



**AGENCY FOR NUCLEAR PROJECTS  
NUCLEAR WASTE PROJECT OFFICE**

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January 25, 1994

B.J. Youngblood  
Director  
Division Of High-Level Waste  
United States Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Mr. Youngblood:

I am writing to let you know of our growing concern with DOE's activities leading to continuing construction of the Exploratory Studies Facility (ESF) at the Yucca Mountain potential repository site. I am aware that your staff shares some of our concerns and has taken measures to increase the frequency of its interactions with DOE in order to assist DOE in understanding NRC's requirements and expectations relative to compliance with repository license regulations, 10 CFR Part 60.

My mounting concern with DOE's activities relative to the ESF are primarily based on the observation that DOE's schedule for beginning underground ESF construction with a tunnel boring machine later this year appears to be resulting in increased subordination of issues important to safety and waste isolation.

On February 4, 1993, Carl Johnson wrote to you regarding our concerns over whether important data collection relative to characterization of pneumatic pathways and conditions might be precluded by proceeding with ESF construction prior to completion of necessary surface-based investigations. To date, I am not convinced that DOE's response to this concern is adequate to meet the objectives of site characterization. Instead, it seems to be one of attempting to prove, during TBM operation, that ESF construction does not interfere with the ability to characterize the pneumatic system. While some surface-based testing has been rescheduled and relocated to respond both to the testing concern and to DOE's latest ESF conceptual design and construction schedule, it likely is impossible to sufficiently characterize the

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undisturbed system prior to DOE's scheduled near-term beginning of TBM operations. As you know, accurate understanding of the pneumatic conditions at Yucca Mountain is a significant factor in assessing waste isolation performance, and it appears the ability to gain such understanding may be sacrificed to DOE's aggressive ESF construction schedule.

The DOE appears to be about to abandon the ESF conceptual design which emerged from the DOE's ESF Alternatives Study, in favor of a major revision, which it refers to as the "enhanced" design. This change appears to have been a response to concerns about safety and efficiency of TBM operation when it intersects the N-S trending Ghost Dance Fault zone, which recent surface mapping indicates is a complex fault and fracture zone, up to about 1,000 feet wide, rather than a single discrete fault as was earlier thought. The enhanced design is also said to have considerable benefits for repository design and operation.

Redesign of the ESF is now under way on a fast track, in order to meet DOE's schedule for beginning tunnel construction with the TBM. We have already seen examples of DOE's commitment to a "just in time" design practice, which is of questionable prudence in the view of some engineers, and seems especially questionable when the purpose of tunnel construction is for site characterization, first, and then, incorporation in a licensed repository at a later date.

DOE's program requires that all aspects of ESF design and activities undergo "Determination of Importance Evaluation" (DIE), which evaluates potential impacts on repository radiological safety, waste isolation, and site characterization test interference. As is indicated by the attached report from Thompson Engineering, who represented the State in the recent DOE Package 2B, 90% design review (in which NRC staff was also present), some design plans are moving forward without DOE having completed the appropriate DIE's, and with limited, if any, coordination and integration with other program interests and participants. The limitations, according to the report, are due to pressure to meet DOE's schedule for beginning TBM operations, as are some other problems, such as lack of integration and design interface with testing facilities.

Also, adoption of the new ESF conceptual design appears to be moving forward without consideration of a newly recognized fault zone which intersects the Ghost Dance Fault zone, and appears to transect the repository block in a northwesterly direction. This zone appears to be about 800 feet wide, and possibly consist of up to six faults with both vertical and horizontal offset. The dimensions and magnitude of this newly recognized feature are similar to those of the Ghost Dance Fault Zone, which influenced a major ESF redesign, yet its impact on the ESF enhanced design does not appear to have been evaluated. This, again, may be due to the pressure to adopt the new design so the construction start schedule can be met.

In view of the information discussed here, and in the attachment, as well as the information which your staff has gathered in its interactions with the DOE, we are requesting that you review the DOE's ESF design program and documents and consider stating your concerns to DOE, in the form of an objection, pursuant to your 10 CFR Part 60 authority. It is our belief that an objection to DOE is appropriate at this time based, as it was in your 1989 Site Characterization Analysis, on the need for DOE to demonstrate the adequacy of both the ESF design and the design control process.

We believe that an objection from NRC at this time, while DOE is awaiting delivery and assembly of the TBM, would not necessarily affect DOE's ESF schedule as it might if NRC found such action necessary at some later date.

I look forward to your consideration of the information in this letter and our request for NRC staff action. If you have questions about this matter, please do not hesitate to contact me.

Sincerely,



Robert R. Loux  
Executive Director

RRL/cs

Attachment (1)

cc: John Cantlon, NWTRB  
Dwayne Weigel, GAO  
Commission on Nuclear Projects  
Legislative Committee on High-Level Nuclear Waste



## **THOMPSON ENGINEERING**

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H. Platt Thompson Engineering Company, Inc.  
Consulting Engineers • Surveyors • Environmental Scientists

January 13, 1994

Mr. Carl A. Johnson  
Administrator of Technical Programs  
State of Nevada  
Nuclear Waste Project Office  
Capitol Complex  
1802 Carson Street  
Carson City, Nevada 89710

Re: Report on 90% Design Review, Package 2B.

Dear Carl:

This report covers the procedures, scope, and observations of the subject design review completed on January 7, 1994. The review documents were issued in mid-December with presentations and discussions held in Las Vegas on January 5, 6, and 7. A comment resolution meeting is scheduled for January 25.

### **PROCEDURE**

This design review followed a new format with the package being issued to the reviewers and observers about three weeks prior to the presentations. This was intended to give the reviewers three weeks to become familiar with the design presented and formulate their comments ahead of time. Verbal comments were encouraged during the presentations in hopes that issues could be solved during the meeting and hopefully eliminate the need to submit written comments.

