Critical Analysis Team Report on Design Review Processes, Silo 3 Rescoping Evaluation and Silos 1 and 2 Design Information Package

CAT Report #22

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The CAT has reviewed the Silo 3 rescoping evaluation and the design information package for Silos 1 and 2 remediation. This CAT report presents comments on these two documents as well as recommendations for an ongoing design review process for the Silos Project.

In general, mechanically retrieving Silo 3 waste through an opening in the side of the silo appears to be a sound approach. However, it is still very early in the alternative evaluation and design development process, and many critically important issues and challenges will have to be resolved in order to assure Silo 3 project success.

Challenges discussed in further detail include controlling airborne contamination, designing a technically sound solution that can safely breach the silo and contain the contents, deploying an effective and reliable retrieval mechanism/system, and developing and successfully implementing necessary project management practices.

The existing Silo 3 documentation provides an adequate basis to begin developing a conceptual design and resolving the many outstanding technical issues associated with this project. The next step is the development and execution of a Conceptual Design Plan.

The Silos 1 and 2 remediation project also appears to be pursuing a sound concept. Again, however, the materials submitted for review are incomplete and wholly inadequate for developing technical, cost and schedule baselines. The next step is to prepare and execute a Conceptual Design Plan.

While concepts for both Silo 3 treatment and Silos 1 and 2 remediation appear sound, the existing documentation is not very useful as a basis for a cost estimate or a realistic schedule. Without a firm baseline scope, further design work and development of resource loaded schedules, any cost and schedule estimates are unreliable. The current documentation is less complete than the Silos 1 and 2 Record of Decision Amendment feasibility studies, estimates and schedules.

The CAT reminds all involved in the Silos effort that past Silos Project failures were not the result of technical problems, but management, design, and contractual difficulties. Overcoming these historical difficulties is critical for the Silos Project to be a success.

It appears there has been no appreciable progress in design and construction of the AWR project for several months. Nor does there appear to be a plan to complete design and construction. Aggressive action must be taken to resolve the AWR impasse.

Additional comments for Silo 3 appear in Attachment 2 and for Silo 1 and 2 in Attachment 3.

Recommendations

Recommendation 22-1: The Silos Project should implement a design review process that meets the process principles outlined in Attachment #1. Further, these design review principles should be followed by all project participants: subcontractors, teaming partners, and suppliers, as appropriate. The CAT recommends it participate in assessments and appraisals of the review process.

Recommendation 22-2: In order to develop credible cost and schedule baselines, Silo 3 and Silos 1 and 2 projects must complete and execute Conceptual Design Plans.

Recommendation 22-3: Mock-up and testing of equipment to transfer and fill Silo 1 and 2 containers is important to confirming reliability, maintainability and operability assumptions in the design.

Recommendation 22-4: Silo 3 retrieval equipment should be: (1) appropriately sized (large enough to provide a reasonable retrieval rate yet small enough to effectively maneuver and recover if the equipment breaks down); and (2) inherently incapable of damaging the silo walls.

Attachment 1: Design Review Process

Effective design reviews are fundamental to the success of any project. Therefore the CAT offers the following processes to help ensure that Silo 3, AWR and Silos 1 and 2 remediation proceed with deliberative, comprehensive and expeditious design reviews.

All design packages should include the identification of the package contents: types and numbers of specifications and drawings (P&ID, electrical one-lines) and other design documents. Design review teams should be organized based on design package type and content. That is, design packages must be matched to appropriate reviewers. Design review teams must represent all appropriate Fluor Fernald organizations (safety, quality, operations and maintenance, etc.). For each review package, a kickoff meeting should be held with the review team to verify assignments, communicate the review schedule, assess the review processes, etc. On complicated review packages an Architect/Engineer representative should also be present during the kickoff meeting to explain the package and assure complete understanding of the review package by the reviewers prior to initiating the review.

For each project the following activities must be completed:

- Identify each design document to be produced and develop a cost and schedule for completion.
- Assure Architect/Engineer completion of inter- and intra-squad checks of all design documents prior to their being submitted for customer review.
- Identify and schedule design reviews.
- Identify each review package including specific documents to be contained therein.
- Schedule each design review including the total design review time and the Fluor Fernald review time (portal-to-portal).

