Critical Analysis Team Report #39
8 April 2004

Fluor Fernald Responses noted
4/28/04

During the week of April 5, 2004, the Critical Analysis Team (CAT) conducted a Reliability, Availability and Maintainability review of the Accelerated Waste Retrieval (AWR) project. As construction is coming to a close, the site is very busy with tours and other visitors. The CAT greatly appreciates Fluor Fernald and DOE support during this visit.

This report is organized into three primary sections:

(1) Major Findings and Recommendations—while the CAT identified no 'showstoppers' in the AWR facility, these items represent the areas most in need of attention.
(2) Specific Comments—most of these comments could be resolved through Fluor conducting a thorough 'walk-down' of the facility.
(3) General Comments—items that could provide minor operational difficulties and should be considered but do not rise to the level of Major Findings.

Major Findings and Recommendations

- FLT-20-404 and FLT-20-419 filter fresh air entering the Silo Ventilation System. There are no heaters to prevent condensation or frost build-up on the filters that could result in filter plugging or failure.

  See Response to Recommendation 39-2

- The slurry and sluicing modules were designed for semi-remote maintenance and operation. In other words, maintenance work, sampling and adding mast sections was intended to be performed through glove ports. However, the glove ports will not be useful for many maintenance activities. As a result, personnel will be required to enter the modules for maintenance. This raises a number of contamination control challenges when entering and exiting the modules. The CAT suggests procedural controls (e.g., wind less than five miles per hour) and construction of a temporary 'greenhouse' or airlock to ensure contamination control. While this is not a 'showstopper,' it appears that the project has not given sufficient attention to the development of procedures and a philosophy for performing necessary tasks in the modules.

  See response to Recommendation 39-4.

- Secondary containment issues:
  1) The two diverter systems in the TTA containment areas A and B do not have secondary containment. The sump and curb serve as a secondary containment for liquid collection and will not suffice for reasonable

leakage events in these areas. For example, gasket leaks on the large flanged motor operated diverter valves could spray contaminated liquids beyond the curbed area and create airbone mists. The project should consider providing an enclosure around containment areas A and B that is vented to a HEPA exhaust system. At a minimum, the flanges should be equipped with flange guards to partially contain spraying.

The project acknowledges this comment and is evaluating options, such as the installation of flange guards or another equivalent means, for controlling spray that could arise from leakage from the flanges. The necessary modification(s) will be incorporated prior to startup.

2) Sheet, N6504, Diverter enclosure ENC-11-001 does not appear to provide secondary containment. This diverter enclosure is a sheet metal box with two roll-up doors. These doors are not sealed, and the enclosure walls contain holes.
The project acknowledges this comment and is evaluating options, such as the installation of flange guards or another equivalent means, for controlling spray that could arise from leakage from the flanges and diverter valves. The necessary modification will be incorporated prior to startup.

3) Several lines (e.g. SLW-62013 and 62002) are double encased to near the wall of the module and then are only single encased within. The project should ensure that the modules on the silo bridge qualify as secondary containment (e.g. the doors seal; glove ports seal, etc).
The outer (containment) pipes on the lines referenced in the CAT's comment are designed to drain into the modules, which in turn drain back to the Silo or TTA tank. The modules on the Silo bridges and TTA deck are intended meet secondary containment requirements. The modules on the Silo 1 bridge and test stand are being evaluated for the issues raised in the CAT's comment – any necessary modifications will be incorporated prior to startup.

Recommendations:

Recommendation 39-1: The project should ensure the concept of double containment has been properly applied throughout the facility.
Agreed – See responses to items 1, 2, and 3 above

Recommendation 39-2: The project should consider installing heaters on the facility air intakes to prevent condensation in and frosting of filters.
The three air filters on the Silos Bridges (FLT-20-402, 404 & 419) have been designed for airflows of 3000 acfm each. The design airflow thru each of the Silos Sluicer and Pump Modules is 125 acfm or a total flow of 375 acfm thru each of the primary 402 and 404 filters; the filters are capable of handling approximately ten times the actual airflow. Each filter is monitored for differential pressure across the filters; this monitoring will allow sufficient time to plan and change filters as needed. With a 3000 acfm capacity, any one of the three filters (402, 404 or 419) can provide the required airflow to <u>both</u> silos. Therefore, if either (or both) of the primary filters is down, this filter can be isolated and any one of the other filters can be used to provide the required airflow; heaters were judged not to be necessary.

