Critical Analysis Team Report #36

24 June 2003

This report documents The Critical Analysis Team (CAT) findings and recommendations resulting from a general Silos Project update and review at Fernald in June 2003. In addition to reviews, the CAT attended the Fernald Citizens Advisory Board meeting.

General Comments

- Construction of the silos project facilities appears to be proceeding quite well. The construction site is clean, organized and appears productive. There appears to be ample access and lay-down areas. Fluor Fernald (FF) deserves credit for coordinating and managing the construction site (particularly given the presence of 8 subcontractors).

- The silos project should take measures to ensure that, when multiple individual project changes are made (e.g. many DCN's; incorporation of multiple changes from testing activities), the systems are reassessed to assure original design criteria are still being met.

- The CAT is encouraged by FF's acknowledgement and initial preparation for AWR, Silo 3 and Silos 1 and 2 turnover and startup activities. However, with the accelerated schedule, the CAT remains concerned with FF's ability to simultaneously turnover, startup and operate three facilities.

  To be successful, FF will need to obtain sufficient personnel resources as well as apply lessons learned from the RCS startup. Of critical importance will be preparation of thorough punch lists and completion of corrective actions prior to turnover. The CAT is supportive of FF's recent hiring of several seasoned start-up personnel.

- In the past, the CAT has commented on the lack of adequate operations and maintenance involvement in the design review process. This lack of involvement will likely lead to an increase in facility problems that must be remedied during turnover and startup.

Silo 3

- The excavator demonstration at Silo 4 was important in demonstrating the excavator's ability to cut a hole in the silo. However, the test was not fully demonstrative of the conditions that will exist during the Silo 3 cut. For example, the operator had complete access (seeing, hearing) to the excavator and the silo—he was not cutting the hole remotely. Also, it was not clear

whether the excavator operated within a boundary representative of the actual excavator room. While noting it here, the CAT does not judge the lack of a fully representative test to be a large programmatic risk.

- The Silo 3 project should ensure it has thoroughly considered the number of wands that could operate simultaneously and ensure that the facility's other systems are capable of supporting such operations. In addition, the administrative controls identified to control wand use and operation need to be documented in operating procedures.

- The CAT viewed the video tape of the vacuum wand demonstration. This demonstration, while useful, was not representative of actual operating conditions. For example, the operator was not in PPE or a fresh air mask, was able to see into the retrieval vessel, was operating with a short wand, was not on a representative work platform, and was not using a representative surrogate.

  Waiting until Systems Operability Testing before this system undergoes additional truly representative testing raises the programmatic risk Silo 3 faces. The CAT recommends that additional testing, more representative of the actual project conditions, be undertaken to ensure this important system is robust. The Silos 1 and 2 project has identified, and corrected, multiple potential, unforeseen problems through mock-up testing. Given this experience, the need for representative testing for Silo 3 is even more urgent.

The CAT reviewed the HVAC drawings for Silo 3 and offers the following comments:

- The CAT is concerned with the HVAC air flow cascade design for the Silo 3 facility. It appears that the flows do not clearly follow the philosophy of air flowing from clean areas to potentially contaminated areas. Examples include flow from the packaging room into a doffing area, and from the packaging room into the excavator service room. The CAT recognizes Silo 3's intent to avoid contamination in the packaging area. However, such contamination is likely. The CAT recommends Silo 3 reanalyze its flow directions. Ideally, ventilation air would always flow from clean areas to potentially contaminated areas.

- The CAT is concerned that the current design does not include back-up power for the HVAC exhaust fans. Generally, radiological facilities are designed to maintain negative pressure. In this case, the stack will provide minimal negative gradient, but will probably not be sufficient to maintain a negative pressure in the facility. In addition, the Silo 3 approach is contrary to the other silos projects. The CAT recommends the Silo 3 project consider adding back-up power to its HVAC exhaust fans.