Based on the design package received, the following steps should be implemented as appropriate:

1. Document Control (ECDC):

- Determines completeness of the submitted package.
- Verifies content by item and number.
- Enters appropriate identification and tracking information into the document control system.
- Reproduces the design package.
- Distributes the review package to appropriate review personnel.
- Retains complete records of all design review efforts.
- Forwards the approved set of review comments to the AE.
- Following resolution of comments by the AE, reflects resolution in the document control system.

2. Project Management:

- Identifies a design review manager for each package.
- Helps identify and obtain the necessary review personnel.
- Assures continuity of review personnel assigned to each review team.
- Overviews the design review process.

3. Review Package Manager:

- Identifies and organizes the review team.
- Trains the review team.
- Establishes communication channels and a problem resolution process.
- Assigns specific portions of the review package to each reviewer.
- Resolves review comments with departmental review representatives.
- Prepares a set of collated, screened, resolved (with the reviewer) review comments.
- Approves the complete set of review comments.
- Reviews and approves all comment resolutions as proposed by the Architect/Engineer.

4. Reviewers:

- Accepts the design review assignment.
- As appropriate, solicits additional reviewers from their respective departments.
- During the review process, serves as the single point of contact for their department.
- Has the delegated authority to represent their department in preparing and resolving review comments.
- Submits one set of collated review comments that represent their department.
- Resolves review comments with each intradepartmental reviewer.
- Resolves review comments with the design review chairman.
- Approves the comments as resolved with the review package chairman.
- Approves comment resolutions as proposed by the Architect/Engineer.

Note: Each reviewer's prime responsibility is for those portions of the review package as specifically assigned by the review chairman. However, as time permits, each reviewer may also review and comment on any other part of the review package.

5. Project Management:

- Screens final review comment package.
- Approves the complete, collated set of review comments.

- Forwards the approved review comments to ECDC.
- Overviews the review process, particularly comment resolution and closure.
- Maintains an action list of all unresolved comments, which includes a responsible person and a completion date.

6. Architectural Engineer:

- Prepare and submits design review packages.
- Receives design review comments.
- Resolves design review comments.
- Reflects comment resolutions in future design documents.
- Establishes and maintains an action list of all open review comments and tracks each review comment to closure.

Key Decision Points:

Historically, the silos project has not rigorously followed a key decision process akin to the one outlined below. As a result, the silos project has often allowed projects to progress without adequate design documentation or credible baselines. The following key decision process is aimed at ensuring that the project has a sound basis as it moves forward and, ultimately, is successful.

1. Conceptual Design Plan (responsibility, preparation, content, schedule) for DOE approval.

2. Conceptual Design Report (CDR) for DOE acceptance. CDR contents included:

    - P&IDs (including HVAC).
    - Electrical One-lines.
    - Plot Plan.
    - Facility Layout: plans, elevations, and sections.
    - Major equipment selection.
    - Mechanical flow diagrams.
    - Process Control Plan.
    - Process flow diagrams.
    - Design packages.
    - Specifications.
    - Equipment Data Sheets (e.g., vessel sizes, pump capacity, etc.).
    - Mass and energy balance calculations.
    - References to supporting calculations.

3. Detailed Design for DOE acceptance.

- Updated versions of appropriate conceptual design documents.
- Drawings and specifications for fabrication, construction, and procurement.
- Procurement Plan, Quality Assurance Plan and Construction Plan.
- Operating and maintenance philosophy.
- Process Control Plan including sampling plan and analysis matrix.

At the completion of each major design activity (e.g., conceptual design, preliminary design, and detailed design) the scope of the next work effort should be identified, documented and agreed upon. This could be done in the baseline design documentation or on the schedule. Schedules must be resources loaded.

Management/Oversight Activities:

- The CAT recommends that it review both Fluor Fernald and Jacobs Engineering design review procedures and processes for implementation. Further, the CAT recommends that identified project management principles be followed by all project participants: subcontractors, teaming partners, suppliers, as appropriate.