Recommendation 39-3: The project should conduct a thorough walk-down and take appropriate follow-up actions to ensure all punch-list items have been identified, closed and incorporated on the drawings.

The three air filters on the Silos Bridges (FLT-20-402, 404 & 419) have been designed for airflows of 3000 acfm each. The design airflow thru each of the Silos Sluicer and Pump Modules is 125 acfm or a total flow of 375 acfm thru each of the primary 402 and 404 filters; the filters are capable of handling approximately ten times the actual airflow. Each filter is monitored for differential pressure across the filters; this monitoring will allow sufficient time to plan and change filters as needed. With a 3000 acfm capacity, any one of the three filters (402, 404 or 419) can provide the required airflow to both silos. Therefore, if either (or both) of the primary filters is down, this filter can be isolated and any one of the other filters can be used to provide the required airflow; heaters were judged not to be necessary.

Recommendation 39-4: The project should develop a philosophy and procedures for maintenance work in the modules.

The AWR Project Team acknowledges this comment and recognizes the need to develop a plan for handling events such as those described above.

First of all, given the variability in the causes that would give rise to a maintenance action it is unlikely that the project will develop a procedure covering the above. However, any entrance into one of the modules will be the subject of a separately developed Maintenance Work Order (MWO) and a Maintenance Work Instruction (MWI) with an accompanying Radiation Work Permit (RWP). A combination of engineering and administrative controls possibly including the above suggestions will be adopted for the maintenance actions on a case-by-case basis.

Nevertheless, there are factors that can be identified now that would govern maintenance actions irrespective of their cause:

1) The project will have continuous monitoring of radiation levels on the deck and on the bridges and specifically in the vicinity of the modules. We have already evaluated conditions that would likely be associated with elevated radiation levels (for example, the filling of one of the TTA tanks) and therefore will be able to assure that the timing of the maintenance action will coincide with quiescent conditions within nearby tanks so that the radiation field is at a minimum.

2) There is considerable flexibility of the RCS operation. By control of negative pressure within the vessel below the module, it is possible to concentrate the fresh air inflow to a particular module thus assuring that outflow from the module to the ambient environment either on the bridge or within the TTA is minimized during the activity. During the penetration of the silo domes to install the risers, the project was successful in containing radon in part through the control of RCS flow to the respective silos.

While the frequency of the need maintenance activities requiring the entrance into the modules cannot be forecast, the lengthening of the masts to accomplish retrieval can be forecast. These mast lengthening actions are expected to be infrequent and their installation will be covered in AWR Procedure #329, "Silo 1&2 Retrieval"

Recommendation 39-5: The project should develop procedures for using the slurry line cleanouts and demonstrate full-dress cleanout activities.

There are a total of 12 cleanout ports on the AWR piping systems. These are situated in multiple locations within the system. At each of the cleanout ports a PIT (Pressure Indicating Transmitter) has been installed. Pressure buildup because of an obstruction will be detected, alarms will be triggered and the pumping will be shut down. Thus it will be possible to determine where the obstruction has lodged. If an obstruction were detected it is the project's decision that the normal course of a maintenance action will be followed: A Maintenance Work Order will be issued, a Maintenance Work Instruction will be developed, coordination with the project radiological engineering will occur and a Radiological Work Permit will be developed governing the safety and exposure aspects of the work.

While prediction of contingency outcomes is always a speculation, the project believes that the probability of an obstruction will be low, therefore we do not see a high priority driver for a demonstration. The project appreciates the recommendation of the CAT to conduct a "full-dress" rehearsal, but we are not proceeding with that measure.