- The pneumatic HEPA filter is upstream of parallel pneumatic discharge blowers. Due to the high potential for frequent filter maintenance and change-out activities, the Silo 3 project should consider adding a second, parallel HEPA filter on the exit air stream. This will prevent having to cease pneumatic operation during filter maintenance and testing.

  In addition, if the pneumatic system is shutdown with the HVAC system remaining operational, the possibility exists that the facility will by more negative than the pneumatic system. This could result in air flowing from the pneumatic system into the facility, thus violating a basic ALARA principle.

Silo 1 and 2

- The Silos 1 and 2 project has identified and corrected several problems as a result of its preliminary testing at vendor facilities. Problems with the gantry manipulator signal cabling, the container car clutch, the lid end effector, the vision system, and the fill head boot have all been identified and corrected through testing, redesign and subsequent testing.

  The Silos 1 and 2 project deserves credit for these successes, as well as a "teaming" procurement approach that has assisted in ensuring vendors provide quality equipment, as well as ingenuity and creativity in technical support to assist FF in procuring functioning equipment.

- The cold loop tests also seem to be yielding useful results. The tests have impacted Silos 1 and 2 project decisions on valve size, valve type, pump type and meter types. Also a positive, the test loop has been operated at solids contents sufficient to plug piping—thereby providing bounding conditions for the project.

  The equipment and instrumentation the project ultimately selects should be installed in the cold loop and then operated as a system to ensure all of the equipment and instrumentation is compatible.

- The CAT has commented in the past on the potential for plugging the clarifier discharge line. The CAT is pleased that the Silos 1 and 2 project is reconsidering the pipe size and pump type for the clarifier underflow to remedy this potential problem.

- The Silos 1 and 2 Time and Motion study is improved over the previous version the CAT reviewed (during preliminary design). In general, the activity durations seem reasonable. However, some may be optimistic given the time required for human-factors type activities (e.g., climbing on and off trucks, breaks, etc.).

- The CAT recommends Silos 1 and 2 re-analyze the potential for continuous (three lines, 24 hours per day) container filling operation. Batch stabilization operations such as this are generally most efficient when run continuously, and only shutdown when maintenance needs arise, rather than in anticipation of maintenance. Continuous operation will also assure a 30-container per day throughput.

- The CAT recommends Silos 1 and 2 assess the practicality of the normal/bypass HVAC modes that are planned when the railcar loading room doors are opened. The CAT is concerned that reversing the flow from normal to bypass will be difficult. Further, when combined with nearly one dozen other doors in the facility that may impact air flow, the HVAC system may be in a perpetually upset condition. In its assessment, the Silos 1 and 2 project should consider simple solutions (e.g., vertical plastic strip walls to baffle roll-up door openings).

Accelerated Waste Retrieval (AWR)

- The AWR project should be commended on the removal of the silo caps and expeditiously dealing with the unexpected water found under the caps.

- As the CAT has noted, to be successful on an accelerated schedule, turnover activities will need to be well planned and executed. The AWR project has made positive strides toward this goal by organizing turnover by systems, as opposed to rooms or areas.

- The CAT will review the new silo penetration and riser installation plan when it is released (scheduled for June 20th). In discussions with the AWR project, it appears that most of the changes to the document will enhance the effort to install risers in the silos (e.g. elimination of the plastic cover on the newly cut riser hole).

- The continuous operation of the RCS is a success. With the capacity of the two carbon beds exceeding expectations, the project may consider not installing the two additional carbon beds. Prior to making this decision, however, an engineering evaluation should be conducted to ensure the RCS has sufficient surge capacity to accommodate potential upset conditions during penetrating the silo domes and wall, and the simultaneous operation of AWR and Silos 1 and 2.

Title III

- The CAT is pleased that the silos project has co-located Jacobs Title III and engineering support personnel at Fernald. As these efforts progress, the CAT will be conducting reviews to evaluate the effectiveness of these activities (e.g. roles and responsibilities, decision-making processes, communication between the field and engineering).

