

YUCCA MOUNTAIN QUALITY ASSURANCE HISTORY
Government Accountability Office (GAO) Reports 1988-2004
Relevant Excerpts

Submitted to: U.S. Rep. Jon Porter, Chairman
Federal Workforce and Agency Organization Subcommittee

Submitted by: Chairman Rory Reid
Board of County Commissioners
Clark County, Nevada

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1988 GAO/RCED-88-159
“Repository Work Should Not Proceed Until Quality Assurance is Adequate”,
September 1988

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“For example, NRC learned that certain project characteristics increase the likelihood that a project will encounter major quality related problems. Among the characteristics that have led to past problems are (1) heavy reliance on contractors (2) indirect project control, and (3) inadequate quality assurance program oversight.”

“. . .GAO recommends that until DOE has determined, and NRC agrees, that DOE’s quality assurance program meets NRC standards, DOE should not proceed with work that may be used to support its license application to NRC.”

Note: NRC has consistently found DOE’s quality assurance program to be inadequate, and has publicly criticized DOE’s lack of progress in this area.

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“Because DOE will use the information to support an application to NRC for a repository construction authorization, the data must be collected under a quality assurance program acceptable for licensing. . . .NRC’s high-level waste repository regulations require DOE to implement a comprehensive quality assurance program for site characterization work. Failure to effectively implement such a program may result in NRC’s denial of DOE’s construction application.”

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“A sound quality assurance program is essential to winning NRC’s approval for constructing a repository. . . .NRC regulations require a quality assurance program that provides a process for demonstrating that work results can be relied on in making licensing decisions about a site’s suitability for a repository.”

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“Effective quality assurance is critical for at least two other reasons. First, the recent amendments to NWSA [1987] directing DOE to characterize the Yucca Mountain site mean that DOE will not have an alternate site in the event that it is not successful at Yucca Mountain. Second, there is the potential for adverse health, safety, and environmental effects if a repository is constructed and operated on the basis of data

that are, unknowingly, unreliable or inaccurate. For these reasons, effective quality assurance at the outset of site characterization is critical to ensuring that the Yucca Mountain site does not fail in licensing or during its use because of the quality of the data obtained during site characterization.”

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“NRC identified quality assurance problems during visits to candidate repository sites. In a September 1984 visit, for example, NRC found that the U.S. Geological Survey – an earth sciences contractor for the Nevada project – had not properly documented or maintained documentation of core samples obtained from boreholes near the Yucca Mountain site. . . .NRC pointed out that questions concerning proper handling and documentation of core samples could ultimately affect DOE’s ability to license the site.

Pages 23 and 24 (audit results from 1986 audits of three candidate sites, including Yucca Mountain):

“Given the potential for weaknesses shown in the [contractor’s] implementation of the quality assurance program and the weakness in the DOE-sponsored audit, the ultimate usefulness of [the contractor’s] work for licensing purposes is in question and will require further review.” (Hanford [Washington] project audit, April 1986)”

“[The] audit lacked sufficient depth of review in many areas to draw a definitive conclusion as to the effectiveness of [the contractor’s] implementation of the quality assurance program.” (Deaf Smith [Texas] project audit, August 1986)

“[D]eviations detected by [the contractor’s quality assurance organization] during audits are not followed up to determine what actions are necessary to ensure that work completed under deviating conditions [is] appropriately dispositioned and the results defensible in licensing.” (Hanford project audit, March 1986)

“The prime contractor is not conducting audits as scheduled and is not documenting the justification for not conducting the audits.” (Hanford project audit, March 1986)

“NRC staff have noted that the scope of the audits conducted by DOE/DOE projects [has] been too optimistic in that they attempt to cover all 18 criteria in less than 4 days.” (General observation – Yucca Mountain project audit, March 1986)

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“NRC found that participate attitudes have an important bearing on whether a project is likely to experience quality-related problems. As a result, NRC has expressed its concern to OCRWM [DOE’s Office of Civilian Radioactive Waste Management] about what it perceives to be negative attitudes toward quality assurance on the part of some Nevada project participants. During a visit to Nevada, for example, some project participants had expressed the view that quality assurance is “unnecessary, burdensome, and an imposition.” OCRWM officials responded that NRC’s observation was derived from an isolated instance that was not representative of the majority of project personnel and, therefore, should not be overemphasized. . . .

