunteer Tutor, 1994 – 1993
INEEL Office of Academic Programs

422 S. Church St.
Charlotte, NC 28202
E-mail
tjwall@dukeengineering.com
702-295-0174

7809 Wedlock Lane
Las Vegas, NV. 89129
E-mail Twall87250@aol.com
702-658-5494

Tommy Wall

Objective

Management

Project/Performance Improvement

Experience

1998-Present Federal Group Duke Engineering and Services
Senior Technical Specialist

- July 99- Present – Yucca Mountain: Currently the Lessons Learned and Root Cause Coordinator for the Yucca Mountain Project. Partial list of work performed includes Nuclear Cultural Surveys as well as assessment of the Yucca Mountain Spent Waste Repository Project. Merged root cause tools and developed an integrated procedure for Root Cause. Assessed the current state of Performance Improvement and Nuclear Culture through an analysis of two years of deficiency reports. Successfully passed ISMS with the Lessons Learned Program.
- Jan 99-June 99 - Oak Ridge: Organization Design/Re-engineering of the Work Control function. Simultaneously developed an Organizational Redesign of the Training Function as a result of previous work. Also, returned to Fitzpatrick for additional work at the request of the Project Manager.
- Dec 98-Jan 99 - Fitzpatrick Nuclear Station: Design Basis Document investigation and clearance of outstanding items. Top performer for the contract.
- Nov 98 - Mox: Training Mobilization Plan for initial staffing after contract.
- Oct 98-Nov 98 - Oak Ridge: Organizational Design Evaluation of the Training Function for Lockheed-Martin Energy Systems. This evaluation resulted in the customer asking for additional work to be done in implementing the recommendations.
- Sept 98 - Millstone Nuclear Station: Evaluation of Technical Training Programs against INPO criteria for self-assessment. Letter of commendation.
- July 98 - Rocky Flats Bid Process(slated to be General Manager, Performance Improvement) (Bid not awarded)

July 1997-Oct 1998 Duke Energy Training (DET) Duke Energy
Manager, Instructional Technology, Evaluation and Records

- Responsible for root cause analysis and Lessons Learned evaluation of customer/ DET interfaces to improve delivery of products and services.
- Benchmark with other large business training/performance improvement organizations in order to recommend business performance improvements to DET. This includes alteration to product and service lines as well as organizational improvements
- Manage the qualifications Skills Database for Nuclear Generation as well as other users
- Responsible for the Records Management of all training records for Duke Energy including Nuclear Training Records. This includes recommendations for technology improvements.

- Managed the development of the Training Management System. An evaluation tool for capturing and analyzing the value added impact of DET's products and services to our customers
- Managed the creation of the Career Development Plan. An instrument which will guide the development of DET personnel, making them more valuable to our business and the marketplace. Currently anticipate sales to 8-10 customers
- Duke Energy's representative to the ASTD Benchmarking Forum

1994-July 1997 Training Division Duke Energy

- Managed the Consulting Team. This team was responsible for analyzing our customers Department strategic plans, making recommendations for performance improvement solutions and helping to implement those solutions. This included a complete revamping of Environmental Training Programs and OSHA Certification.
- A staff of 12, customer satisfaction response was such that all 12 were fully billable to our customers and the section turned a substantial profit.
- Assisted Nuclear Generation with Mock Board Review for accreditation at Catawba NS.

1992-1994 Business Management Duke Power

Manager, Performance Improvement

- Managed the section involved with critical assessment of the department's competitive position in the marketplace. This included analyzing and recommending changes to enhance competitive positioning, tracking and publishing the Monthly Reports on Strategic Plan trends, and trending Critical Success Factors.
- Developed Competitive Analysis process with the Environmental Division

1991-1992 Training Division Duke Power

Manager, Planning and Quality

- Responsible for Strategic Planning, Benchmarking, and the Quality Process. Included in this are functions as the Business Manager, Financial Manager, budget, and resource planning.
- Consultant to the Nuclear Training Function in the above capacities.

1990-1991 General Office Duke Power

System Specialist, Maintenance Training

- Provided technical leadership and expertise in the planning, assessment and evaluation of Nuclear Maintenance Training Programs. The programs were Mechanical Maintenance (including Lockout/Tagout), Instrument and Electrical, Transmission, and Construction. Duties included ensuring compliance with NRC and INPO requirements, bringing to resolution the differing opinions on approach to programs, chairing the interface working groups, and new start up trouble shooting. This was a staff position reporting to the General Manager.
- Peer Evaluator for Seabrook Nuclear Initial Technical Training Accreditation.

1987-1990 McGuire Nuclear Station Duke Power

Director, Technical Services Training

- Responsible for oversight and direction of training programs in the following areas: Chemistry, Radiation Protection (including ALARA, Environmental Monitoring and GET), Manager/Technical Staff, Instrument and Control, and Maintenance Supervisor.
- Managed the planning and assessment related to Initial INPO accreditation as well as successful renewal of all programs.
- Supervised 11 technical instruction staff.

1982-1987 McGuire Nuclear Station Duke Power Director, Radwaste Processing

- Manager of Radwaste Processing, Nuclear Chemistry. Responsibilities included reduction of inventories, program management of radwaste volumes, and optimization of station processing equipment in Solid, Liquid and Gaseous radwaste.
- Supervised 6 direct and 25 indirect with a multi-million-dollar budget.

1979-1982 McGuire Nuclear Station Duke Power

Supervisor, Chemistry/Radwaste

- Provided supervisory coverage of all aspects of Nuclear Chemistry including Analytical, Instrumentation, Water Treatment, Primary systems, Environmental and Radwaste.
- Start-up manager for Boron Recycle Systems, Waste Evaporators, Waste Gas, and Resin Reprocessing.
- First successful operation of a Westinghouse 15 GPM Evaporator in the processing of Radwaste in the country
- Successfully converted the Waste Evaporator to a Recycle Evaporator saving millions in reprocessing costs and preventing the discharge of millions of gallons of waste to the environment.

1976-1979 McGuire Nuclear Station Duke Power Chemistry Specialist Hierarchy

- Various hourly employee responsibilities associated with Nuclear Chemistry including environmental sampling

Education

1975 Trident College Charleston, SC

- AAS, Chemical Engineering
- 3.98/4
- Received the Chemical Engineering Society Award of Merit

1989 Gardner-Webb University Boiling Springs, NC

- BS , Business Management
- 3.92/4
- Licensed NC Water Treatment Operator
- 1988 Certified Professional Manager
  Renewed in 1993 and 1998

ADDITIONAL TRAINING:

Organizational Performance Improvement
Managerial Development Core
Managerial Leadership Development
Training Managers Workshop
Project Management
Certified TapRoot Instructor
Advanced Root Cause Investigator Training

INTERESTS: Golf, Reading, Travel and Motion Pictures

FAMILY: Wife: Katherine (29 years), No children

F. Larry Zajac
10560 Haven Street
Las Vegas, NV 89123
(702) 617-3275

Summary

Twenty-nine years of diversified work experience including management and technical participation in a wide range of technical and administrative activities. Management experience includes contract execution, equipment control, avionics repair, Aviation Spares Stockroom, and aircraft quality assurance. Technical experience includes construction crafts, mechanical repair, and avionics repair. Administrative experience includes government personal property control, contract administration, technical writing, cost estimating and budgeting activities. Developed complex technical specifications for requests for proposals for the procurement of items such as aircraft refueling vehicles and helicopters. Participated in the development of the EG&G desk instruction system. Established the Aviation Spares Stockroom, which is currently recognized by the DOE as one of the best. Developed the cost model for DOE/NV aircraft cost reporting and the establishment of aircraft rates.