Early access to the package appeared to bring a better informed audience to the meetings and, as intended, verbal comments and questions abounded during the presentations. However, rather than comments being quickly resolved, the dialog often prompted several additional questions and most issues were resolved by the presenter instructing the reviewer to submit a comment in writing. One session on the fire suppression system got so heated and chaotic that the discussion was terminated during the presentation and the meeting moved on to the next topic.

### **SCOPE**

Design Package 2 includes design of the facilities required for the North ESF Ramp from the portal to the Topopah Springs Level. Package 2 has subsequently been split into three sections: 2A, 2B, and 2C.

The subject package, 2B includes:

- Muck Storage Study. Because a new location for the muck storage area is being considered, this study was not discussed.
- Excavation Methods Study. This study concluded that the main tunnel would be driven by a TBM and all other excavation would be done by drill and blast. However, new cutter design by the Colorado School of Mines might be available in the future allowing the use of mechanical miners for alcoves, etc.
- ESF Ventilation Study. From this study it was concluded that 15 fans should be procured; however, a power-cost trade-off study was not evident.
- ESF Ventilation System procurement specifications. Note that these procurement specifications preceded design drawings and specifications for the Ventilation System which are scheduled to appear in Design Package 2C.
- Surface Conveyor System concrete drawings and specifications. These will be redesigned if the muck pile is relocated.
- Rail Haulage System procurement specifications. The issue of Diesel vs Electric locomotive power supply has not been resolved. This specification covers the procurement of a 25 ton electric trolley/battery locomotive and a diesel locomotive. Also included are specifications for the purchase of specialty rolling stock of the manufacturer's design.
- TBM Mapping Platform procurement specification. This specification covers a series of rail cars (8) that will carry a mapping platform 246 feet in length. This platform will be inserted in the middle of the TBM train which is currently being fabricated in Seattle. The manufacturer of the mapping platform will be responsible for designing the platform to interface with the TBM components. Hopefully, the TBM supplier will secure this contract to insure compatibility.

## CONCERNS

**CONSTRUCTABILITY:** During the three day review session, the reviewers commented that many features of the design exhibit "overkill." The M&O defends this "gold-plating" approach by pointing out that regulations (BFD and ESFDR) may have resulted in the production of an impractical and unrealistic design in some instances. This over-design may render some elements unconstructable and some equipment unobtainable.

**DIEs:** The program calls for investigation of each item or activity in the ESF effort to undergo a "Determination of Importance Evaluation" (DIE). This analysis addresses three issues:

- (1) Does the item or activity have a potential impact important to radiological safety?
- (2) Does the item or activity have a potential impact important to waste isolation?
- (3) Does the item or activity have a potential impact important to test interference?

DIEs for many of the elements of the subject design package have not been completed. This package is primarily a procurement package, and when approved, this equipment will be ordered and fabricated. However, until the DIEs are completed, there is no assurance that the various pieces of equipment will meet the radiological safety, waste isolation, and test interference standards. The DOE admits that they are proceeding with procurement at risk but the TBM schedule drives the need to have ancillary equipment operable in late 1994. The current procurement includes items such as locomotives, rail systems, and ventilation equipment. Should this equipment later prove unacceptable by future DIEs, the DOE will simply instruct the contractor to procure an acceptable second set of equipment. As some items have a year delivery lead time, redesign and reorder of a critical item could dramatically impact schedule. In addition to operating at risk regarding schedule, the DOE may also be risking a major budget problem if repurchase and delays develop.

**BUDGET:** Several procurement items specify the purchase of new equipment or equipment of a unique size or design that precludes using existing equipment available at the NTS. Example: design specifies the use of 85 pound rail; REECO stated that there are "miles" of used 90 pound rail available at the NTS. A 20 ton diesel locomotive is available at NTS; design specifies 25 ton diesel locomotive. Purchasing all new equipment could deplete the budget as projected and adversely impact construction efforts.

**LIMITED DESIGN:** Upon questioning by reviewers, presenters admitted that in some cases alternative methods or design features had not been considered during the design and specification effort. Further, many trade-off studies were not performed. Example: would two 48-inch vent ducts and fewer fans be more economical to operate than one 66-inch vent duct? Time and budget restraints were cited as the reason for the limited analyses.

**FRAGMENTATION:** The design effort is being broken into smaller and smaller packages. Items in one package are designed and procurement could proceed without consideration of interface with an item to be designed in a mini-package next year. Some design being presented now relates to operation of the testing facilities and often is not compatible with construction phases.

**CONCLUSION**

The design effort is being fragmented, accelerated, and driven by the scheduled startup of the TBM in late 1994. In some cases, realistic, workable design elements are not being produced due to restraints imposed by regulations. Designers seem reluctant to initiate the needed regulation revisions because of the time and paperwork involved to effect a change. Unless integration of the construction, testing, and performance assessment disciplines is expanded, costly redesign and repurchase of equipment is likely to occur. It is recommended that the design control framework be reviewed, altered, and perhaps even expanded to insure the quality and cost effectiveness of the overall project.

We suggest a meeting soon to discuss the concerns expressed herein.

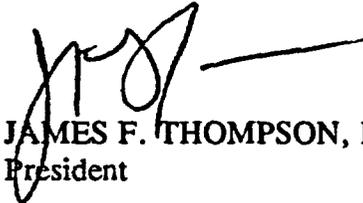
Very truly yours,

H. PLATT THOMPSON  
ENGINEERING COMPANY, INC.



JAMES R. GRUBB, P.E.

Vice President



JAMES F. THOMPSON, P.E.

President

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