Subsequent statements and documents indicate, however, that the above example was not an isolated event. For example, the following excerpt from the Nevada project office’s April 28, 1986 stop-work order issued to the USGS – a prime contractor on the

project—expresses concern about the attitude toward quality assurance requirements of some contractor technical staff. It also recognizes the importance of quality assurance to achieving project success:

“It has been reported to me that the USGS technical staff, people who are committed to executing scientific studies, have not achieved a full appreciation of the importance of QA [quality assurance] on this program. This is clearly a USGS management problem. After these many years of effort and expenditures the practice of QA at the USGS has not reached the level necessary to satisfy our standards. Also, it is doubtful that the present USGS work would meet the U.S. Nuclear Regulatory Commission’s (NRC) expectations.”

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Stop-work order text continued:

“. . . It is essential that your scientific staff fully understand the situation, commit to meeting the requirements, and conform to the process as defined in your internal operating manuals. There is no longer any place in this Project for a scientific staff that does not accept and perform in accordance with the requirements established for QA.”

“. . . during NRC’s June 1987 exit conference following a Los Alamos audit, NRC found that attitudes of project participants toward quality assurance were still a problem. . . . NRC staff told DOE that contractor participants did not have an adequate appreciation for quality assurance documentation standards.”

“An NRC official who was present during the exit conference stated that contractor personnel appeared to view NRC’s audit findings as challenges to their professional integrity. . . Others, the official said, complained that NRC had overstated the significance of its findings because the findings do not have an actual or likely impact on public health and safety. According to the NRC official, these participants argued that the quality assurance problems identified by NRC are less important than they would be if they related to a nuclear power plant project because the repository project does not present the same potential for a serious accident as does a nuclear facility.”

Page 40 – Conclusions

“In view of the time, expense, and risk associated with characterizing a repository, it is imperative that DOE carry out a high-quality site characterization program. Therefore, it is essential that DOE take all reasonable measures to ensure that the quality of site characterization activities, and the information developed from these activities, meet applicable NRC regulatory standards. The correctness of this approach is amply demonstrated by past failures to receive licenses or added costs and delays in numerous nuclear power plant construction projects.”

1991 GAO/RCED-91-7

**“Nuclear Waste: Quality Assurance Auditors Need Access to Employee Records,”
February 19, 1991**

Page 3

“The quality assurance program requires DOE to document that DOE and contractor employees who perform repository-related work important to safety and waste isolation are properly qualified and trained for their positions.”

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“DOE’s inability to resolve these questions about the applicability of the Privacy Act to its quality assurance program in a timely manner is but one example of the difficulties it has had over the last several years in developing a satisfactory quality assurance program.” . . . We also concluded that the lower priority DOE had assigned to resolving quality assurance issues appeared inconsistent with its commitment to having a satisfactory quality assurance program in place by the time it is ready to investigate the Yucca Mountain site.”

Page 8 – Conclusions

“[T]he auditors have not had unrestricted access to the records of employees of DOE, USGS, and two project contractors because the notice of the new system of records did not take effect until October 1990. Although NRC and DOE officials consider it unlikely that these employees would be found unqualified, any further discrepancies in employee qualifications found by auditors, once they begin audits of the remaining employee records, could raise questions about the quality of their work.”

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“In October 1990 DOE obtained full NRC approval of quality assurance programs for two contractors (Lawrence Livermore and Sandia National Laboratories) and qualified NRC approval for four contractors (Fenix and Scisson, Holmes and Narver, USGS, and REECO) subject to resolution of open audit items, for the latter two contractors, include performance of quality assurance audits of personnel training and qualifications.”

NOTE: This approval came 3 years after the selection of Yucca Mountain as the only site for further study as a potential repository site, even though the NRC’s rules required approval of a quality assurance program prior to site evaluation.

1997 GAO/RCED-97-30
“Nuclear Waste: Impediments to Completing the Yucca Mountain Repository Project,” January 1997

Page 2

. . . “Specifically, DOE . . . decided to revise its guidelines for determining if the Yucca Mountain site is suitable for a repository by deleting those criteria that require compliance with specific technical conditions, such as those concerning the travel time for groundwater; . . .

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“According to DOE, among the most important attributes of a repository at Yucca Mountain are the rate at which water seeps into the repository, the period of time that the packages containing waste will prevent the release of radioactive materials from them, and the manner in which radioactive materials that eventually reach the water table beneath the repository will be diluted by groundwater.”