Education

- Graduate, Basic High School, Henderson, Nevada, 1971
- Graduate, U.S. Air Force Avionics Systems Repair, 1973
- Graduate, U.S. Air Force Survival Instructors Course, 1975
- Graduate, Glazier Apprenticeship Program, Las Vegas, Nevada, 1978
- Undergraduate studies (35 credits) in Electrical Engineering, Clark County Community College, Las Vegas, Nevada, 1985
- U.S. Office of Personnel Management, Federal Budget Execution Course, Sacramento, California, 1995

Employment History

1996 - Present <u>Bechtel Nevada</u>

Manager (1998 - Present). Manage activity of the Department Operations Support Section, which provides administrative and WFO logistics support to the Remote Sensing Department Project Managers. Participated in the Bechtel Nevada Work Control Implementation Team. Developed annual Aviation operating budget and established aircraft service rates.

Administrative Staff Assistant (1996 - 1998). Departmental interface for work for others (WFO) customers, developed cost estimates and coordinated proposal packages. Managed WFO contractual issues, such as funds authorization, period of performance, work start/stop. Developed annual Aviation operating budget and established aircraft service rates.

1983 - 1996 EG&G Energy Measurements, Inc.

Administrative Staff Assistant, Aviation Section (1993 - 1996). Formulate the annual operating budget for the Aviation Section. Monitor the execution of the operating budget and provide weekly reports to the section manager. Establish the job number system used to track and report annual aviation costs to the DOE. Produce the annual A-126 aircraft cost report. Review and revise draft operating procedures. Provide logistical support to the section manager for special requirements.

Section Head II, Technical Support Section (1990-1993). Provided supervision and logistical support for a section comprised of Avionics Technicians, Aircraft Quality Control personnel, Material Handlers and a Chief Clerk. Provided budget formulation and execution information to the department manager. Developed technical documents to support procurement activities. Produced annual aircraft cost reports.

Senior Administrative Assistant, Aviation Section (1990). Acted as the Department Administrative Coordinator; produced and monitored budgets, reported aircraft costs, initiated procurement actions, maintained record files, maintained section P.C. Network, coordinated development of Aviation Support software, and supervised casual employees.

Material Handler III, Technical Support Section (1988 - 1990). Established and managed the NTS/RSL Aviation Spares Stockroom. Managed ground-support equipment and related service contracts. Established procedures to define stockroom operations.

Property Specialist, Property Management Section (1984 - 1988). Managed the data input to the NTS Equipment Control Computer System. Performed data manipulation and report development; developed location codes for inventory control; wrote desk procedures and did troubleshooting on perplexities with record keeping and equipment tracking. Developed annual operating budget.

Material Handler II, Property Management Section (1983 - 1984). Established initial identification and control of DOE property purchased by EG&G. Maintained computer records of equipment and manipulated data to provide customer reports in support of customer requests. Conducted field inventories of equipment.

1982 - 1983 Vegas World Hotel

Resident Glazier and Facilities Maintenance Technician. Responsible for glass and mirror installation on major remodeling projects. Performed entrance door maintenance and general facility maintenance.

1981 - 1982 Fuller O'Brien Paint and Glass

Glass Contracts Manager. Responsible for project management to include calculating estimates for material and labor based on blueprint interpretations; formulating competitive bids for construction projects; procuring materials to support projects; and, ensuring timely contract performance. Managed work crew; performed maintenance on automatic entry systems, and installed glass and mirror.

1978 - 1981 The Import Yard

Operations Manager. Responsible for the initial organization and ongoing management of an auto recycling facility. Evaluated recycle potential and submitted bids on salvage vehicles for inventory. Established inventory system to track parts and vehicle locations. Established daily priorities for employees. Determined critical shipping requirements to secure favorable freight rates. Expedited lost and delayed shipments.

1976 - 1978 Silver State Glass & Mirror

Journeyman Glazier. Responsible for the timely fabrication, installation and maintenance of glass storefronts and entry systems for contract work. Provided labor estimates to supervisors. Managed activities of co-workers. Repaired electrical screw guns and drills.

1976 - 1978 Cylinder Head Exchange Machine Shop

Machinist Trainee (part-time). Operated machine shop equipment, such as surfacing mills, vertical mills, glass bead abrader, various boring and honing equipment and other machines, tools, instruments, and indicators associated with full service auto machine shops.

1974 - 1976 U. S. Air Force

Survival Instructor. Trained USAF aircrew members to employ a diverse range of survival techniques and principles to protect themselves from harsh environments and hostile encounters. Primarily responsible for the supervision, safety, and welfare of student groups while conducting extended field-training sessions. Accompanied helicopter crews on aerial searches. Developed lesson plans and trained new instructors.

1972 - 1974 U.S. Air Force

Avionics Component Repair Specialist. Operated electronic test equipment to perform repairs, calibrations, and diagnostic tests on malfunctioning avionics instruments.

1972 - 1976 Silver State Glass & Mirror

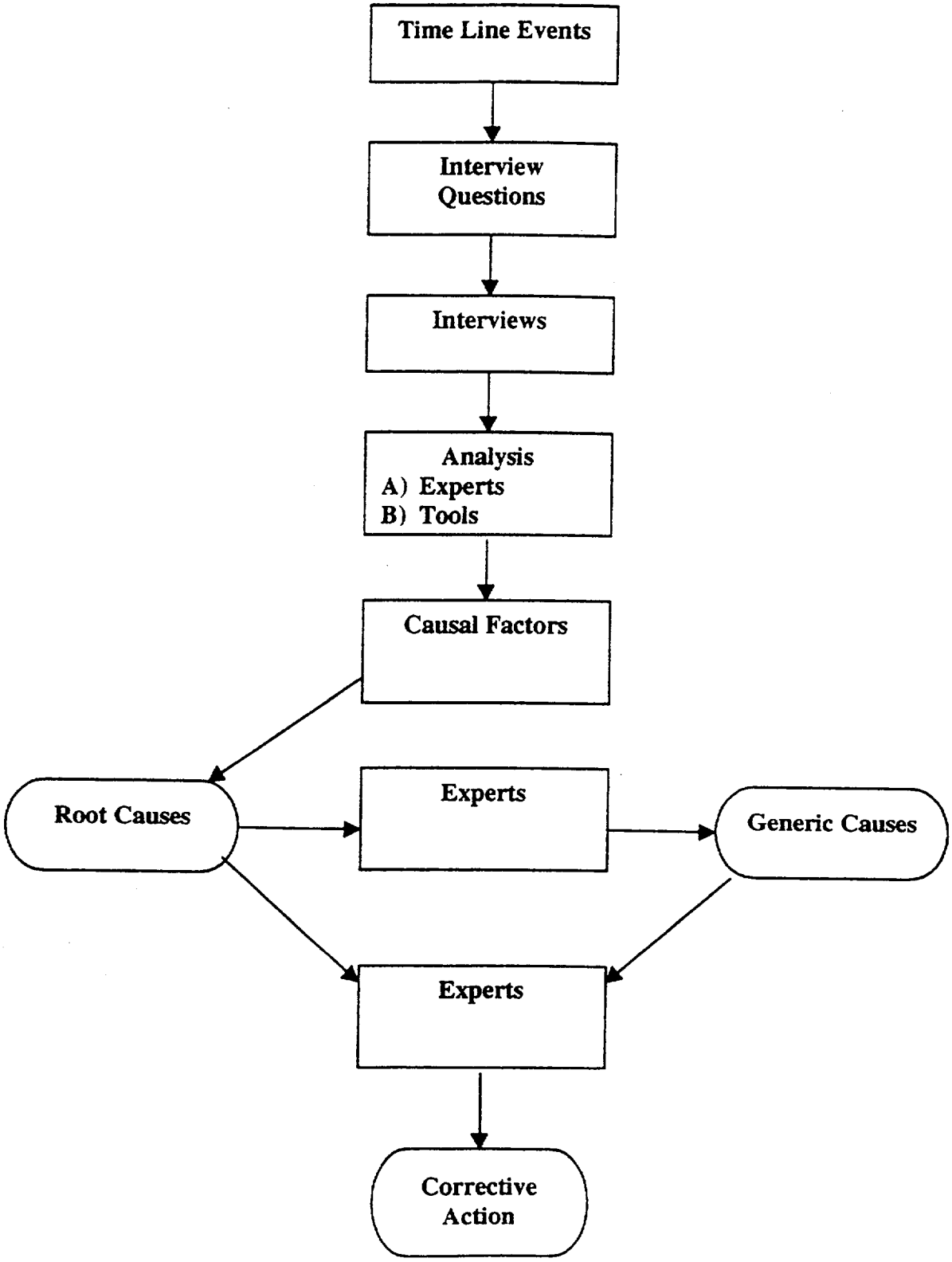
Apprentice Glazier. Assisted with the fabrication and installation of glass, mirror, and aluminum storefront systems.

