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SILO PROJECT INDEPENDENT REVIEW TEAM DOCUMENTATION - DECEMBER 12 & 13, 1996 MEETING NOTES - PATH FORWARD DECISION

01/03/97

MN:WMTSP(SP):97-0004
IRT IRT
13
MINUTES

FEMP Silos Project
Path Forward Decision
Distribution List

Independent Review Team w/ Attachments
Gail E. Bingham, consultant
Gilles Chevrier, NUMATEC
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Bob Lawrence, WVNS
Todd Martin, HEAL
John Plodinec, WSRC
Bob Roal, consultant
Ben Smith, consultant

Decision Analysis Support Contractor
Lee Merkhofer, Applied Decision Analysis, Inc.
w/ Attachment

Fluor Daniel Fernald
John Bradburne w/o Attachments
Mike Connors w/o Attachments
Doug Daniels w/o Attachments
Mark Dehring* w/ Attachments
Yvonne Gale w/o Attachments
Terry Hagen w/o Attachments
Bob Hock w/ Attachments
Rick Maslin w/o Attachments
Richard L. Maurer w/o Attachments
Dennis Nixon w/o Attachments
Don Paine w/ Attachments
Harry Robertson w/ Attachments
Jeff Stone w/o Attachments

Jeannie Foster w/ Attachments
Jill Oligee w/ Attachments

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Johnny Reising w/o Attachments
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Building Trades w/ Attachments
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11/27/96

MEETING NOTES MN:WMTSP(SP):97-0004

SUBJECT: Silos Project, Path Forward Decision

MEETING DATE: December 12 & 13, 1996

LOCATION: Fluor Daniel Fernald Office

ISSUE DATE: January 3, 1997 File Record Storage Copy [redacted].5

DISTRIBUTION: Please refer to the attached Distribution List

1.0 PURPOSE

The meeting was the second in a series of working sessions to review and evaluate path forward alternatives for the FEMP Silos Project. The meeting involved the Silos Project Independent Review Team (IRT), along with representatives of FEMP stakeholder groups, regulatory agencies, the Department of Energy and Fluor Daniel Fernald. Specific objectives of the path forward evaluation were revisited as part of the meeting discussion.

Comments by IRT members and stakeholder representatives are documented as part of the meeting notes. It should be recognized that the comments by IRT members during the course of this two-day working session reflect ongoing evaluation. Comments by individual members of the IRT do not necessarily represent the views of the IRT as a whole and are not necessarily intended as a final path forward recommendation.

2.0 DISCUSSION

Thursday, December 12

Review of Objectives Bob Heck opened the two-day meeting with an overview of the objectives of the Independent Review Team and the path forward evaluation. His comments are attached. Bob Heck also introduced two members of the IRT that were not present at the first meeting: Jim Edmondson - a consultant to the commercial glass industry formerly with GE Glass, and John Plodinec - from the Savannah River Technical Center.

Open Actions from Last Meeting Don Paine addressed open actions from the November meeting as follows:

1) A comparison of vitrification and cement stabilization options with respect to volume reduction was distributed (attached);

MEETING NOTES - Continued

2) Cost information requests involving waste disposal costs and project cost growth will be addressed as part of the Cost & Schedule Technical Committee reports in the January and February meetings; and

3) In response to the request for off-gas composition, a copy of the Radon Balance for the 1 MT/D Vitrification Pilot Plant was distributed (attached). The composition of remaining constituents will be provided under separate cover.

Silos Project Update Don Paine provided the meeting with an update of ongoing Silos Project Activities including the Vitrification Pilot Plant testing, Silo 3 Report Update, and Silo 3 Request for Proposal. A copy of the presentation is attached.

Decision Analysis Approach Lee Merkhofer of Applied Decision Analysis initiated a discussion of the proposed decision analysis approach for the Silos Project. After some discussion, the meeting agreed that it would be helpful to postpone the presentation until after a detailed review of the technical issues associated with the alternatives, focusing specifically on Alternative 2 - Vitrification of Silo 1 & 2 and Cementation of Silo 3. Lee Merkhofer continued the presentation in the Friday session as time allowed. The presentation addressed the utilization of a decision model consisting of a decision tree and a multicriteria value model to support the evaluation of project alternatives. Six technical committees have been established to develop information and estimates required to support evaluation by the IRT: the Core Committee, the Regulatory Committee, the Funding and Waste-Site Availability Committee, the Technical Issues Committee, the Cost and Schedule Committee, and the Health and Safety Committee. The Core Committee is responsible for defining and optimize the project alternatives, design and implement the overall approach and managing and coordinating the decision analysis effort. The remaining five technical committees were established to focus on specific areas of project risk and uncertainty identified by the IRT at their first meeting. A copy of the full presentation is attached.