Specific Comments

In general, most of the following items could be remedied relatively easily with a thorough walk-down and appropriate follow-up actions. The CAT identifies the following inconsistencies as examples of the need for a line-by-line and item-by-item walk-down. Some of the following items are subject to Design Change Notices (DCN's)(e.g. numbers 460, 596, 577) that have not yet been completed and incorporated on the P&IDs.

Comprehensive system-by system walk-downs were in process at the time of the CAT's review, and will continue as part of the construction turnover to operations and startup preparation processes. Corrective actions are tracked on a daily basis through construction punchlist and startup issue databases to ensure their resolution prior to startup. Each of the specific comments noted below will be reviewed to verify that it is either 1) an item already identified and/or resolved as a punchlist item or startup issue; 2) a item that is inaccurate or otherwise requires no action; or 3) an item not previously identified that will be added to the appropriate punchlist and tracked to resolution.

- N6501, FLX-13-406 and 407: the P&IDs show these flex connectors outside the modules. However, they are inside the module.
  Although there are several flex hoses inside the modules, FLEX –13-406 and FLEX-13-407 are installed on the outside of the modules as shown on sheet N6501. No further action necessary.

- The high pressure water system has pressure gauges near each end-use point. The P&IDs show a single block valve between the supply line and the pressure gauge. In the field there is a second block valve in series with the first valve and a bleed valve between the last block valve and the gauge. The CAT assumes this inconsistency will be incorporated into a drawing revision via a DCN.
  The second block valve and the Bleed valve were added as a part of DCN 577. These revisions are depicted on drawing 94X-3900-N-02318 rev 4 (Sheet N7509).

- Sluicer module SLC-11-204 is designed differently from the other sluicer modules. For example, SLC-11-203 has a flat floor, with drain slots in the floor that drain to the silo. SLC-11-204 has a lip at the door and three levels (glove ports, glove ports to door and then the channel at the door), with drain slots in

only the highest level. When the door to 204 is opened, collected liquids will be released onto the bridge deck. This should be remedied.
The modules on the Silo bridges and TTA deck are intended meet secondary containment requirements. The modules on the Silo 1 bridge and test stand are being evaluated for the issues raised in the CAT's comment – any necessary modifications will be incorporated prior to startup.

- Sheet N6501, SLC-11-203: The door on this sluicer module will not close and the handle is broken.
  This item had been identified under RCI 380R and corrective measures are in progress.

- Sluicer arms are being stored in an open box on the Silo 1 bridge. Some parts of the sluicers are beginning to rust and two amphenol connectors do not have protective coverings and are open to the weather.
  The Sluicer arms were staged on the Silo 1 bridge for installation. The parts were exposed for 5 days prior to installation. The installation is now complete. Although the sluicer arms will be either in the sluicer module or the silo itself, the parts are designed for extreme temperature and humidity conditions and will constantly be wetted during operations.

- The modules will require work platforms or steps to enable access to glove ports, samplers and the modules.
  This was considered during design. Permanent catwalks and stairs were not installed because this would create access problems to and around the modules during operations. The project will utilize rolling stairs, which can be moved to allow maintenance accessibility but will provide safe and stable support when needed.

- The pass-through port door on SLC-11-204 will not open. All other pass-through doors are operable.
  This will be corrected

- Sheet N6501, HOV-50-111 is not tagged in the field.
  The valve has been tagged and the QEP for verification of labeling submitted.

- The project should ensure it is in compliance with ladder requirements. Some ladders are caged while others are not.
  Ladder safety was considered during design review. Under OSHA 1910.27(d)(1)(ii) cages are required on fixed ladders of more then 20 feet. Fixed ladders of more than 20feet in the AWR facilities are caged as required. Most of the ladders on the modules are less then 20 feet.

- Sheet N7509, line HPW-50001-2"-107-PF-ET shows HOV-50-464 but HOV-50-463 is in series with this valve and is not shown.
  Sheet N7509 Rev.4 now has both valves shown. This revision was in the approval process during the CAT Team visit.

- Sheet N7509, Line HPW-50011-2"-107-PF-ET shows HOV-50-116 but there is also HOV-50-106 in series with this valve on this line that is not shown on the P&ID.
  Revision 4 of Sheet N7509 shows both valves.