ADDENDUM B

ROOT CAUSE PROCESS FLOWCHART

ADDENDUM B

ROOT CAUSE PROCESS FLOWCHART



ADDENDUM C

INTERVIEWEE LIST

ADDENDUM C

INTERVIEWEE LIST

	NAME	AREA of RESPONSIBILITY	ORGANIZATION
1)	Andrews, Robert "Bob"	Science & Analysis Mgr	Bechtel SAIC Company, LLC (BSC)
2)	Caprio, Christina	Deputy Info Compliance	BSC
3)	Case, John	Flow Transport	BSC
4)	Cereghino, Steve	License Application Manager	BSC
5)	Dana, Steve	Quality Engineering Support	BSC
6)	Green, Hank	Sr QA Spec / Eng & Ofc of Science organizations	BSC
7)	Hardin, Ernie	Technical Issues	BSC
8)	Harris, Steve	QA Onsite Rep @ LBNL	BSC
9)	Hartstern, Bob	Qualification Assessment	BSC
10)	Hess, Ken	General Manager	BSC
11)	Howard, Rob	Integration Analysis Mgr	BSC
12)	Keele, Robb	QA Mgr	BSC
13)	Kicker, Dwayne	Thermal Mechanics	BSC
14)	King, Jerry	Site Recommendation Mgr	BSC
15)	Krisha, Don	Mgr of QA	BSC
16)	Pearman, Don	Deputy General Mgr	BSC
17)	Sharrocks, Chuck	Chief Information Officer	BSC
18)	Splawn, Steve	Software Configuration Mgmt/Installation	BSC
19)	Thornton, Thomas	Waste Form Eval	BSC
20)	Trautner, Larry	Repository Design Mgr	BSC
21)	Voegele, Michael	Chief Science Officer	BSC
22)	Warren, Charlie	QA Onsite Rep @ LLNL	BSC

ADDENDUM C

INTERVIEWEE LIST

NAME	AREA of RESPONSIBILITY	ORGANIZATION
23) Whitcraft, Jim	Engineering Mgr	BSC
24) Williams, Nancy	Mgr of Projects	BSC

ADDENDUM C

INTERVIEWEE LIST

NAME	AREA of RESPONSIBILITY	ORGANIZATION
1) Blaylock, James	QA Verification (Audits & Surveillance)	Department of Energy (DOE)
2) Clark, Bob	QA Mgr	DOE
3) Dyer, Russ	Project Mgr	DOE
4) Hampton, Catherine	Office of Project Executive Deputy Asst Mgr	DOE
5) Hasson, Bob	QA Verification Div Mgr	DOE
6) Horton, Don	Deputy Project Manager/Technical	DOE
7) Iorii, Vince	Mgr of Project Mgmt Division	DOE
8) Mellington, Suzy	Office of Project Execution Assistant Mgr	DOE
9) Newbury, Claudia	Regulatory Interactions & Policy Development Team	DOE
10) Spence, Richard	Office of Project Execution Deputy Assistant Mgr	DOE
11) Sullivan, Tim	Regulatory & License	DOE
12) Wells, Bob & Jensen, Dee	Chief Information Officer & SRO Team Lead, Sftwr Procedure	DOE
13) Williams, Dennis	Office Lic & Reg Compliance - Deputy Asst Mgr	DOE

ADDENDUM C

INTERVIEWEE LIST

NAME	AREA of RESPONSIBILITY	ORGANIZATION
1) Buenviajt, Paul	National Labs/USGS	Los Alamos National Laboratory (LANL)
2) Bryan, Debbie	Technical Issues	LANL
3) Eckhardt, Rogert	Edit DTN's, Coordinate Review Comments	LANL
4) Eddebbarh, Al	Saturated Zone PMR Deputy Manager	LANL
5) Hyer, Dianne	Technical Editor	LANL
6) Kwickles, Ed	Flow & Transport Process	LANL
7) Levy, Schon	Rock Prop AMR	LANL
8) Meijer, Arend	Groundwater Chemistry, Principal Investigator	LANL
9) Perry, Frank	Team Leader	LANL
10) Peters, Mark	Testing Mgr	LANL
11) Reimus, Paul	Hydrogeologic Testing & Data Acquisition	LANL
12) Vaniman, Dave	Field Geologist	LANL
13) Wolfsberg, Andy	Zone Colloid Transport	LANL
14) Zyvolski, George	Principal Investigator	LANL

ADDENDUM C

INTERVIEWEE LIST

NAME	AREA of RESPONSIBILITY	ORGANIZATION
1) Bodvarsson, G. R. "Bo"	Unsaturated Zone Lab Lead	Lawrence Berekley National Laboratory (LBNL)
2) Haukwa, Charles	Code Developer	LBNL
3) Hedegaard, Randy	Software Mgr & Qualification Coordinator (Unsaturated Zone)	LBNL
4) Li, Guomin	Software Developer	LBNL
5) Liu, H.H.	Unsaturated Zone Modeler/ Software Developer	LBNL
6) McClung, Ivenina	Software Qualification/ Installation	LBNL
7) Moridis, George	Radionuclide Transport Lead	LBNL
8) Mukhopadhyay, Sumit	Scientist/Mathematical Model Developer	LBNL
9) Pan, Lehua	Radionuclide Transport	LBNL
10) Spycher, Nicolas	Geochemist Code Developer & Modeler	LBNL
11) Ungar, Andre	Developer Numerical Models	LBNL

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INTERVIEWEE LIST

NAME	AREA of RESPONSIBILITY	ORGANIZATION
1) Buscheck, Tom	Waste Pkg Performance Modeling	Lawrence Livermore National Laboratory (LLNL)
2) Gdowski, Greg	Integration Mgr Waste Package Dept	LLNL
3) Lingenfelder, Al	Retired Materials Deputy Director	LLNL
4) Lu, Stephen	Group Leader Systems Evaluation	LLNL
5) Melczer, Ed	Software Quality Mgr	LLNL
6) Rosenberg, Nina	Geochemistry Group Scientist	LLNL
7) Steward, Steve	Former Deputy Technology Dir (WF)	LLNL
8) Summers, Tammy	Metallurgist - WP Dept Mgr	LLNL
9) Viani, Brian	Chemist	LLNL
10) Wilder, Dale	Chief Scientist	LLNL

ADDENDUM C

INTERVIEWEE LIST

NAME	AREA of RESPONSIBILITY	ORGANIZATION
1) Aguilar, Richard	Soil Scientist	Sandia National Laboratory (SNL)
2) Arnold, Bill	TSPA-Geologist Hydro, Modeling of Unsat Zone	SNL
3) Itamura, Michael	PA Group	SNL
4) Kuzio, Stephanie	Unsaturated Zone	SNL
5) Lee, Joon H.	Code Mgr	SNL
6) McKenna, Sam	Saturated Zone	SNL
7) Miller, Steve	TSPA-Analyst	SNL
8) Orell, Andrew	Near Field Environmental Dept	SNL
9) Richards, Robert	TSPA Process	SNL
10) Schenker, Albert	Feature Events Process	SNL
11) Wallace, Mike	Checker	SNL
12) Wilson, Mike	TSPA Process	SNL