Description of Alternative Approaches In the November meeting, it was tentatively agreed that the evaluation would focus on three alternative approaches:

Alternative 1: Vitrification of Silos 1, 2 and 3 Residues,

Alternative 2: Vitrification of Silo 1 & 2 in Conjunction with Cementation of Silo 3 Residues,

Alternative 3: Stabilization of Silo 1, 2 and 3 Residues.

Don Paine described each of the three alternatives including the approach, technical basis and significant assumptions. Most of the discussion focused on Alternative 2 which is similar to the current Silos Project Baseline. A copy of his presentation is attached.

MEETING NOTES - Continued

Technical Issues Committee Report Leads for each of the technical committees presented the current understanding, scope of effort and deliverables to be presented to the IRT during the January and February meetings, the approach to be used and significant issues and influencing factors related to the path forward evaluation. Harry Robertson, Technical Issues Committee lead, presented issues and risks on an activity-by-activity and system-by-system basis.

The risks associated with upgrading and/or taking the Vitrification Pilot Plant (VITPP) "hot" were discussed. Several members of the IRT indicated that they would not recommend using the VITPP in radioactive service. Gail Bingham suggested that upgrade of the VITPP to 6 MT/day should only be considered after first upgrading the VITPP for radioactive service at the current capacity as called for in the current baseline. John Plodinec recommended that FDF consider an approach that involved running glass formulation testing with actual Silo residues at a small scale (such as the 10 kg/day CU VSL tests) in conjunction with piloting the full-scale melter with surrogate materials. This approach was used by the West Valley HLW Vitrification Project (West Valley Project). Both John Plodinec and Bob Lawrence pointed out that West Valley never ran their full-scale pilot melter hot except as part of plant start-up. All glass chemistry work for the West Valley Project was performed though Pacific Northwest Laboratories (PNL) and Catholic University Vitreous State Laboratory (VSL). A full-scale pilot was run with surrogate materials. After testing, evaluation, modifications and confirmation testing were complete, the facility was torn down. To run a full-scale pilot melter with radioactive materials would not be cost-effective. Todd Martin suggested that FDF evaluate the cost of the VITPP Upgrade based on its use in surrogate testing operations only.

Several members of the IRT agreed that gems (the current waste form for the Silos Project) represents a technology development risk. Even though all waste forms (cullet, gems, monolith) have pluses and minuses, Bob Roal and John Plodinec both favored the use of monolith, and suggested that FDF may want to revisit this issue for the Silos Project.

It was suggested that FDF consider removing a good portion of the bentonite prior to treatment and dispose of it separately. Currently, FDF is evaluating the potential for feeding the bentonite at a controlled rate. VITPP testing indicates that the presence of bentonite actually promotes vitrification. High concentrations of the material in the slurry feed seem to exacerbate plugging problems, however.

Lessons learned on existing West Valley and SRS vitrification process control systems were discussed. Past control system problems were characterized as an area that deserves focus but did not represent a significant risk to the success of the project ("an annoyance, not a showstopper"). Both John Plodinec and Bob Lawrence commented that FDF should strive for a simple, robust system.

MEETING NOTES - Continued

Members of the IRT agreed that operating the melter at a (relatively) high temperature did represent a risk. Corrosion, thermal stresses and melter life were the primary concerns compared to VITPP operations in the 1200°C to 1350°C range. West Valley and DWPF melters operate in the 1150°C to 1200°C range. John Plodinec indicated that both Clemson University and SEG had some limited experience at temperatures comparable to those of the Silos Project. Jim Edmondson noted that in commercial application (with benign, nonradioactive glass), temperatures in the 1550°C to 1600°C range were not unusual.

Team members also commented on the application of a joule heated melter. John Plodinec indicated that if the melter were only processing Silos 1 & 2 residues, a joule heated melter is appropriate. The addition of Silo 3 residues to the feed may introduce sufficient variability to consider a different melter type (a different melter type may be appropriate for Silo 3 by itself or mixed with K-65 residues). Members also commented on the unique nature of the VITPP melter design. It is a one-of-a-kind melter that will require development prior to production application.