- The P&IDs show a pressure diaphragm valve at each breathing air station. These valves appear to be spring loaded relief valves.
  The P&ID's show the pressure regulator as part of a vendor provided breathing air station.

- Sheet N6501, HOV-41-127 is labeled HOV-41-158 in the facility.
  Sheet N6501, HOV-41-145 is not labeled.
  Breathing Air has been removed completely from Sheet 6501 rev.6. A new drawing for breathing air distribution is being prepared. The field will review the valve labeling and correct any missing labels or mislabeling that may exist
- Sheet 6504, HOV-50-578 is mislabeled as HOV-50-186. It is a vertically oriented quick-disconnect valve that should be protected with a blind cover.
  Sheet 6504, HOV-50-579 is not labeled.
  Both of these valves were added through recent DCN's. The field will address and correct these issues
- Line TW-500020-1″-103-PF-ET is incompletely labeled as TW-500020-1″-103.
  A new label will be applied to correct this.

- Sheet N6501, HOV-50-456 could not be located in the field.
  The valve was found. It is labeled and a QEP documenting the labeling has been submitted.

- Sheet N9500, FLT-20-419 is missing one door latch roll pin and a welding rod has been inserted. The knob is missing from another door latch.
  This had been identified during our walkdowns and is on the punchlist to be corrected.

- Sheet 6501, FLX-13-406 could not be located in the field.
  Flex –13-406 is located on the exterior of SLC-11-204. (Silo 1 Sluicer). This flex was located by the CAT team and referenced in their first specific comment.

- Sheet N6504, MOV-62-116AB/AC/OFF is a flange that has not yet been bolted together.
  The flange remained open for visual inspection of the valve operation during startup. The flange was bolted on 4/12/04.

- Sheet N9500, Pipe support U bolts on line RCS-20456-12″-893-AS are not yet installed. This support is on the upper pipe way near the diverter station.
  Complete
- Sheet N9500, FLT-20-404 the differential pressure gauge transmitters have drain lines that are not shown on the P&IDs (e.g. INT-90411-3/8T and INT-90410-3/8T and INT-90409-3/8T). Also, the line with HOV-90-431 has another valve in series that is not labeled.
  These valves were field routed. Redline drawings will show all root valves. The control system rack layout drawings will contain the full details of the instrumentation racks.

- Sheet 9500, HOV-90-586 should have been labeled HOV-90-588 and HOV-90-588 should have been labeled HOV-90-586. Also, there is a valve on this panel (RAC-20-002) that is not shown on the P&IDs, nor is it labeled in the field.
  Redline drawings will show all root valves. The control system rack layout drawings will contain the full details of the instrumentation racks. All valves on the racks will however be tagged to agree with the rack drawings.

- SLC-11-203 and SLC-11-204 contain water in the depression adjacent to the window gasket. The source may have been rain water which would suggest the enclosure leaks.
  Removal of this depression and additional gasketing are on the Silo 1 startup punchlist

- N6003, Line CA-40001-11/2"-136 includes a T with a cap that is not shown on the P&ID.
  All drain caps and breather caps are being reflected on the latest redline revisions of the drawings

- N6003, Line CA-40001-11/2"-136, has a flange before the branch to SLC-13-202 and SLC-13-204 and one after the branch, neither of which are shown on the P&IDs. Both flanges have a blank installed.
  N6003, Line CA-40001-11/2"-136, there is a stub with a cap at the end of this line that is not shown on the P&ID.
  CA-40001-1 ½" is a field routed line. The P&ID is not meant to serve as an Isometric drawing for these lines. The redline drawings are picking up additional details of the pipe routing and configuration.

- Sheet N7513, PI-SMP-12-001 could not be found in the field.
  PI-SMP-12-001 was installed but removed for recalibration at the time of the CAT team visit.
- N7501, Breathing air station UA-SLC-41-417 is tagged as UA-SLC-41-421. N7501, HOV-41-134 is tagged as HOV-41-140.
  The modules on Tank 001A are properly tagged with Breathing Air Station UA-SLC-41-417 and valve HOV-41-134. Station UA-SLC-41-421 and valve HOV-41-140 are located on SLC-13-205 located on Tank 002A located directly south of Tank 001A.
- N7503, Station 420, Line SA-41005-2"-136 includes a stub with a plug that is not shown on the P&ID.
  SA-41005-2"-136 is a field routed line to a vendor supplied Breathing Air Station. The P&ID will not reflect all the piping details.

