DEFENSE NUCLEAR FACILITIES SAFETY BOARD

November 4, 1992

MEMORANDUM FOR: G.W. Cunningham, Technical Director

COPIES: Board Members

FROM: Lester Clemons
Tank Analyst

THROUGH: Paul Gubanc
Hanford Site Team Leader

SUBJECT: Trip Report - ALARA Assessment of Tank 101-SY Mixer Pump Installation Project, September 21-25, 1992.

1. Purpose: The purpose of this visit to the Hanford site was to perform a review of the ALARA (as-low-as-reasonably-achievable) aspects of preparations for installing the mixer pump into Tank 101-SY for mitigation of flammable gas generation. A review of available field procedures and worker training for installing and operating the mixer pump in tank 101-SY was conducted. The primary objective was to assess how ALARA principles are factored into procedures and worker training for what is expected to be a potentially high radiation exposure project. Included in the visit was attendance at the Waste Tank Advisory Panel (TAP) Sub-panel meeting, which convened to review the technical status of the mixer pump gas mitigation program.

2. Summary: The Hanford Tank 101-SY Mixer Pump Installation Project will require the removal of highly contaminated equipment and the installation of the pump into the tank in workstation areas expected to have extremely high radiation dose rates. The radiation level in the dome of the tank was measured by Westinghouse Hanford Company/Department of Energy, Richland, Washington Office (WHC/DOE-RL) at a level of 200 r/hr and the "shine" through the 42" riser into the pump pit was estimated to be 47 r/hr (783 mr/min). The dose rate at the worker's knees (whole body dose) at ground level, using a dose reduction factor inversely proportional to the distance to the edge of the pump pit is estimated to be 31.5 r/hr (525 mr/min). At this exposure rate a worker could receive the administrative dose limit of 300 mr/wk in just 34 seconds. In discussions with craft and health physics personnel it was not clear that they were aware of the intensity of the radiation hazards associated with the mixer pump installation. The implementation of ALARA principles in this project is currently not consistent with generally accepted radiation protection principles used in the commercial nuclear industry.

3. Background: The mixture of radioactive and hazardous chemical high-level waste in the Hanford tank 101-SY experienced an episodic gaseous release on September 3, 1992, which has been designated as the window "G" burp. The analysis of gases previously

collected above the surface of the waste has indicated that concentrations of flammable gases (e.g. hydrogen) exceeds the lower flammability limit (LFL) during a burp event. The WHC/DOE-RL have developed plans to install a slurry mixer pump into the tank during window "G" in a test program to mitigate the episodic releases of flammable gases. The objective of the test is to determine if mechanical agitation of the waste will result in a gradual (continuous) release of the gases, resulting in lower maximum concentrations of hydrogen in the dome space of the tank. The removal of highly contaminated equipment from risers in the tank is necessary to make provisions for installing the mixer pump and supporting test equipment. This means that workers must handle equipment and debris that have a high potential for personnel exposures and could adversely impact worker safety.

A visit was made to the Hanford site on September 21-25, 1992 to review task procedures and worker training for the mixer pump installation project. The intent was to assess the implementation of ALARA concepts and methods developed for application during the program. A DNFSB staff team of Paul Gubanc, Tim Dwyer and Lester Clemons held a "roundtable" discussion with the pump installation crafts, consisting of nuclear process operators (NPOs), health physics technicians (HPTs), pump riggers and supervisors of the various crafts. A fruitful and open exchange developed during the session. In addition, the TAP sub-panel was conducting a review of the technical aspects of the test on September 2223, 1992 at Hanford. Attendance at this meeting provided a final review of the technical issues associated with operation of the mixer pump and physical parameters to be measured during the test.

4. Discussion/Observations

Training Program: The riggers and pump handlers had been trained to the pump rigging procedure on a mockup using a "dummy" pump made from pipes filled with concrete for weight distribution to simulate the 19,000 pound, 53 foot long mixer pump. At the time of the visit, the closing date for window "G" operations was October 4, 1992. With only ten days left in the schedule, approved procedures did not exist and the training of NPOs, HPTs, and persons-in-charge (PICs) had not been completed. In particular, despite radiation levels inside the 101-SY dome space expected to be in the 150 r/hr to 200 r/hr dose range, no training in ALARA principles and methods for minimizing worker exposures had been scheduled or performed. The testing and checkout of equipment to meet the accelerated window "G" schedule was given as the reason why approval of procedures and worker training was falling behind schedule.