Fernald organizational issues and acquisition strategies were discussed. John Plodinec indicated a need on the part of Fernald and a willingness on the part of the Westinghouse organizations utilize the available resources from around the DOE complex. It was agreed that future design efforts would benefit from outside technical review. The subcontract approach proposed by FDF for the Silo 3 alternative was generally accepted as appropriate. Various acquisition strategies for design, fabrication and installation of a Silo 1 & 3 or Silo 1, 2 & 3 melter were discussed. Bob Roal suggested FDF consider letting contracts for 2 or 3 designs and awarding a fixed price fabrication contract to the best design. John Plodinec discussed the approached used by West Valley which proved to be successful. The initial melter design was developed by PNL. Westinghouse tested and modified the PNL design. Fabrication of the modified design was competed on a fixed price basis. John Plodinec suggested that the most appropriate acquisition strategy would heavily influenced by whether or not Silo 3 materials are to be vitrified (a melter intended for Silo 3 materials or a mix of 1, 2 & 3 materials would likely be involve more of a custom design).

The approach to plant start-up was discussed. Based on Lessons Learned: equipment should be turned over from construction to the start-up team as complete sub-systems instead of areas. The subsystems need to be identified and defined early in design. Representatives from the construction and startup/operations organizations need to be involved early in the design effort. John Plodinec stressed that the start-up test program needs to address the full range of variation anticipated in production operations. He also suggested that use of modular vitrification units be considered for final remediation (such a concept was developed by SRS and is currently being tested at Oakridge).

MEETING NOTES - Continued

The use of the Houdini Robot was discussed and concern was raised with using it for waste retrieval. It was pointed out that this technology was intended to be used primarly to remove any remaining 'heel' in the silos and was not intended to be used as a primary means of waste removal.

Based on Lessons Learned from other operational facilities, the vitrification off gas system is an area that deserves significant focus, but was not considered a significant program risk. Recommendations included designing the off gas system with significant extra capacity (to account for factors such as unexpected melter in-leakage) and keeping the system pressure drop as low as feasible.

Slurry feed systems generally are problem areas. Here again, the system deserves focus, but was not considered a significant program risk. John Plodinec recommended a robust approach to design (use of proven, reliable and simple systems and components, with emphasis on simple). Bob Lawrence addressed West Valley's experiences with their feed system. Many of their Lessons Learned have already been reviewed in detail with the FDF Silos Project staff. Several members of the IRT supported a recommendation to utilize the VITPP and the Silo 4 Demo program to test several candidate equipment components (pumps, valves, etc.). Further, it was suggested that FDF consider setting up a test loop to evaluate slurry feed system components.

Several comments were made on waste form. Based on the uncertainties involving the gem making equipment, John Plodinec recommended that FDF consider conducting experiments to determine what dose rates could be expected from a monolith waste form. John Plodinec suggested that the ability to store the treated waste on site on an interim basis may be a discriminator. Each alternative would need to be evaluated from a safety perspective. The Hanford experience highlighted a risk associated with interim storage of cemented waste. The treated waste would need to be protected from freeze-thaw cycles to assure integrity of the waste form.

The limited availability of expertise related to either radioactive waste cementation or vitrification was discussed. John Plodinec suggested that within the DOE complex, cement expertise is currently more limited than vitrification.

Ben Smith requested clarification of the schedules included in the Silo 3 Alternatives Evaluation. From his review it appeared the approach to the "all vitrification alternative" was much more conservative than that of the "vitrify 1 & 2, cement stabilize Silo 3 alternative". Mike Connors provided an explanation as part of the Cost & Schedule Committee Report on December 13 as follows:

John Plodinec noted that the dryness of Silo 3 residues represents an advantage relative to the cement stabilization process. He suggested FDF may want to revisit the original or more recent samples to confirm the dryness of the material.

MEETING NOTES - Continued

Friday, December 13

Regulatory Committee Report Terry Hagen presented the Regulatory Committee report. A copy of the presentation is attached. Highlights of the discussion are a follows:

Robert Cook noted that the most significant discriminator between alternatives from a safety perspective is the risk associated with transportation. The significant increase in waste volume associated with solidification will represent an increase in the number of shipments to the disposal site.

Much of the discussion revolved around what was the "principal threat" associated with the Silos residues. The principal threat was different for Silo 1 & 2 - radon, as opposed to Silo 3 - Thorium-230. Vitrification has been deemed the "best" technology relative to limiting radon emanation. According to the treatability tests, cementation actually represents an advantage over vitrification relative to Thorium-230 in Silo 3 residues.

Several members of the IRT requested an update on the Silo 3 Alternatives evaluation, specifically:

What is the status of the Silo 3 cementation alternative evaluation;

What is the status of it's implementation? (has FDF officially recommended the alternative?, has DOE officially supported the recommendation?, has EPA taken a position?);

How is the evaluation related to the current path forward decision process?; and

The following response was provided and is attached: Silo 3 Consensus Statement.