ADDENDUM C

INTERVIEWEE LIST

NAME	AREA of RESPONSIBILITY	ORGANIZATION
1) McNeish, Jerry	TSPA Co-Mgr	DESI
2) Smith, Tony	TSPA	DESI
3) Pasupathi, Pasu	Waste Pkg Deputy Mgr	FANP
4) Wagner, Ralph	Thermal Test Model Coordinator	ISSI
5) Eshelman, Mike	MTS/BAH - MTS Info Tech	MTS/BAH
6) Hodges, Kristi	Special Projects M&O Liaison/ TSPA/QA	Navarro Research & Eng/ NQS
8) Bob Latta	NRC	Nuclear Regulatory Commission (NRC)
7) Glenn, Chad	NRC	Nuclear Regulatory Commission (NRC)
Parks, Bruce	Asst Project Mgr	
Bryant, Debbie		
9) Schaffer, Pat		USGS

ADDENDUM D

DOCUMENTS REVIEW LIST

ADDENDUM D

DOCUMENTS REVIEWED LIST

1. AP-3.10Q, "Analyses and Models," thru rev. 2, ICN 4, Effective April 1, 2001
2. AP-SI.1Q, "Software Management," thru rev. 3, ICN 0, Effective April 1, 2001
3. AP-SI.1Q Software Management timeline, from Mike Eshleman, June 12, 2001 & "Software Management Overview," Lyle Southworth, June 7, 2001. Includes data on DR99 media demonstration success rate.
4. AP-16.4Q, "Root Cause Determination," Revision 1, ICN 0, August 9, 2000.
5. AP-16.1Q Management of Conditions Adverse to Quality
6. AP-SIII-3Q Submittal & Incorporation of Data to the technical Data Management System
7. NUREG 1636, "Regulatory Perspectives on Model Validation in High –Level Radioactive Waste Management Programs...," USNRC, March 1999
8. Memorandum from Harvey Dove to William Watson on AMR Model Validation Investigation Report, 06/05/01. Includes Tables 1-9, "AMR Model Validation Status," & Table 10, "AMR's with Inadequate Model Validation."
9. Numerous Modeling AMRs listed as having inadequate model validation in Table 10 of item 6 above.
10. "Evolution of Processes and Procedures," Don Beckman, May 22, 2001.
11. Naomi Oreskes, et al, "Verification, Validation, and Confirmation of Numerical Models in the Earth Sciences," Science, February 4, 1994.
12. "Product Quality in Brief – Model Validation Corrective Action Report," May 22, 2001, Rob Howard
13. STIR No. BSC-01-004, "Alternative Approach to Model Validations not in Accordance with AP-3.10Q"
14. Numerous DRs & CARs w/ related documentation as they apply to CARs 01 &02.
15. OCRWM Concerns Program: Software Concerns and Issues, Gary Smith, June 13, 2001
16. PORB Position Paper on Verification, Validation, and Software Qualification, August 5, 1999.
17. DOE OCRWM "Performance Evaluation and Measurement Plan...," Contract DE-AC08-01NV12101, April 11, 2001
18. Technical Work Plan for FY01 Model Validation Status Review – DI Number: TWP-WIS-MD-000006, Rev 00A June 2001
19. TDR-WIS-PA-000001 REV 00 ICN 01 - Appendix E, pages Ei and E1-E16 Appendix F, pages F2-21 and F2-18
20. Management of Conditions Adverse to Quality, presentation by Bill Glasser, June 7, 2001
21. Yucca Mountain Science and Engineering Report, USDOE, May 2001 (excerpt)

ADDENDUM D

DOCUMENTS REVIEWED LIST

22. BSC and DOE Organizational Charts
23. Statements of Work for Lab work performed under the TRW & BSC contracts.
24. Monthly Performance Indicators Reports, February 2000 – May 2001
25. Scientific Notebooks AP-SIII.IQ Rev. 1. ICN; Effective Date July 21, 2000
26. TRW contract DE-AC01-91RW00134
27. Software Mgmt Lesson Plan LPTEC00-007-01 7 course material
28. DOE/RW-0333P & addendum– QA requirements & descriptions
29. Yucca Mountain Site Characterization office (TMSCO) ISMS Phase II Verification Report
30. Performance Evaluation 7 Measurement Plan for Bechtel SAIC Contract DE-AC08-01NV12101
31. Numerous contract section J listed requirements to include: DOE O 414.1A Quality Assurance, DOE G 414.1-2 Quality Assurance Management System Guide, DOE G 450.4-1B ISMS Guide,Pro-MG-004 ISMS, DOE 5480.19 Conduct of Operations Requirements for DOE Facilities
32. AQ-OM-001 Conduct of Operations & Conformance Matrix dated 14 December 2000.
33. Numerous OQA Audit Reports & M&O Self-Assessment reports.
34. YMP Capability Maturity Model (CMM) Level 2 baseline processes.
35. SCM software baseline report, SCS Working Q report, SCS Weekly Summary Report , and SQA Testing Status report all provided by Steve Splawn on 6/18/01.