“ . . . According to the U.S. Geological Survey, which performs groundwater research for DOE, new questions about the importance of groundwater to the scientific investigation are beginning to arise; . . . One such issue is the unexplained cause of the large drop in the elevation of the water table at the northern end of Yucca Mountain. Geological Survey scientists say that this feature, which was discovered in 1981, is the most striking

hydrologic feature in the area. . . . According to a 1996 report by DOE on the quality of the Geological Survey's hydrologic investigations, major uncertainties, such as the unexplained drop in the groundwater level, at this stage of the scientific investigation limit understanding of how radioactive materials would move in groundwater."

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"The [waste isolation] strategy defines the following key attributes for predicting the performance of engineered and natural barriers:

- The rate at which water seeps into the repository. Assessments of the repository's performance have shown that water seeping into the emplacement areas is the most important attribute of the ability of the site to contain and isolate waste. This process affects all aspects of performance, from the life of the waste packages to the movement of radioactive materials. . . ."

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"The Geological Survey also identified what it considered important²¹ hydrological issues concerning the (1) scarcity of transport data and (2) flow of water directly from the Amargosa Desert near Yucca Mountain to Death Valley to the west."

Footnote 21; "An important issue is one that warrants careful consideration but may not be resolvable or may be so difficult or costly to resolve that the Yucca Mountain Project may choose not to resolve it."

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"In June 1996 DOE issued a report on the Geological Survey's program to ensure the quality of its research on the repository project. Although the report's authors concluded that the quality assurance program was adequate, they also expressed concern about persistent, major, unquantified uncertainties at this stage of the project."

2002 GAO-02-539T

"Nuclear Waste: Uncertainties about the Yucca Mountain Repository Project," March 21, 2002

Page 5

"The uncertainties related to the physical characteristics of the site center on how the combination of heat, water, and chemical processes caused by the presence of nuclear waste in the repository would affect the flow of water through the repository. . . . The NRC staff's concerns about DOE's mathematical models for assessing the performance of the repository primarily relate to validating the models; that is, presenting information to provide confidence that the models are valid for their intended use and verifying the information used in the models. . . . DOE uses the data collected during site characterization activities to model how a repository's natural and engineered features would perform at the site."

2003 GAO-03-826T

"Nuclear Waste: Preliminary Observations on the Quality Assurance Program at the Yucca Mountain Repository," May 28, 2003

Page 1

"To ensure that DOE can safely construct and operate the repository, NRC requires DOE to have a quality assurance program. The quality assurance program is designed to include procedures to assure NRC that the information submitted to it is verifiable and

well documented. . . An ineffective quality assurance program could potentially impede the application process and could precipitate potentially adverse health, safety, and environmental effects.”

“DOE’s track record of correcting problems with its quality assurance program is less than favorable. Recurring problems have persisted in the program despite DOE’s numerous attempts to correct them. DOE evaluations and NRC oversight activities have concluded that the program still falls short of expectations.”

Page 2

“. . . DOE has recently identified further quality assurance problems, including recurring problems with the data that will be used to support the NRC’s decision on whether to authorize DOE to construct the repository. . . Our observation is further supported by NRC’s recent comment that DOE’s quality assurance program has yet to produce outcomes necessary to ensure that this program meets NRC requirements.”

“Among other things, such a quality assurance program is required to (1) train personnel in quality assurance; (2) inspect activities that affect quality; (3) establish controls over testing programs and test equipment, such as ensuring that this equipment is properly calibrated; (4) establish and maintain records, including records documenting the qualifications of personnel performing repository work; and (5) verify compliance with the rules and procedures of the quality assurance program to determine the effectiveness of the program.”

Page 3

“[In 1988] we found that NRC had identified many specific concerns from the oversight activities it had performed at Yucca Mountain. For example, NRC noted that DOE’s heavy reliance on contractors and its inadequate oversight of quality assurance activities would increase the likelihood that DOE might encounter quality-related problems. . . NRC also found that DOE staff and contractors exhibited negative attitudes toward the function of quality assurance, noting that participants appeared to lack a full appreciation for what it took to get a facility licensed by NRC.”

“DOE was put on notice of these shortcomings, but the problems continued.”