The potential for Envirocare accepting treated Silo 1 & 2 materials was addressed. Don Paine indicated that even considering the changed proposed by Envirocare to their licence, the amount of radium in Silo 1 & 2 residues would likely preclude acceptance.

Funding & Waste Site Availability Committee Report Terry Hagen presented the Funding and Waste Site Availability Committee report (presentation attached). Highlights of the discussion are noted below:

IRT members requested the current funding projections for the Silos Projects (this information was provided as part of the Cost and Schedule Committee Report, and attached).

MEETING NOTES - Continued

IRT members requested the rationale for the current funding allocation to the Silos Project relative to the remaining FEMP projects. Both John Plodinec and Gene Willeke noted that since Operable Unit 4 presents the biggest environmental risk, it follows that it should receive funding priority. Terry Hagen indicated that the current funding scenario (referred to as the FY97 Replan) was developed at a time when it became clear that the path forward for the Silos Project was uncertain. The funding allocation reflected in the FY97 Replan was established in recognition of 1) the need to preserve the overall FEMP cleanup schedule (including maintaining regulatory milestones for Operable Units 1, 2, 3 and 5), and 2) an established path forward for the remaining FEMP projects. The current funding scenario will be revisited once a path forward has been established for the Silos Project. Johnny Reising indicated that in addition to the funding, all FEMP milestones may need to be revisited with the regulators. Tom Schneider clarified that the EPA has never endorsed the 12 year scheduled for the Silos Project included as part of the FY97 replan, or the implied priorities of the FY97 Replan.

Safety & Health Committee Report Pat Fisk presented the Safety and Health Committee Report (presentation attached).

Robert Cook noted that he is interested in an assessment of long-term risks both local to the FEMP, at the disposal site(s), and potentially for interim storage sites, if required.

Gene Willeke noted that the Silo 1 & 2 waste retrieval concept is of concern and would appreciate a review by the IRT to assess its likely effectiveness. The utilization of water jets was a specific area of interest. Bob Roal indicated he had reviewed the Waste Retrieval System Conceptual Design Report. He endorsed the hydraulic retrieval of Silo 1 & 2 residues, noting that it has been successfully accomplished several times at the Hanford site in similar or more severe service. He expects that hydraulic retrieval of Silo 1 & 2 material should go quickly. He also suggested that FDF may want to consider slurrying material out of Silo 3. Bob Roal noted, however, that the March '96 Waste Retrieval conceptual design was not complete enough to be considered a conceptual design. Bob Roal reiterated his suggestion to set up a test loop for Silo residue slurry to evaluate valves, pumps, instrumentation, etc.

Robert Cook indicated he is interested in an assessment of the long-term intruder scenario risks associated with local disposal of rubble from decommissioning and demolition of FEMP facilities.

Vikky Dastillung inquired as to whether the team would be looking at alternatives involving offsite treatment and disposal of Silo residues (such as by Envirocare). Don Paine indicated that these alternatives have not been eliminated.

Cost & Schedule Committee Report Mike Connors presented the Cost & Schedule Committee Report. A copy of the presentation is attached including a Phase I FY97

MEETING NOTES - Continued

Replan Schedule, a Phase II Replan Schedule, and the Summary Baseline for the FY97 Replan (showing FY97 through FY08 funding allocations). Mike described the current Silos Project Schedule baseline and the planned scope of work and deliverables for the Cost & Schedule Committee for the January and February meetings of the IRT. He clarified that cost estimates provided for Alternatives 1 and 3 would be provided to the committee as a range reflecting the uncertainty in the basis for the estimates. The uncertainty is significant in the case of Alterative 3. Other than the recent work of the Cost & Schedule Committee in support of the IRT, no development of the "all solidification alternative" technical basis has occurred since the Operable Unit 4 Feasibility Study.

Several members of IRT commented on the discontinuity of the Silos Project engineering effort. The current baseline reflects no current design effort associated with the final remediation facility with Advanced Conceptual Design (continuation of the Conceptual Design effort completed in December 1992) not starting until July of 2000.

- Bob Roal stressed the importance of a continuing engineering effort throughout the program in conjunction with the Vitrification Pilot Plant test program. Development of the design concept and performance of engineering studies in conjunction with the VITPP program is essential for effective kickoff of the Advanced Conceptual Design. Bob Roal commented that without this continuity, the value of the VITPP test program to the Silos Project is severely comprimised. Bob Roal's position was supported by several IRT members.

- Bob Roal pointed out that overlap between the project technology development programs (such as the VITPP) and Title II design (detail design of the final remedation facility) is often a benefit. It is not unusual during the course of detailed design to discover that addtional design data is required. If the technology development programs have been closed out prior to this time, it would either be much more expensive or not feasible to obtain the needed data.