Upcoming Document And reviews

- Revision of Engineering Execution Plan (End of June, beginning of July).
- Revision of silo penetration and riser installation (June 20).
- Review Silo 3 test plan for packaging/handling/conditioning system and observe Silo 3 packaging station demonstration. (plan was scheduled for June onsite review; the demonstration is now scheduled for September).
- Observe Silos 1 and 2 integrate fill room test (August).
- CAT observation of Silos 1 and 2 cold test loop (August).

Recommendations

Recommendation 36-1: The Silo 3 project should undertake vacuum wand testing representative of the actual project conditions to ensure the wand system is sufficiently robust and performs as expected.

Recommendation 36-2: The Silo 3 project should reanalyze its HVAC flow directions to assure ventilation air is always flowing from clean areas to potentially contaminated areas.

Recommendation 36-3: The Silo 3 project should consider adding back-up power to its HVAC exhaust fans.

Recommendation 36-4: The Silo 3 project should consider adding a second, parallel HEPA filter on the pneumatic system air.

Recommendation 36-5: The Silos 1 and 2 project should re-analyze the potential for continuous (three lines, 24 hours per day) container filling operation.

Recommendation 36-6: The Silos 1 and 2 project should assess the practicality of the normal/bypass HVAC modes that are planned when the railcar loading room doors are opened.

Appendix 1, CAT Report #36: Baseline Assumptions

The CAT has identified the following assumptions that may be contrary to DOE's best interests. DOE should consider risks these assumptions might pose and, if appropriate, take exception to specific assumptions. All page numbers are from the Silos replan baseline.

The replan basline assumes:

- Only SSR's will be required for project startup (page 12 of 97). The validity of this assumption, in particular, should be resolved by DOE as soon as possible.
- No more than two assessments will be conducted per year by external organizations (page 2 of 97) .
- EPA will review DCN's within one working day (page 5 of 97).
- DOE will complete the N-HASP review within 25 days (page 6 of 97).
- Silos retrieval equipment, filters, PPE will be disposed of in the OSDF (page 16 of 97).
- Disposal at NTS is a DOE cost (page 16 of 97).
- DOE will meet all designated review/comment and document approval times (page 12 of 97).
- No DOE Headquarters approvals required for Silo 3 (page 16 of 97).
- For revised documents, only changed pages will be submitted (page 17 of 97).
- Fluor will allow EPA 30 calendar days to review and approve a revised document or provide additional comments (page 18 of 97).
- The CAT will provide the independent reviews required by DOE 413.3-1 (page 19 of 97).
- Some heel removal equipment is procured with EM-50 funds (page 3 of 47).
- Readiness assessments will not be impacted by external reviews (page 5 of 47).
- A layout of AWR funds flow by FY does not present a realistic manloading scenario. Personnel cannot be hired, fired transferred in the quantities and within the times shown (page 16 of 47 through 47 of 47).
- Review comments that are deemed 'preference or excessive' will not be implemented without direction from the DOE CO (page 3 of 24).
- NTS disposal cost for Silos 1 and 2 is $10/cubic foot, whereas NTS disposal cost for Silo 3 is $6.50. Why is there a difference? (page 7 of 24)
- Significant amount of GFE to be provided the silos projects (e.g. eight fork trucks, two vans, three yard trucks, 1 truck scale, etc.) (page 9 of 24).
- The new schedule assumes an unrealistic amount of overtime, particularly for construction, contract management, turnover/startup and operation (19 of 36 through 25 of 36).
- The baseline assumptions include providing both AWR and Silos 1 and 2 with 2,000 cfm RCS capacity to support full-scale operation (page 5 of 47).
- Sufficient quantities exist of the worker classification effort onsite (page 6 of 24).
- Fluor claims will be settled within current limitations of liability (page 5 of 47).