- Fluor Fernald and DOE should work to minimize (through consolidation) the number of documents required for submittal for each project. For example, if fire hazard analysis, carcinogen analysis, etc., can be consolidated into a single hazard analysis document, this would simplify the number and complexity of the reviews required.

- The CAT should be included in the Conceptual Design Plan, the Conceptual Design Report and the Detailed Design Report review process.

- While the CAT recognizes that subcontractors and teaming partners must be used to perform some project activities, Fluor Fernald should perform as much of the project work as practicable. This is because, regardless of which organization performs the work, Fluor Fernald is ultimately responsible for the project.

Attachment 2: Comments on Silo 3 Rescoping Evaluation

The CAT does not expect formal written responses to the following specific comments. Rather, the comments are offered to support further development of a credible rescoping document and to raise issues that must be resolved during the conceptual design process. While the CAT does not expect formal comment responses, future revisions of the document as well as design documentation should adequately resolve concerns raised in this attachment.

The CAT offers the following specific comments of the Silos 3 rescoping document/evaluation:

1. The document should identify the process by which alternatives are selected for evaluation. In addition, the document appears to represent a decision-making process that is an evolution of the Silo 3 project as opposed to starting over. If this is true, it should be stated in the document.

2. The schedule is overly optimistic. If the schedule is accurate, the project is already several weeks behind schedule. Following are specific comments on the schedule:
    - Fig. 2, Sheet 1: The schedule shows bench-scale testing has already started. Is this true?
    - Review cycles are extremely short and unrealistic.
    - Fig. 2, Sheet 1: Based on the information and background available, all cost estimate and schedule estimates should be identified as, at best, having an accuracy of + or – 50% or, at worst, Rough Order of Magnitude estimates.
    - Fig. 2, Sheet 2: A 154 day total design time appears almost impossibly aggressive, especially given that 62 days of the 154 days is for review and approval. Thus, only 92 days of time is available for design activities. Even though the system and process are identified as simple, this schedule will most likely prove impossible.
    - Typically, when schedules are unrealistically short, the project management processes suffer.
    - Fig. 2, Sheet 2: The design review and approval times appear very unrealistic: 18 days for conceptual; 20 days for preliminary; and 24 days for final.
    - There in only one review scheduled for conceptual, one for preliminary and one for final design. Furthermore, each review identifies 9 days for review and comment resolution. This schedule is very unrealistic and, from a project management standpoint, is next to impossible.
    - How much contingency was included in the schedule? How was this contingency developed and applied/distributed?
    - An effort should be made to accelerate the EPA review of the remedial design package. For example, involve EPA during each design stage and review so

they are well aware of the design basis and are part of the early approvals. EPA should be involved early so they can provide an accelerated approval.

- The schedule indicates Systems Operating Tests (SOTs) beginning the day following completion of construction. Many SOTs (especially utilities) can and should proceed parallel with construction to both support construction and accelerate the test program.

3. The existing documentation is suitable to initiate work on conceptual design. Conceptual design, however, must demonstrate the selected approach is technically viable, and provide sound cost and schedule estimates to support the design.

4. As currently represented on the schedule, conceptual design time is not adequate. This effort includes structural calculations; bench testing; selecting excavators, conveyors, and mixers; facility layouts and locations; and, HVAC including contamination containment and control. When conceptual design is complete, all technical issues and significant risk issues should be resolved.

5. At this early stage in the project, the CAT believes FF would be prudent to not consider pneumatic transfer of silo material, because of potentially severe dusting, operating and maintenance problems. Separating small (less than 3 micron) particles from air to prevent dusting is technically challenging.

6. The selection of equipment to breach the silo and retrieve waste is a key to project success. FF should visit vendors and users where similar equipment is operating or has operated, witness demonstrations (if possible), interview previous users of the equipment, and confirm maintenance issues and remote capabilities. As more information is collected, the design descriptions should be updated.

7. The document states that Fluor Fernald (FF) has technical expertise (i.e., process engineering, HVAC, etc.). The CAT questions FF's existing capability in these and other disciplines, and thus their ability to perform the work. FF needs to build an integrated project team that includes the necessary technical expertise.