- Bob Roal stressed the importance of a definitive Conceptual Design prior to proceeding with the final design of the final remediation facility. This may well imply both more time and more money than currently reflected in the Silos Project budget. As an example, he noted that the current Waste Retrieval System conceptual design is inadequate to proceed into Title I design.

Based on the VITPP design, John Plodinec voiced a concern about the capability of the various Fernald organizations will respect to the final remediation facility. The shortcomings of the VITPP design call into question the capabilities of the site A-E to perform the design as well as the FEMP to oversee the effort without additional support. Both FDF and the IRT agreed that future design efforts should take advantage of existing experience within the DOE complex. One suggestion was to involve a selected team of experts throughout the Silos Project design process.

MEETING NOTES - Continued

Several members commented on the inadequacy of the current funding scenario, noting the current shortfall in FY98, FY99 and FY00.

Relative to the cost estimates for Alternatives 1, 2 & 3 to be provided by the Cost & Schedule Committee, Todd Martin requested that assumptions used by FDF be included with the information provided.

Committee members requested that estimates be provided to the IRT ahead of the January meeting if feasible.

Open Discussion Meeting representatives participated in an open discussion of issues. During this discussion period, Lee Merkhofer attempted to determine if their was consensus at this point in the evaluation among the IRT members regarding an appropriate path forward. After some discussion, it was determined that there was not agreement on either a single path forward approach or agreement on speicific alternatives that should be ruled out at this point in the evaluation. The IRT issued a white paper entitled "IRT Action Statements" (attached). It captures in-progress recommendations of the IRT as well as some of the issues discussed.

Assignment of Roles and Responsibilities Roles and responsibilities of the meeting participants in the remainder of the evaluation process was discussed.

- It was agreed that the six technical committees would take the lead in developing the necessary information to support the evaluation.

- In addtion to fullfilling the overall objectives expressed by Bob Heck at the beginning of the meeting, the IRT members will review and evaluate the information developed by the technical committees, determine the validity of the estimates provided, and determine if additional information is required. The IRT will share their collective experience and lessons learned and provide advice relevant to specific technical areas.

- Stakeholder representatives will participate in the evaluation process suggesting weights and other value judgments.

- Both the IRT and stakeholder representatives will provide overall comments and recommendations including considerations that must be overlaid on the quantitative model.

Meeting Assessment/Path Forward Overall objectives of future meetings were discussed (refer to page 26 of Lee Merkhofer's presentation). The January meeting schedule was revised from two days (January 16 and 17, 1997) to three days (January 21, 22 and 23, 1997). The February meeting was revised from February 13 and 14, 1997 to

MEETING NOTES - Continued

February 11, 12 and 13, 1997. An additional meeting was tentatively scheduled for February 27 and 28, 1997.

3.0 ACTIONS

During the course of the two-day meeting, the following information was requested by or promised to members of the Independent Review Team:

Provide a copy of the completed VITPP Phase I, Campaign 2 Test Report to the IRT

Provide a copy of the Updated Silo 3 Alternatives Evaluation to the IRT (enclosed in the packet)

Provide information from the OU4 Feasibility Study addressing a comparison of the performance of glass vs. cement waste form for disposal at the Nevada Test Site to the IRT (requested by Robert Cook). This has already been provided as an attachment to the November meeting notes in the form of Volume III, Appendix C of the Feasibility Study.

MLD

MEETING NOTES - Continued

LIST OF ATTACHMENTS

Meeting Agenda

List of Attendees

Overview of Objectives Independent Technical Review Team, presentation by Bob Heck

Silos Project Update presentation by Don Paine

Proposed Decision Analysis Approach for the Silos Project, presentation by Lee Merkhofer

Description of Alternative Approaches, presentation by Don Paine

Technical Committee presentation by Harry Robertson

Regulatory Committee presentation by Terry Hagen

Funding & Waste Site Availability Committee presentation by Terry Hagen

Safety & Health Committee presentation by Pat Fisk

Cost and Schedule Committee presentation by Mike Connors

Silos Project Phase II Replan, Level 2 Schedule, plot date 12/13/96

Silos Project, Phase I Replan Schedule, plot date 9/19/96

Summary Baseline Replan FY97, dated 09/27/96

Comparison of vitrification and cement stabilization options with respect to volume reduction (9 pages, dated 12/13/96)

Radon Balance for the 1 MT/D Vitrification Pilot Plant, dated 8/20/96

IRT Action Statements, dated 12/13/96

Technical Committee - FDF committee member names, committee leads and their phone numbers

Silo 3 Consenus Statement