Page 4

“DOE renewed its efforts to correct problems with its quality assurance program starting in the late 1990’s when its own audits at Yucca Mountain identified quality assurance problems in three areas: data sources, validation of scientific models, and software development.

“Model validation and software development problems . . . resurfaced in 2001.”

Page 5

“Whether DOE can correct its quality assurance problems in time to meet its milestone for submitting an application that is acceptable to NRC is not clear.”

2004 GAO-04-460

“Yucca Mountain: Persistent Quality Assurance Problems Could Delay Repository Licensing and Operation,” April 2004

Page 1

“The quality assurance program involves a two-part process that (1) requires program staff to follow procedures to help ensure the reliability of information and (2) uses quality assurance auditors to verify that the procedures have been followed. Both program staff and quality assurance auditors are required to identify when procedures are not being following or when they encounter problems with the procedures.”

Page 2

“In 1998, DOE’s quality assurance auditors identified significant problems with data sources, validation of scientific models, and software development and issued three corrective action reports.”

Page 3

. . . “DOE issued a corrective action plan in July 2002 that addressed both the quality problems with data and models and the management weaknesses. In addition to the 37 actions in the 2002 plan that addressed models and software, DOE added 35 corrective actions to address management weaknesses that it found in five key areas; roles and responsibilities, quality assurance processes, written procedures, corrective action plans, and a work environment that allows employees to raise quality concerns without fear of reprisal.”

Page 4

“[In May 2003]. . . we noted DOE’s poor track record in correcting recurrent quality assurance problems . . .”

Page 6

“An ineffective quality assurance program runs the risk of introducing unknown errors into the design and construction of the repository that could lead to adverse health and safety concerns.”

“Given the prominence of computer modeling in the licensing of the repository, one of DOE’s most important tasks is to demonstrate the adequacy of the data, models, and software used to perform the simulation. . . DOE must demonstrate that its quality assurance program can effectively identify and correct deficiencies in areas important to the safe operation and long-term performance of the repository, such as the natural and engineered barriers of the repository and the program’s data, models, and software.”

Page 7

“Since the late 1990’s, DOE has attempted to correct continuing quality assurance problems in three areas critical to the repository’s successful performance: the adequacy of the data sources, the validity of scientific models, and the reliability of computer software that have been developed at the site.” . . . DOE was unable to ensure that critical project data had been properly collected and tracked back to original sources.”

Page 8

“In 2001, similar deficiencies associated with models and software resurfaced. DOE attributed the recurrence to ineffective procedures and corrective actions, improper implementation of quality procedures by line managers, and personnel who feared reprisal for expressing quality concerns.”

Page 9

[In September 2003] the audit found that some data sets did not have the documentation needed to trace them back to their sources; the critical process of data control and management was not satisfactory; and, as in 1998, faulty definitions were developed for data procedures, which allowed unqualified data to be used. In addition, DOE found that overall compliance with procedures was unsatisfactory.”

Page 10

“An October 2003 DOE quality assurance audit found continuing problems with the documentation and validation of models that DOE plans to use in its license application.”

Page 15

“. . . At an April 2003 management meeting with DOE< an NRC official commented that the quality assurance program had not produced the outcomes necessary to ensure that the program is compliant with NRC requirements. . . . NRC officials stated that they were seeking evidence of incremental DOE progress in the implementation of the quality assurance program in order to gain confidence in the adequacy of data, models, and software supporting the potential license application. . . . NRC staff continued to express concerns with DOE’s lack of progress in correcting repetitive quality programs with models and software.”

Page 16

[An April 2004 NRC report] states that DOE and Bechtel had not integrated human performance concerns into their root-cause and corrective action efforts in response to past quality problems. The NRC report concluded the following: . . . if DOE continues to use its existing policies, procedures, methods, and practices at the same level of implementation and rigor, the license application may not contain information sufficient to support some technical positions in the application. . . .”

Page 22-Conclusions

“Entering into the licensing phase of the project without resolving the recurring problems could impede the application process, which at a minimum could lead to time-consuming and expensive delays while weaknesses are corrected and could ultimately prevent DOE from receiving authorization to construct a repository. Moreover, recurring problems could create the risk of introducing unknown errors into the design and construction of the repository that could lead to adverse health and safety consequences. Because of its lack of evidence that its actions have been successful, DOE is not yet in a position to demonstrate to NRC that its quality assurance program can ensure the safe construction and long-term operation of the repository.”

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