8. The waste stabilization formulation must be developed prior to completing conceptual design. Has a mix formulation been developed, tested, demonstrated and approved? If no, when will this be competed? If yes, are the results available?

9. What is the definition of "mechanical agitation"? Because there will likely be significant dusting associated with mechanical agitation, tests should be performed to determine the following parameters: time required, force required, percentage of material breakup, material size following breakup, and utility of the equipment.

10. The retrieval equipment should be inherently unable to break or seriously damage the wall or ceiling of the silo. In addition, the structural evaluation should include a case of the mechanical excavator accidentally contacting the silo wall or ceiling. CCTV is, in this case, poor for assuring an excavator won't contact the silo structure, especially given the high probability of heavy dusting. Considerable engineering and testing should be done to ensure the project uses the simplest, proven, most rugged retrieval equipment.

11. Regardless of the mixing mechanism, the water/waste material reactions should be understood prior to beginning the process design. For example, the robustness of the reaction, any reaction byproducts, the rate of heat generated and the time period over which this reaction occurs, and the possible impacts of a higher than anticipated heat generation rate. The cause of concern is that some of these events could impact personnel, safety requirements, handling, packaging, storage and shipping.

12. The heat of mechanical mixing retained in the waste material as well as the exothermic nature of the reaction may result in significantly higher than expected temperatures in the supersaks. The impact of the exothermic water-waste reaction on the supersaks needs to be determined. Also, it is unclear to the CAT how "hands-on" sealing of supersaks can meet ALARA requirements. If supersaks are not airtight, special storage (i.e., monitoring, access control, air treatment) maybe required to deal with steam, radon or other releases.

13. Are the mechanical and electrical subcontracts (construction) so similar that the fieldwork can be completed in exactly the same amount of time and at the same time? Generally, mechanical leads electrical by a considerable period of time.

14. More justification is necessary for the document statement that "the preferred approach is ALARA".

15. The IT/FDF interface can be a vulnerability. Measures should be taken to ensure that any requirements of other contractors such as IT be identified and a process developed for resolve any potential issues. An Interface Control Document or an MOU is suggested.

16. Are the minutes of the referenced brainstorming session available for review?

17. The Silo 3 project team should make maximum use of all past data including test data, test reports, video tapes and personnel interviews.

18. The document should clearly state that the schedule and cost data are order of magnitude.

19. Is the budget available within the Site FY 2001 and the 2002 budget projections sufficient to proceed with this project?

20. Page 5, mid page 4th bullet:
    - What is an 'unoxidized nitrate"? Nitrates are highly oxidized.
    - The heat of hydration of the treated waste needs to be identified and used in the design process and hazards assessments. Heat removal systems may be necessary.
    - Mechanical excavation—Pictures or sketches of the type of excavation equipment being considered should be included in the document to aid understanding.

21. Page 6—The document should be more clear about the concepts envisioned for the excavator. Will it be remotely operated via an umbilical or radio?

22. Fig. 2 Sheet 3: Who will perform Title III? In this case is Title III field inspection or engineering design during construction and checkout? Who will perform the activity that is not Title III?

23. P. ES-1: Will FF self-perform design, construction, inspection or checkout/testing? If any are to be subcontracted, what contracting mechanism is being considered: fixed price, cost plus fixed fee, cost plus award fee? Are these subcontractors the subcontractors/teaming partners discussed in the Evaluation? Has an Acquisition Plan been prepared outlining and justifying the proposed approach?

24. P. 8: What volume of water is required before a spray forms a slurry of the Silo 3 material and possible "exothermic reaction, potential material expansion, and unanalyzed failure scenarios for the silo"? The chemistry of the Silo 3 material must be understood. Spray misting should probably be used for specific events, not for routine control of dusting given it may cause more problems than it solves.

25. P. 15: What is Fluor Fernald's estimate of approval time for the "exemption to "allow shipment from the FEMP of material with elevated Th-230 activity in the same gondola cars"?

26. P. 15: What is Fluor Fernald's estimate of the time and effort required to obtain IP-2 packages for shipment? Would this involve identifying new packaging methods, or obtaining approval to designate supersaks as an IP-2 container?