- N7504, HOV-41-153 is tagged HOV-41-154.
  Sheet N7504 Rev.6 no longer shows the Breathing Air system. HOV-41-153 has been confirmed to be properly labeled.
- N7504, Hose reel, CBR-13-202A-3 is labeled as CBR-13-202A-4.
  CRB-13-202A-1. CRB-13-202A-2, CRB-13-202A-3 and CRB-13-202A-4 have all been checked to confirm proper labeling.
- N7504, FLX-62-452 is not labeled.
  FLX-62-452 is identified with a marker, but no permanent label has been installed. This will be addressed.

- N7504, Line HPW-500023-2"-107 has two HOV-50-563's. Only one of these valves is shown on the P&IDs.
  Redundant valve numbers were erroneously utilized on the high point vents. This error has been corrected via a DCN to issue unique valve numbers.

- Sheet 9504, the pneumatic lines on the differential pressure instrument system for FLT-20-412 and FLT-20-412 each have three drain lines to the floor and are not shown on the P&ID (Sheet N9502, HOV-90-622, HOV-90-623, and HOV-90-624; Sheet N9504, HOV-90-629, HOV-90-630 and HOV-90-631).
  Redline drawings will show all root valves. The control system rack layout drawings will contain the full details of the instrumentation racks. All valves on the racks will however be tagged to agree with the rack drawings.
- Sheet 9504, Line RCS-20426-12"-893-AS shows two capped stubs that are not on the line (subject to DCN 460 we think).
  The stubs are sampling ports that have been installed per the drawings and insulated
- Sheet N6500, HOV-41-127 is labeled HOV-41-158 in the field.
  This is correct. The field will confirm that no DCN is pending and revise the label.
- Sheet N6500, Line SLW-62014-4"-104A-PF-ET includes a capped line below FLX-62-404. In the field it is neither capped nor labeled.
  Per Rev 6 of this drawing, HOV-62-127 will be installed in this location.
- Sheet N6501, HOV-41-128 is tagged 157 and HOV-41-129 is tagged 159.
  The field will correct this mislabeling
- Sheet N7502, Line HPW-50019-1"-107 refers to sheet N7509. The line actually continues on N7503.
  These are actually two separate lines that originate on Sheet 7509 and are referred separately to sheets 7502 and 7503. Sheet 7502 is correct.
- N7509, HOV-50-467 is labeled HOV-50-462.
  There is no HOV-50-467 on Revision 4 of Sheet 7509. There is an HOV-50-462, but this valve and the associated PI-HPW-50-403 have been removed.
- Sheet, N6504, the diverter enclosure ENC-11-001 roll-up door will not close due a bolt (that attaches the door to the water stop) catching on the door frame. The handle of a manually operated valve also prevents the door from closing.
  The repair of the diverter door has been a long standing punchlist item which is finally completed.
- TK-12-001A and B, TK-12-002A and B, pressure control valves (PCV-12-001A1, 12-001-A2, PCV-12-001B1, 12-001-B2, PCV-12-002-A1, 12-002-A2, PCV-12-002B1, 12-002B2) are labeled only on the top and therefore require a 10-foot step ladder to read. Labels should be relocated so they are readable.
  The field will resolve this issue by adding additional labels to these PCV's
- Currently, TTA tank risers are not labeled in the field or on the P&IDs. They should be labeled to assist operations and maintenance personnel.
  The tank risers will be labeled with two labels at 90 degrees to insure readability.

General Comments

- Sheet N9052 and N9053, pressure control valves (PCV-12-001A1, 12-001-A2, PCV-12-001B1, 12-001-B2, PCV-12-002-A1, 12-002-A2, PCV-12-002B1, 12-002B2) are provided for each transfer storage tank. The set points for these

pressure control valve are +4 and –3 inches of water (approximately +0.153 psi and –0.115 psi).