ADDENDUM E

MODELING PARETO ANALYSIS

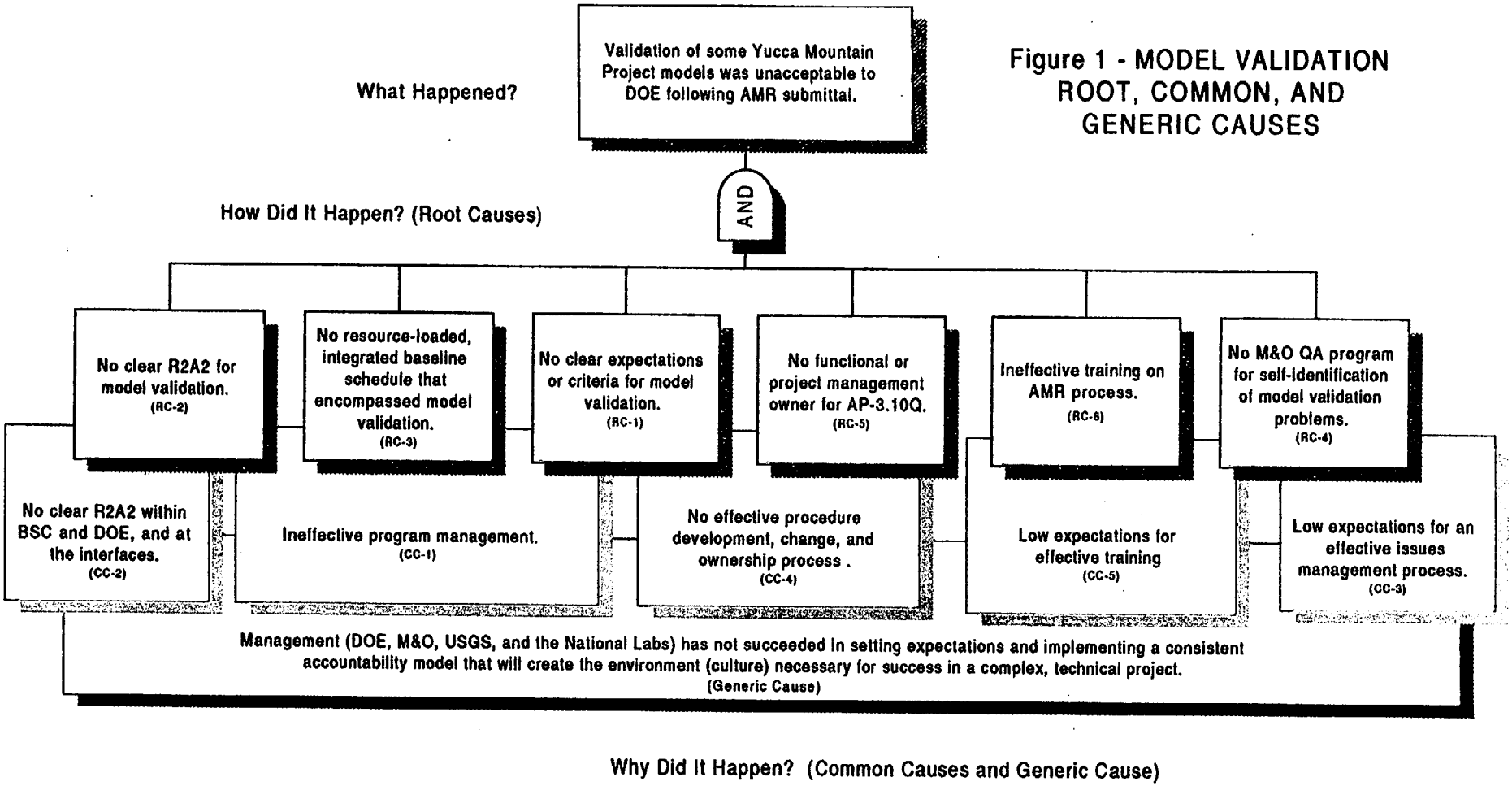


Figure 1 - MODEL VALIDATION ROOT, COMMON, AND GENERIC CAUSES

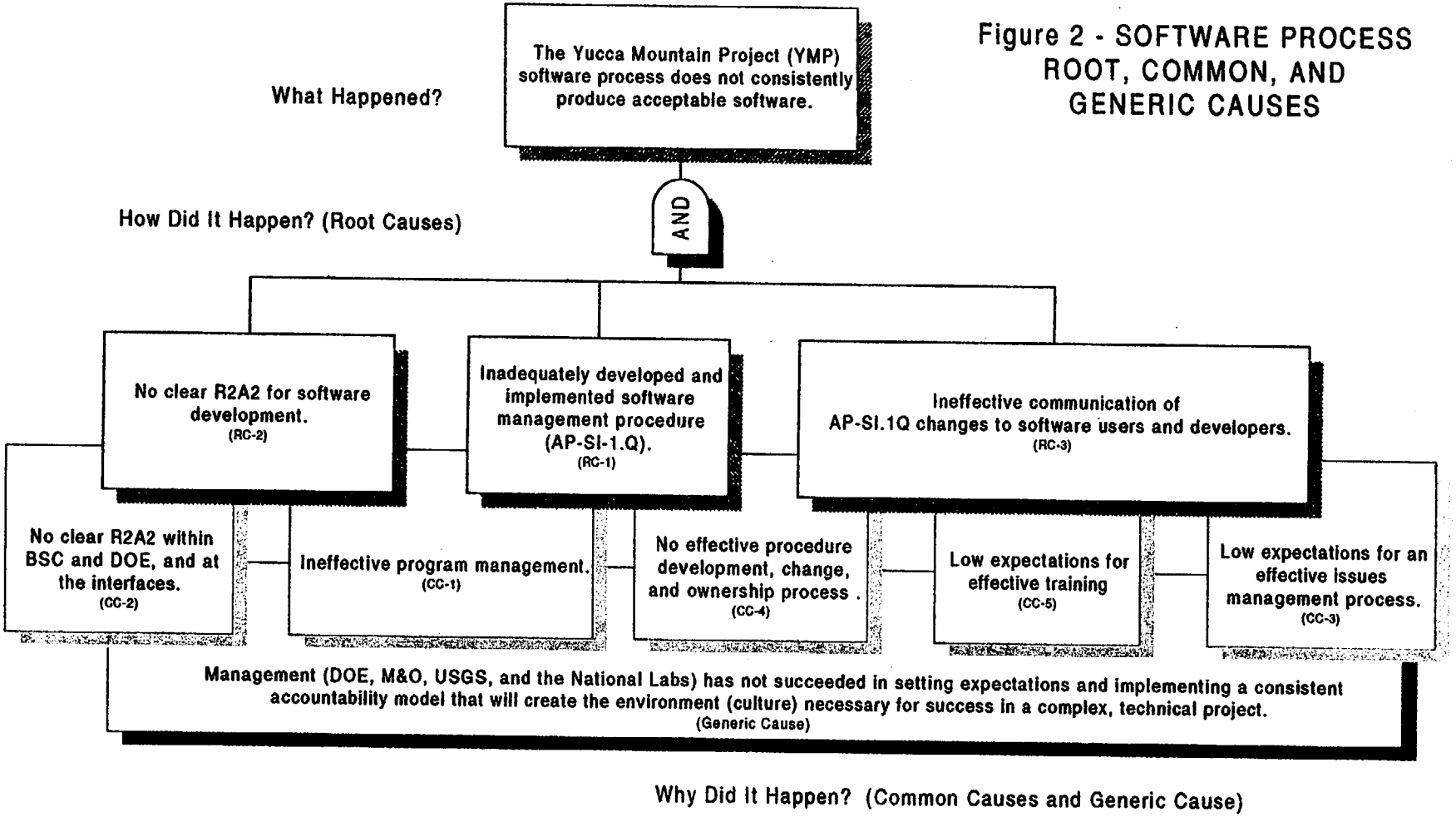


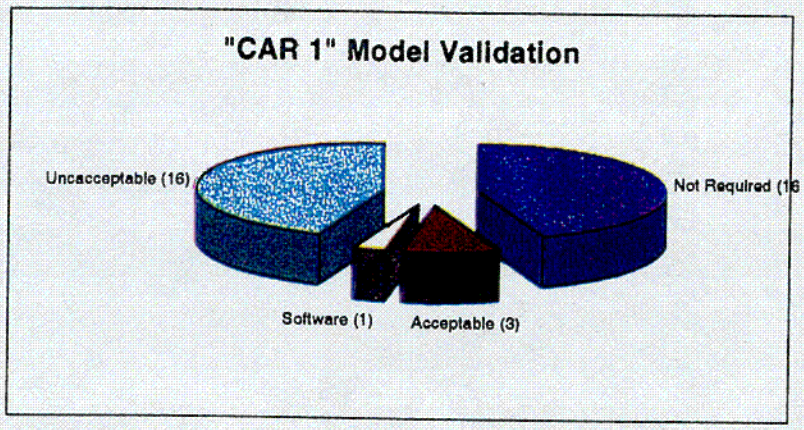
Figure 2 - SOFTWARE PROCESS ROOT, COMMON, AND GENERIC CAUSES

ADDENDUM E

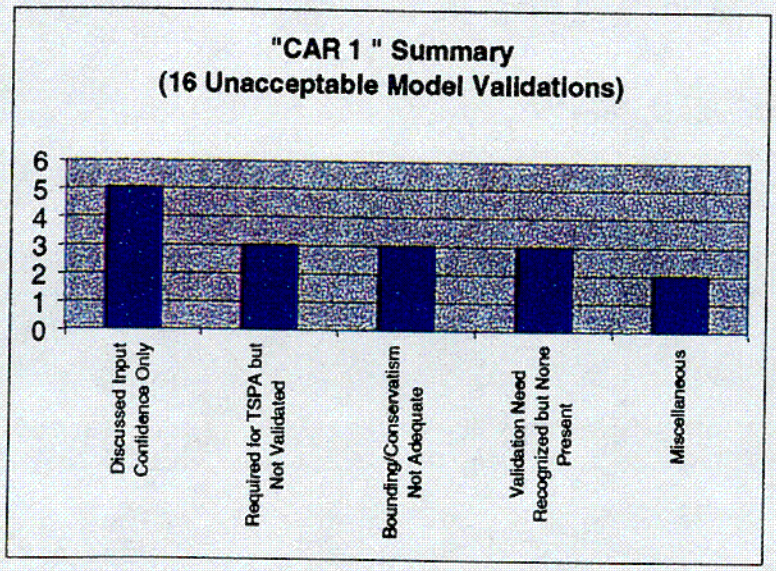
MODELING PARETO ANALYSIS

BSC-01-C-001 ("CAR 1") and a June 5, 2001 memorandum from F. H. Dove to W. Watson reported unsatisfactory model validation failure rates. However, some model developers had been able to satisfy the requirements of AP-3.10Q. The root cause analysis team decided to identify and explore any relevant distinctions between successful and unsuccessful model validation efforts.