27. P. 3: The recommended approach should be highlighted on Table 1 to aid the reviewer to an early understanding of the proposed path forward. Currently, the recommended approach doesn't become clear until P. 18.

28. P. 15: Has the Army Corps or Engineers been contacted and do they agree with FF using their disposal contract with Envirocare?

29. P. 15-16: Is Envirocare confident that the State of Utah will grant their request to dispose of Silo 3 material in their LLW cell? If this approval is not obtained, does the NTS become the only available disposal site?

30. P. 15-16: What has past history shown to be the average time to obtain approvals similar to those discussed here? Are these times reflected in the Silo 3 schedules and cost estimates?

31. P. 16: If the State of Utah denies Envirocare's request can the Silo 3 material meet the 11e(2) cell requirements of 60,000 Ci/g per railcar?

32. P. 16: The Th-230 concentrations referenced on this page are confusing: 150,000 pCi/g, 60,000 pCi/g, 21,010 – 71,650 pCi/g, 4,000 pCi/g, and 30,000 pCi/g. These should be clarified.

33. P. 21: Where would the rework process be performed were a treated batch of waste to fail analysis and acceptance requirements?

34. P. 24 Does using existing subcontractors and teaming partners open Fluor Fernald to criticism and possible claims of noncompetitive activities?

35. Fig. 2, Sheet 1: Waiting until a bench scale test plan is prepared, reviewed and approved before procuring chemicals appears an unnecessary delay. These could be parallel activities unless there is uncertainty concerning the treatment process and product formulation. If the latter is the case, then bench-scale formulation testing may require more than 28 days.

36. Fig. 2, Sheet 4: Are there any HVAC system components that will become long lead procurement items (e.g. blowers, filters, stack, instrumentation)?

37. Fig. 2, Sheets 3 and 4: Is FF's intent to bid the civil, mechanical, and electrical subcontracts separately? What if the same bidder is unable to win all three of these packages? If separate contracts are awarded, field integration by FF will become vital to the success of the project, and FF will need to develop a comprehensive interface control document.

38. General: The text indicates the following Silo 3 excavation rates:

Shifts/Day	**yds/shift**	**ft^3/shift**	**ft^3/hour**	**ft^3/min**
1	24	548	69	1.2
2	12	274	34	0.6
3	8	183	23	0.4

The above rate appears rather low. A person with a shovel could move that much material. What was the basis of the retrieval figures? Where is the pinch point

and can it be minimized? Does it make sense to go this slow? FF needs to perform time and motion studies on remote activities to optimize design.

39. P. 25: What are the assumptions (basis and source) for the strength of the Silo 3 concrete wall and floor? Are original design and construction documents available or was a design basis reconstitution performed?

40. P. 26: The text indicates an operating schedule of one shift/day and 4days/week. Has FF shown this to be the most cost-effective operating schedule through cost analysis?

41. P. 26: Wouldn't a rail accident also be a potential risk? Shouldn't this be included in the discussion?

42. P. 27: Is RMRS still a viable company, and if so will it continue to exist a year from now? If RMRS ceases to exist, who will be liable for providing Envirobond?

43. P. 39: What is the "typical G&A" experienced at FF?

44. P. 39: The two cost tables cannot be compared. Table 8 has no G&A; Table 9 has no DOE costs. Cost tables should be based on the same assumptions.

45. P. 26: What are the bases/assumptions for the preferred alternative cost estimate? Difficult to understand how may of the assumptions listed in the text are included as part of the estimating assumptions. Are the cost estimates based on: parametric, comparison, ratio, similar facility, other?

46. General: A confidence level should accompany each cost and schedule estimate. Escalation and risk based contingency should also be included so that realistic, defensible estimates are provided.

Attachment 3: Comments on the Design Information Package for Silos 1 and 2

The CAT does not expect formal written responses to the following specific comments. Rather, the comments are offered to support further development of a credible conceptual design. While the CAT does not expect formal comment responses, the conceptual design should adequately resolve concerns raised in this attachment.

1. The Design Information Package represents only very preliminary information on the Silos 1 and 2 remediation facility. The package is not sufficient for an AE to begin work on conceptual design. A Conceptual Design Plan is a first step to providing more mature information for initiating a conceptual design, and this Plan should be completed and issued as soon as possible.