Valve actuation on a negative pressure draws air into the system. However, valve actuation on a positive pressure releases process system gases (including radon) into the TTA building deck.

There is no need for these valves as the tanks are vented to the RCS and if the tanks should pressurize, release of the gas via the RCS system would be preferable.
A positive pressure release on the TTA tanks through a PCV is a very unlikely occurrence. The system operates in a normal steady state range of –0.5 to 0.0 inches water column, according to procedural requirement. The system provides automatic pressure release through the RCS system at +0.2 inches water column, and shuts the system down, automatically, at +0.45 inches water column. As the system shuts down, it has a tendency to move toward a more negative pressure.

The PCVs are a means of protecting the TTA tanks from a catastrophic over pressure event. The PCV ensures tank integrity in the unlikely event that inflow louver is prevented from closing, or responds too slowly for the outflow, while the outflow louver is prevented from opening.

Two additional factors mitigate the affect of a release through the PCVs. First, the TTA is not an occupied area. It will only be entered under a Radiological Work Permit. In the event of a release through a PCV, the operator would be notified by control system alarm(s). Area radon monitoring would also provide information on the extent of a release in the control room display and through local instrumentation. Those factors would be considered in planning any work evolution. Second, the Silos are protected by identical PCVs. They have not allowed a release during our year of operation.

- The existing breathing air system does not provide humidification. This may lead to worker discomfort through breathing unusually dry air.
The breathing air system is compliant with site standards. Since use of the breathing air system is expected to be infrequent at best (only for back-up or emergency use), a humidification system is not justified.

- Several pieces of equipment are inaccessible:

  --Two pipe cleanouts are located between the bridge and the TTA, approximately 40 feet off the ground. Unfastening and lifting flanges, working on the cleanout and controlling contamination would be extremely difficult. A procedure and training (mock-up) should be provided for using clean-outs to unplug a slurry line.

  --Many cameras and lights are inaccessible in the event maintenance is necessary.

  --Top doors on inlet filters are seven and a half feet off the ground. Changing these filters will be difficult.

--Many valves cannot be reached (e.g. HOV-50-166 is a valve with a quick disconnect that is fifteen feet from the nearest platform).

--Two filter inlet screens are inaccessible in the event trash or other material blocks the inlet.

Accessibility of equipment for necessary operations and/or maintenance activities will be specifically evaluated during System Operability Tests. The need to implement modifications to improve accessibility will be evaluated on a case-by-case basis dependant upon factors including the expected frequency with which assess will be required. It is recognized that some equipment for which assess is either not expected to be required at all, or is expected to be of low frequency, is relatively difficult to access. If access to these pieces of equipment does prove to be necessary, it will be appropriately planned, reviewed, and controlled at that time.

- Drain valves exist that open to the atmosphere or the TTA deck from the HEPA filters (e.g. FLT-20-404, HOV-20-431 and 432; FLT-20-412, HOV-20-426 and 503

  The drain valves will be normally closed. Any requirement to open the valves will be a planned work evolution, conducted under the direction of a system breach Radiological Work Permit and the supervision of Radiological Control personnel. This approach is consistent with current RCS procedures.

- PNL-11-002 BOP Video System Remote Ethernet is located outside on top of the bridge. The box may not provide adequate protection from the weather.

  The enclosure for PNL-11-002 is rated NEMA 4 and will provide "protection against windblown dust and rain, splashing water, and hose-directed water". The normal requirement for outdoor service is a NEMA 3 rating; the NEMA 4 enclosure provides protection in excess of a NEMA 3 enclosure.

- Sheet N6504, ENC-11-001 is not a leak tight enclosure and does not appear to qualify as secondary containment. At a minimum, flange guards should be installed in order to prevent a leaky or blown gasket from spraying on the roll-up doors and potentially outside the enclosure.

  The project acknowledges this comment and is evaluating options, such as the installation of flange guards or another equivalent means, for controlling spray that could arise from leakage from the flanges and diverter valves. The necessary modification will be incorporated prior to startup.