With the cooperation of F. H. Dove, the team developed this breakdown of the 36 AMRs reviewed in "CAR 1":



The sixteen AMRs from "CAR 1" with unacceptable model validation fell into five categories:

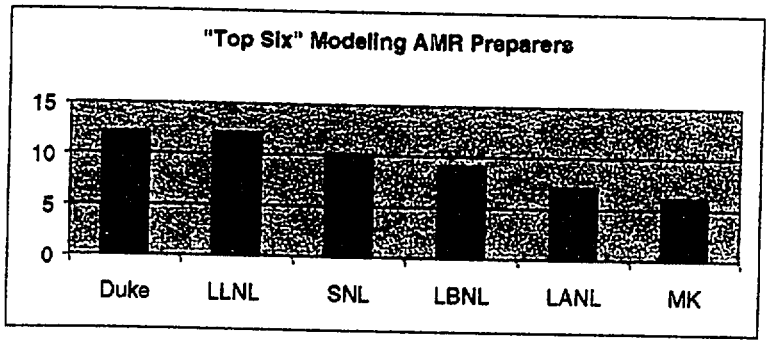


C01

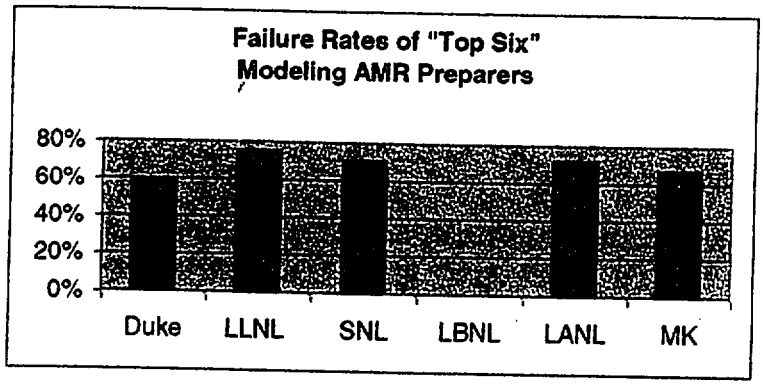
ADDENDUM E

MODELING PARETO ANALYSIS

The June 5 memorandum and its accompanying ten tables provided a fuller assessment of the entire modeling AMR population. Six model developers accounted for 56 of the 73 modeling AMRs:



Of these developers, all except Lawrence Berkeley National Laboratory experienced validation failure rates between 58-71%. LBNL had *zero* model validation failures.

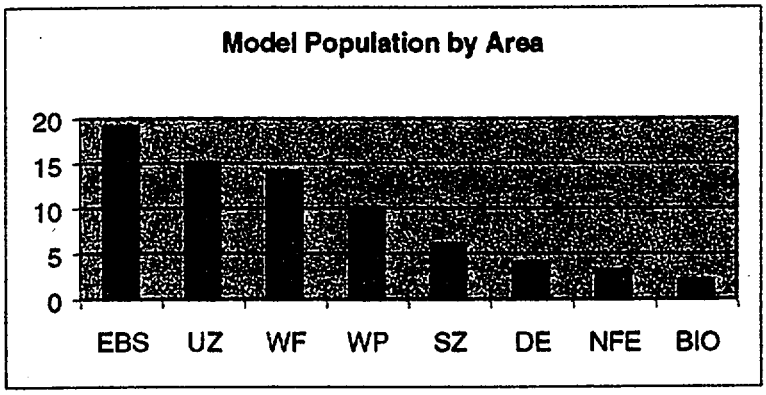


The team later determined that LBNL was unique in two areas affecting validation success: (1) a special compliance group to ensure satisfaction of AP-3.10Q requirements before final AMR submittal, and (2) many LBNL models were supported by data.

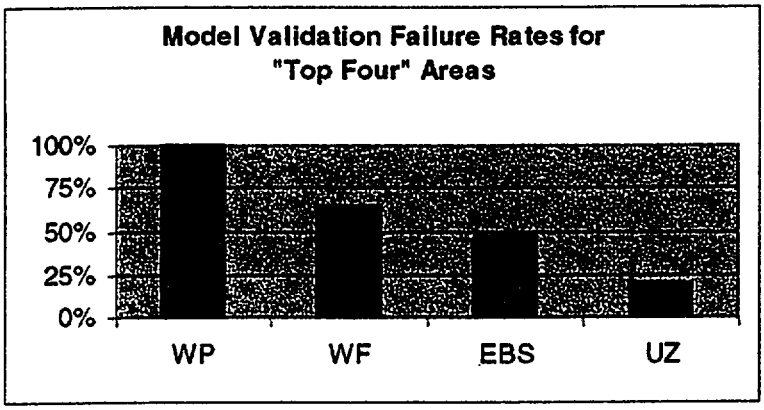
ADDENDUM E

MODELING PARETO ANALYSIS

The Total System Performance Model (TSPA) is "fed" from subordinate models in eight specific areas, e.g., unsaturated zone (UZ), engineered barrier system (EBS), and waste package (WP). Model population (73) is distributed as follows among these areas:



The first four areas accounted for 58 of the 73 models as well as 31 of the 40 validation failures. However, there was wide variation in validation failure rate, depending on area:



The team noted that waste package (WP) modeling, which is highly predictive, produced zero satisfactory validations. WP models came from only two developers, Lawrence Livermore National Laboratory (7) and Duke Engineering (3).

On the other hand, unsaturated zone (UZ) validation was much more successful. UZ modeling was often supported by field and laboratory data (7 of 15 models). Also, LBNL produced 8 of the 15 UZ models (see discussion above).

Acceptable waste form (WF) and engineered barrier system (EBS) models generally were conceptual models (no validation required), or supported by data, or "reasonable." Models in these two areas came from numerous developers with no obvious failure pattern.

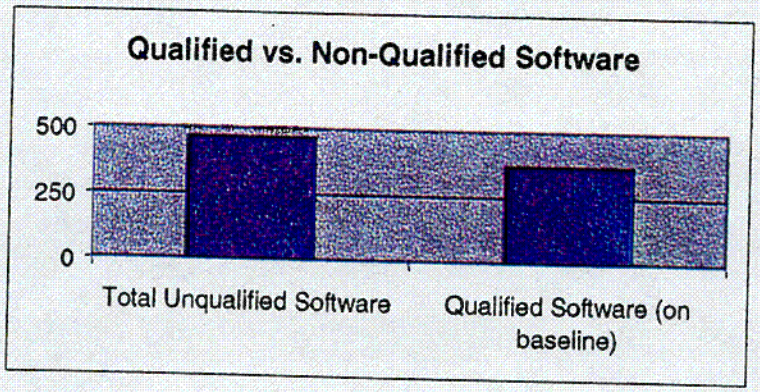
ADDENDUM F

SOFTWARE PARETO ANALYSIS

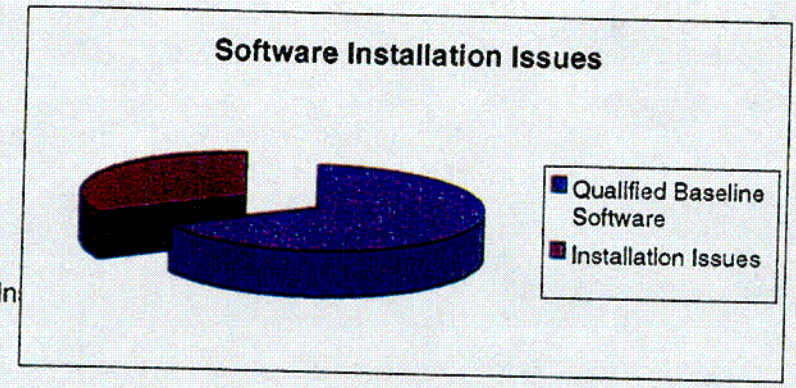
ADDENDUM F

SOFTWARE PARETO ANALYSIS

The currently identified YMP software population consists of 828 items, of which 366 are qualified (and therefore have satisfied AP-SI.1Q). 462 software items are as yet unqualified. Additional software items are currently under review, some of which could add to the population.



Of the 366 qualified baseline software items, 120 (approximately 33%) had installation issues, i.e., the inability to install the software on a clean environment at the site in Las Vegas.