2. The CAT recommends the Conceptual Design Plan include the approach to reviewing and analyzing/evaluating the existing Foster Wheeler AWR design and recommend/implement applicable modifications to support Silos 1 and 2 remediation work.

3. The formula for the Silos 1 and 2 waste form is very important. In conducting treatability tests to support formula development, FF should ensure it takes maximum advantage of past silos project information: vitrification pilot plant, POP test reports, video tapes of past tests, interviews with involved test personnel.

4. A long-running concern of the CAT is the ability of the Silos Project to utilize AWWT for wastewater disposal. AWWT is of limited capabilities when applied to waste streams that could conceivably result from Silos 1 and 2 treatment processes. During design, FF must be cautious in its assumption about the use of AWWT, and fully document and justify the basis of its use.

5. The design information package lists three main treatment challenges: a) the removal of large quantities of water from the slurry pumped from the TTA so a smaller quantity of treated waste is produced; 2) the retention of high concentrations of water and lead compounds in the treated waste while still meeting required shipping and disposal requirements; 3) the control of radiological exposure to the workers and the public to ALARA. The CAT wishes to add one more concern to this list: The generation, control, treatment and disposal of secondary wastes and especially wastewater.

6. At this early stage of the project, FF should investigate other retrieval methods from the TTA. The proximity of the TTA to the treatment plant may make mechanical transfer possibilities appealing.

7. FF should evaluate whether bentonite could be removed from the waste during retrieval from silos or prior to transfer to the treatment plant. Early retrieval/separation of this material greatly simplifies the treatment process.

8. P. 1-1: What is the schedule for completing the "treatment development activities, to better define the waste treatment process"? Are the development activities at such a stage of development that the results could not have major impacts on the process design? If not, what alternative actions are proposed?

9. P. 1-1: If the chemical additive formulations are still being "investigated", then one would have to question the strong desire to aggressively pursue the process design. Incomplete R&D makes pursuing design a major risk.

10. P. 1-1: Based on the three major challenges, what has been positively determined concerning the waste treatment process? What actions are being taken to resolve these three main challenges?

11. P. 1-2: The early demonstration treatment (POP) tests with the Silos 1 and 2 material had similar serious problems with water, settling and product flow.

12. P. 2-2: Is there a basis for assuming (or can it be shown) that source terms 20% greater than mean values captures the worst case conditions.

13. P. 2-2: Is there reason to believe that once the material is placed in the TTA holding tanks that the radionuclide levels will become more uniform? Won't settling result in nonuniform fields? What is the definition of "secular equilibrium"?

14. P. 2-6, Table 2.1-3: What are the potential impacts (density changes, pluggage, heat of reaction, etc.) of footnotes 1 and 2 on the treatability tests being performed? That is, the formation of carbonates, sulfates, nitrates, hydroxides and hydrates? These impacts need to be identified, understood and bounded.

15. P. 2-8: During the POP treatment tests, waste loading of as much as 40% were advertised as achievable. Why is waste loading of 15% now acceptable since it is significantly lower than previously acceptable?

16. P. 2-9: The text would indicate that there would be no gain in waste loading from the TTA to the treated waste. That is, each will be approximately 15% maximum waste loading. Is this correct?

17. P. 2-12: What is the "estimated maximum interior temperature of a curing container of grout"? Is temperature directly proportional to waste loading? The temperature caused by the energy of mixing should also be considered in calculating maximum temperatures.

18. P. 2-15: Section 2.8 Rework says little about rework. It simply describes storage of failed containers of treated waste. Rework is going to be a difficult process—a 22,000-pound monolith with 3-inch steel walls will not be easily shredded or unloaded.

19. P. 2-16: Handling 2200 pound empty containers and 22,000 pound loaded containers is going to require cranes and hoists as well as heavy lifting devices such as lugs, hooks, slings and yokes. Remote handling is difficult and should not be discounted. Generally, if a remote crane covers more than 100 feet, a second control station is required or the crane radio operated because of the size and management of the control cable.