- The SLC-11-204 sluice module floor low spot is at the access door. Liquids within the enclosure will collect here and spill on the deck when the door is opened or this gasket leaks. SLC-11-203 floor is designed differently and drains to the silo riser.

  The modules on the Silo bridges and TTA deck are intended meet secondary containment requirements. The modules on the Silo 1 bridge and test stand are being evaluated for the issues raised in the CAT's comment – any necessary modifications will be incorporated prior to startup.

- The drains from the annulus in the encased slurry and sluice lines are outside the modules. This does not appear to meet secondary containment requirements. To test for leaks will require removing the cap and draining any liquid into an uncontaminated bottle. How frequently will this be checked and how will any fluid be contained?
  The containment piping for the sluice and slurry lines are sloped to and open to the interior of the sluice and slurry modules via holes in the end plate inside the expansion joint. Any leakage of the sluice or slurry lines will discharge into the modules and drain back into the TTA Tanks or Silos. As leakage will be monitored by the cameras located inside the modules, checking for leaks will not require the valves to be uncapped and opened. Use of the valves would only be required in the event that sampling of material accumulated in the containment piping was desired..

- After completion of surrogate testing, the effected AWR lines and valves should be flushed. Otherwise, subsequent startup activities may encounter plugging.
  Agreed. The lines will be flushed after completion of surrogate testing.

- There may be high entrainment from the TTA tanks into the RCS vent system when filling TTA tanks. No demisters are provided to remove entrained moisture, thus placing a significantly increased load on RCS for moisture removal.
  The project has considered this issue for quite a while; there were differing opinions about what the appropriate measure should be. Nevertheless, a decision on the issue has been taken to proceed with the existing configuration without a change in the capability of the RCS to handle mist and entrained moisture.

- The procedure for entering the sluicer modules and adding sluicer arm segments need to be developed and demonstrated on the test stand.
  Agreed – the procedure for addition of sluicer arm segments will be evaluated and improved as required during operability testing

- The CAT requested Hazelton Slurry pump vendor data for the AWR project from Silos Document Control. The Silos 1 and 2 project vendor data was complete. However, the pump vendor data for AWR could not be located in document control and the CAT was referred to the project engineer.
  The Hazelton Pump vendor data was provided in two separate Turnover Packages. Data for the pumps for the six (6) new Pump Modules SLR-11-201 & 202 and SLR 13-201A&B ad 202A&B are in Turnover Packages 40710-FTP-0010, -0011, -0012, -0013, -0015 & -0016 issued by Oak Ridge Tool & Engineering (ORTE). Data for the three spare pumps (rebuilt pumps from the Cold Loop Test) are in Pump Module System Data Package 40710-PMS-0003 issued by TPG Applied Technology.

  The CAT also requested vendors data on the TPG Sluicers. This was in the file and appeared complete for both AWR and Silos 1 and 2. The motors driving the yaw and pitch do not appear to include a position feedback. The index position feedback mechanism is flimsy in design and will likely not operate reliably, leaving the project to depend on video to monitor sluicer position. Gears are fastened with very small screws. The CAT hopes these screws were installed with Loctite to ensure they do not loosen and pieces fall into the tanks.
  The sluicer nozzle pitch and yaw servo-motors were provided with internal encoders. Under DCN No. 40710-JEG-386, these internal encoders were used to provide a redundant position

feedback to the Control System that can used if the primary encoders become disabled. The screws that attach the driven gear to the encoder were installed with "Loctite".

- A number of the P&IDS included the statement, "Revised per Redline Mark Up" in the revision block. It appears that field conditions differed from the approved drawings without supporting documentation (such as a DCN).This may be the reason the CAT found many discrepancies between the P&IDs and field or installed conditions.

  The P&ID Drawings are revised per the "Red-Line/As-Built Document Plan for the Silos Project" as provided in the Silos Project Engineering Execution Plan. As was discussed with the CAT during the review, field walkdowns, and final verification of P&IDs were in process at the time of the review; field conditions will be verified to be in accordance with final approved drawings, including applicable DCN's, prior to startup.