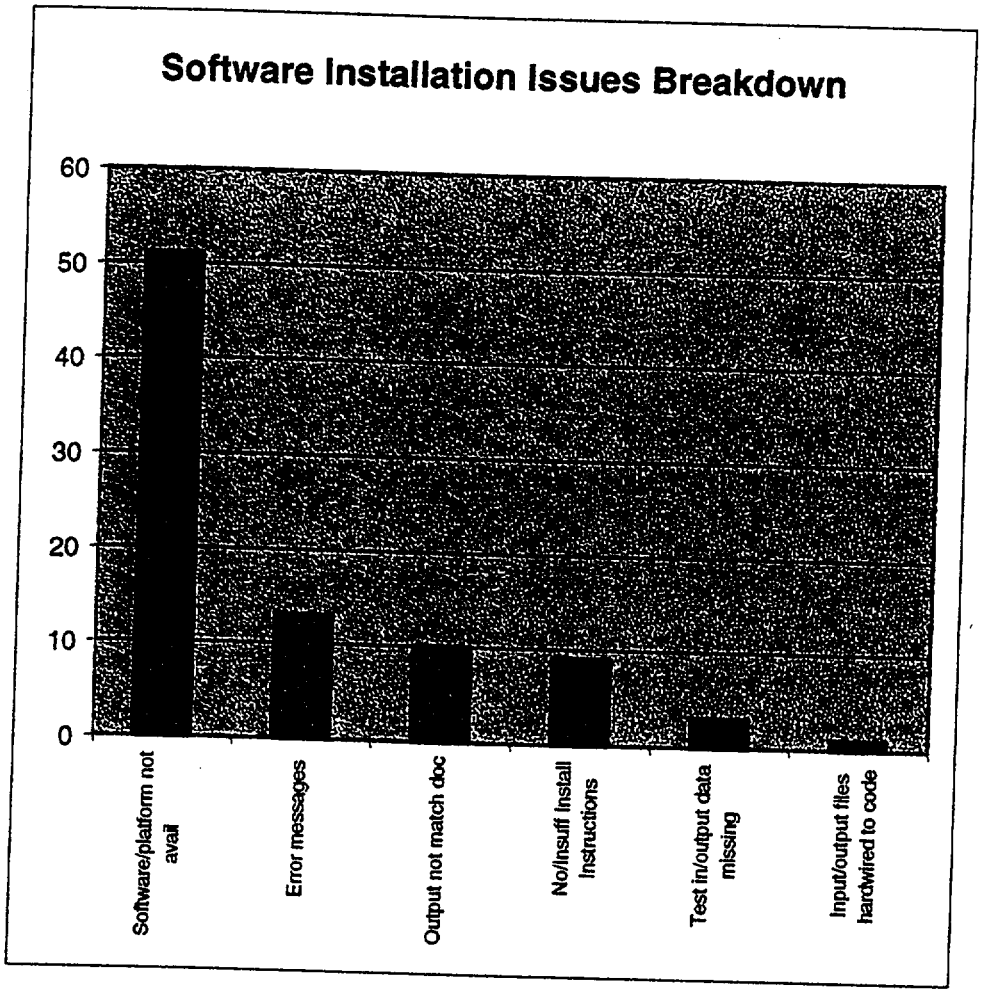


C02

ADDENDUM F

SOFTWARE PARETO ANALYSIS

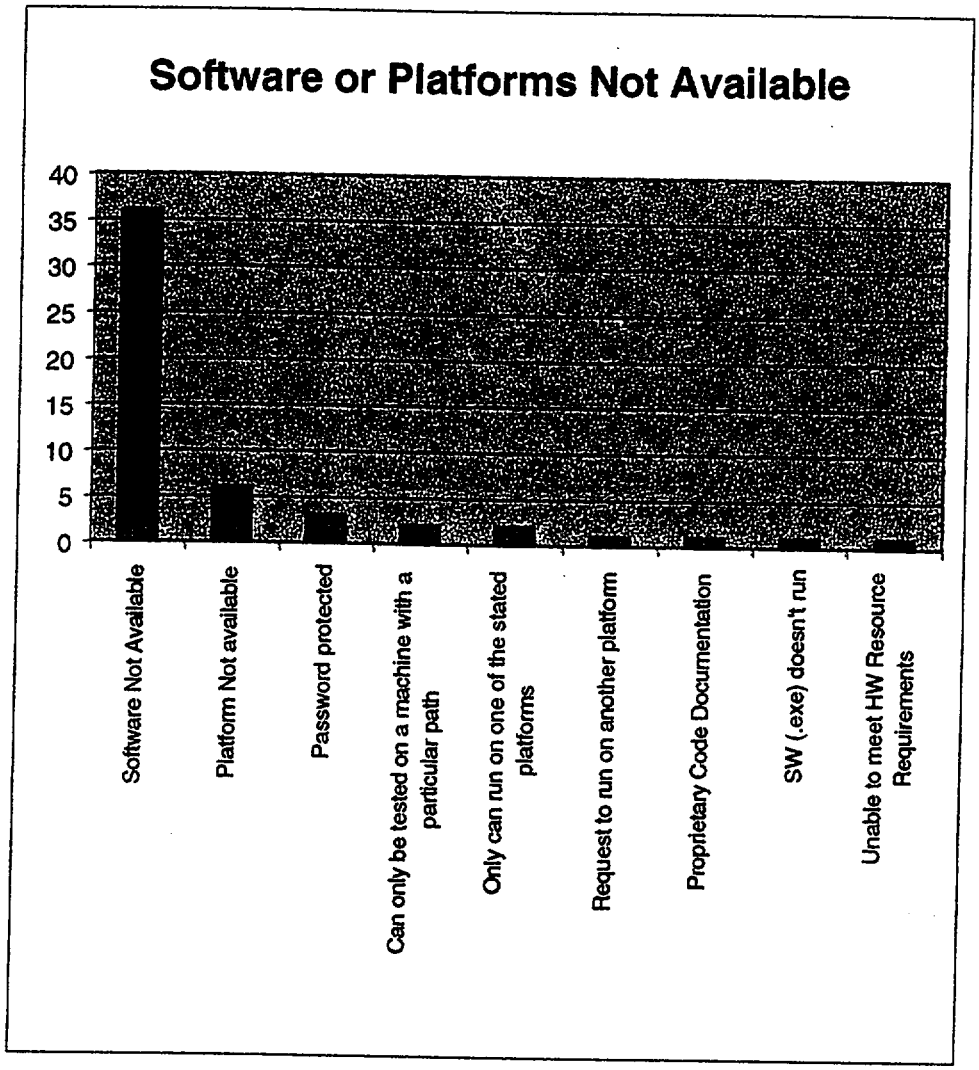
A sampling (87) of the 120 software installation issues determined that most software installation problems result from (1) lack of software and platform availability, (2) error messages, and (3) output that does not meet AP-SI.1Q documentation requirements.



ADDENDUM F

SOFTWARE PARETO ANALYSIS

Of the 51 software items for which software or platforms were not available for SCM testing, the principal reason (36) was that essential software was not provided by the developer or was not commercially purchased, and therefore not available to SCM.