20. P. 2-19: What will be the process for collecting, treating and disposing of liquid wastes generated when treating spent HEPA filters?

21. P. 2-19: Can the carbon remain in and be disposed of with the RCS, or must it be removed and treated and disposed separately?

22. P. 2-23: Does the RCS design include the ability to add more carbon beds? If not, how will the potential additional flow from this facility be accommodated?

23. P. 2-26: The HVAC systems (especially the high activity zones) must maintain a minimum of about 100-150 CFM flow across open doors, hoods, hatches, etc. This is especially important with the process equipment.

24. P. 2-26: Will the HVAC systems be single pass, push-pull, pull, or push? The CAT recommends a single pass pull system.

25. P. 2-29: Is the control room planned to be a positive pressure area to prevent possible airborne contamination?

26. P. 2-41: The airflow in potentially contaminated areas should be from least to most contaminated areas, e.g. entryways to process vessels. This helps prevent the spread of contamination.

27. P. 3-7, 5.1.3: What does the statement "Equipment or a means to prevent contamination of the external surface of the disposal container is provided" mean? Remote equipment, robotics? The areas will need to be provided with coated floors and walls, methods to collect liquids, and methods to accelerate decontamination.

28. General: Has a preliminary risk list been prepared for this project and the risks analyzed? This should be done since the result will be used in preparing the cost estimate and schedule. The risk assessment should be part of the conceptual design report.

29. Dwg P-SK- 1, D:

- The utility doors at 4D appear to be a route for entering and exiting the process area without passing through personnal monitors or clothing change areas.
- Suggest a number of observation stations around the perimeter of the mixing and loading areas for direct observation in case of mistakes, errors, failures, etc.
- Suggest significant mockup and testing of all the activities that might be performed in this area to assure equipment access, visibility, maintenance capability, operation, replacement, and recovery from possible failures.
- Suggest significant operator and maintenance training of all of the activities being performed in this area. This will prove essential to success.

30. Dwg P-SK- 1, C: Need to explain the purpose for and method of using the five temporary ventilation connections.

31. Dwg F-SK-3442, 2, B:
    - Will pumping the waste water from the treated waste Packaging, Lidding, Decon, Scale area to the Slurry Receipt Tanks be acceptable. This waste water contains not only waste, but also some concentrtion of all of the additives. How will this impact the additives needed for additional waste processing?

32. General: The method of maintaining/replacing conveyors, mixers, head grapple, sample station, head fastener, survey equipment, and decon equipment needs to be developed and demonstrated.

33. General: How will a required daily inspection be performed on each filled and stored waste drum?

34. Dwg P-SK-XXXX, 1,A and B:
    - There doesn't appear to be an entry door into the Interim Container Staging Facility. Is the assumption that entry will never be required?
    - Is any ventilation provided for the Container Staging Facility?
    - Is any air sampling performed or required in this building to assure containers are not leaking?
    - What is the recovery method if the bridge crane should fail in the storage area while manipulating (transporting) a waste container?
    - How are samples placed and retrieved from the sample archive area?
    - The distance from the conveyor to the crane operation station is almost 200 feet. Recommend (in addition to the crane TV) a number of observation stations around the perimeter of the storage area in case of problems, failures, etc.
    - All mockup and training should reflect expected working conditions as closely as possible.

35. General: As part of the design effort, suggest alternatives to some of the more complicated remote activities be at least discussed in case one or more do not develop as anticipated. For example, head removal/replacement, fill station, head fastening.

36. Dwg F-PID-D, A: Has FF established a color standard for run, standby, stop, auto control station indicator lights? If so, this standard should apply to this design.

37. Dwg F-PID-E, A: The Lime Slurry, Phosphate and Alum Addition pumps and mixers are SS. The alum and lime addition lines are SS. However, the phosphate addition line is carbon steel? Is this justified?

38. Dwg F-PID-J, A: Will the fly ash and cement flow adequately from a 12 foot diameter bin, or will vibrators be required. During POP testing Chem Nuclear Systems encountered problems getting the additives to flow (even on a miniature scale) from the hopper although it was provided with a vibrator.

39. Who will be responsible for providing and operating the analytical lab?