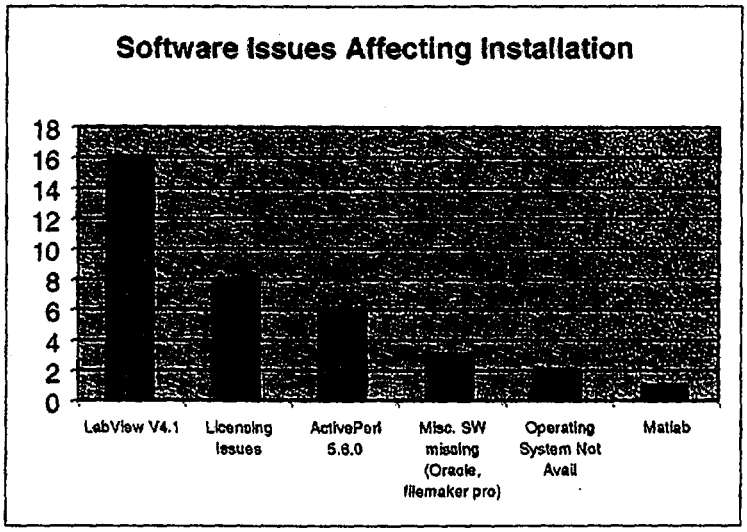


ADDENDUM F

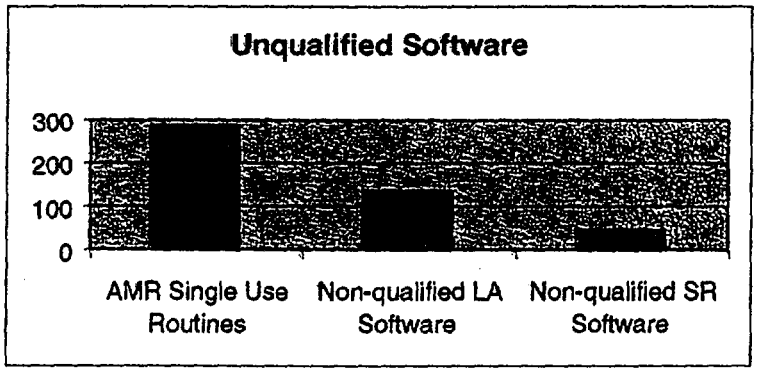
SOFTWARE PARETO ANALYSIS

16 of the 36 citations of software unavailability consisted of the program "LabVIEW V4.1" not having been provided to SCM for installation testing. Software that requires LabVIEW to run may also have hardwired input data (e.g., plug in data acquisition boards). This may mean that inputs also were missing from the software package.

The chart below shows the LabVIEW issue and others of this type as well as licensing/proprietary software issues affecting SCM's ability to install and run YMP qualified software.



The unqualified software population (462) consists of 285 Single Use Routines/Macros (SURM), 133 software items to be qualified before License Application, and 44 software items to be qualified before Site Recommendation.

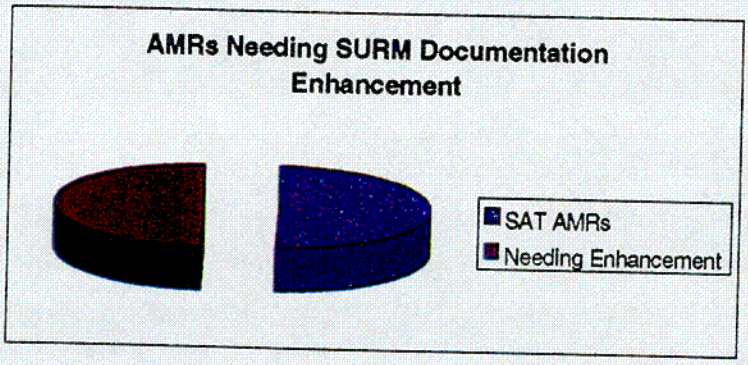


The 285 SURMs are managed by 123 AMRs. The discussion below will be limited to these 123 AMRs to reflect the way data are managed within the Information Compliance department.

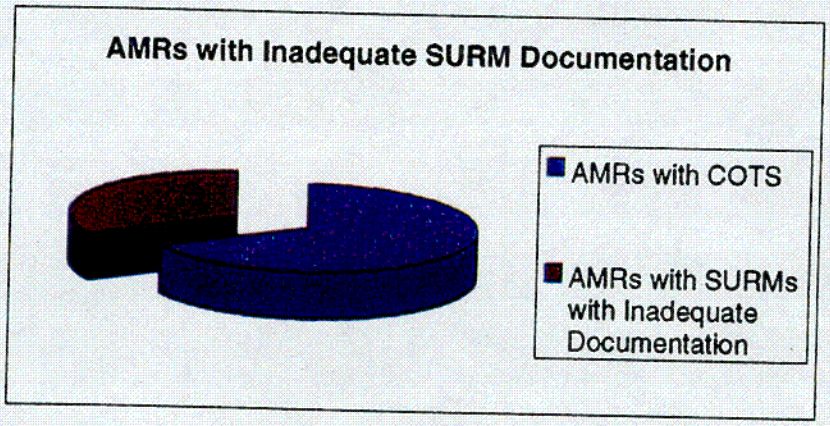
ADDENDUM F

SOFTWARE PARETO ANALYSIS

According to the Manager, Software Compliance, 61 (approximately 50%) of the involved AMRs need SURM documentation enhancement.



Of these 61 AMRs, 41 of them use SURMs the developers had built with commercial off the shelf (COTS) software. 20 AMRs use SURMs developed with a software language. In many instances involving COTS, developers did not include all of the steps in the AMR documentation showing how to recreate the algorithm (e.g., not all of the MicroSoft Excel functions that were used were defined), etc.). SURMs developed with a software language include inadequate test cases (e.g., no input files included), reformatting of the data without a correctness statement, no acceptance criteria defined, etc.

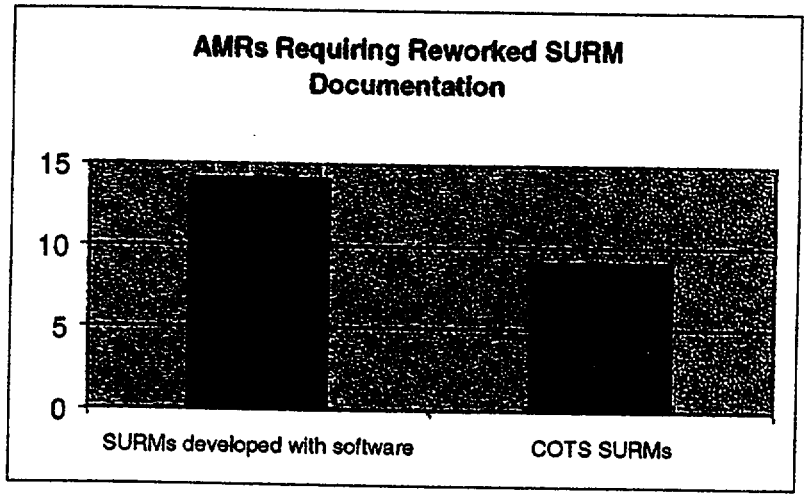


C03

ADDENDUM F

SOFTWARE PARETO ANALYSIS

There are 23 AMRs that require rework for better SURM documentation. Of these, 14 are AMRs with SURMs developed with software and 9 AMRs with COTS SURMs.



The 133 software items to be qualified by the License Application and 44 software items to be qualified by the Site Recommendation have only begun the qualification process. There are 14 software in the Information Technology Software Management Analyst (ITSMA) review process. The ITSMA review is a procedural compliance review. 12 of the 14 items have issues.

ADDENDUM G

ROOT CAUSE TapRooT© CAUSE CODE CORRELATION

ADDENDUM G

Root Cause - TapRooT© Cause Code Correlation

ROOT CAUSE	TapRooT© CODE
Model Validation Causes	
1 Criteria and Expectation	3M – Management System
2 Roles, Responsibilities, Authority and Accountability	3M – Management System
3 Project Planning & Work Management	3M – Management System
4 Quality Assurance	3Q – Quality Control
5 Procedure Ownership and Change	3M– Management System
	3P – Procedures
6 Training	3T – Training
	3M – Management System
Software Process Causes	
1 Roles, Responsibilities, Authority and Acountability	3M – Management System
2 Software Procedure	3P – Procedures
3 Communication, Feedback & Training	3C – Communications
	3T – Training
	3M – Management System
Common Causes	
1 Ineffective Program Management	3M – Management System
2 Lack of Clear Roles, Responsibilities, Authority and Accountability	3M – Management System
3 Low Expectation for an Effective Issues Management System	3M – Management System
	3Q – Quality
4 Lack of Effective Procedure Development, Change and Ownership Process	3M – Management System
	3P – Procedures
5 Low Expectation for Training	3T – Training
	3M – Management System
Generic Cause	
1 Expectation and Accountability	3M – Management System