101-SY ALARA Program: The evaluation of the ALARA program for installation of the 101-SY mixer pump was based on the description of tasks that were to be completed in potentially high radiation fields. Approved procedures were unavailable during the Hanford visit, but a draft copy of the procedure, TFPE-YP-0110, Work Instructions for Installation of Mixer Pump in Tank SY-101, Rev.-2, September 25, 1992, (92:5349) was subsequently forwarded and reviewed. Of particular radiological concern are the tasks for removing the slurry distributor (Section 7.3), measuring the roundness of the 42" diameter

riser (12A)(Section 7.6), and installing the pump load distribution frame (LDF) structure (Section 7.4)(Attachment 1). The removal of the slurry distributor opens the 42" riser, exposing the inside of the tank to the atmosphere. The opening of the riser and handling the slurry distributor create the following radiological problems:

l) The function of the slurry distributor was to spread waste as it entered the tank. The number of crud traps and amount of radioactive materials adhering to internal surfaces is unknown. However, estimated 5-10 r/hr or higher dose rates may be expected from the slurry distributor, depending upon crud buildup. Procedure step 7.3.13 requires that the slurry distributor be wrapped in plastic after removal from the riser to minimize the spread of contamination. The potentially high external dose rates from the slurry distributor and "shine" from the tank do not appear to have been considered in developing plans to carry out this step.

2) Available measurements of dose rates in the tank dome indicate levels of about 200 r/hr. The subsequent "shine" beam through the 42" riser inside the pump pit was estimated to be 47.0 r/hr (783 mr/min) (see Figure 1). Based on a dose reduction factor inversely proportional to the distance from the riser opening to the worker's knees (whole body dose) at ground level, 8 feet above the riser, a "shine" beam dose rate of 31.5 r/hr (525 mr/min) is estimated. The stay time in such a "shine" beam would be 34 seconds to reach the Hanford administrative dose limit of 300 mr/wk.

3) The procedure specifies a tank ventilation system minimum flow rate of 400 cfm. This volume flow rate results in a linear velocity flowing into the 42" riser of 41.6 ft/min. The nuclear industry uses a minimum linear flow velocity of 150 linear ft/min to ensure adequate airborne contamination control. The 41.6 ft/min is only 27.7% of that minimum. If the ventilation system operates at the maximum flow rate of 700 cfm, the linear velocity is 72.8 ft/min or 48.5% of the industry minimum. The procedure states that a tent will be used when possible. However, the tent will be opened or removed for crane lifts when moving equipment in and out of the tank. The procedure does not fully address the potential for an airborne release during these operations.

4) Despite the above radiological conditions, the procedural steps 7.3.12 to 7.4.6 and steps 7.6.9 to 7.6.11 are performed with the riser open to the atmosphere. No mention or recognition is made of the "shine" beam intensity (Attachment-1). The survey called for in step 7.3.12 is concerned primarily with contamination levels, and gives no clue as to the expectation of high dose levels from the open riser.

5) The steps 7.4.7 and 7.5.4 require workers to be in and around the pump pit. There is no indication that a radiation survey is to be made (1) prior to the initiation of this work or (2) any time conditions change in the workstation area. The installation or removal of the shield plug from the riser represents a major change in the workstation radiation environment.

6) Removal of the slurry distributor leaves a 42" diameter open penetration into the tank. The procedure has no requirement for guard rails to be installed or safety lines to be attached to the workers. Workers will be provided with supplied air respirators fed by 100 foot long air hoses. The procedure does not address the potential for a tripping accident and a worker falling into the tank.

The Figure-2 is a plan view (map) of the 101-SY tank top showing the locations of test equipment and sizes of the associated risers.

Evaluation Criteria: The criteria utilized by the DNFSB review team for evaluating the 101-SY Mixer Pump Installation Project ALARA program were based on generally accepted "good" ALARA work practices and experience gained in the commercial nuclear industry. The criteria include, but are not limited to, the following:

1) Project Conceptual Stage

Establish ALARA goals (exposure budgets, contamination limits)
Determine radiation sources
Determine shielding requirements
Establish dosimetry requirements, including the need for personnel dosimetry located at the knees and forehead as well as the chest and extremities

2) Develop Task-by-Task Exposures Estimates.

3) Develop procedures and work packages that utilize "good" radiological work practices. Flag the tasks to be performed in high radiation fields.

4) Emphasize and concentrate heavily on training for the potentially high exposure tasks. Where possible, conduct final training under simulated field conditions on full-size mockups before going to the field.

5) "Do the job right-the-first-time." Personnel exposures are doubled or tripled when mistakes have to be corrected in a high radiation environment.

6) Use extended probe survey instruments (e.g., Teletectors) that allow the health physics technician (HPT) to make a radiation survey at a distance of up to 13 feet (four [4] meters) from the source, minimizing exposures to the HPT.

7) Track personnel exposures for high exposure tasks daily in order to properly manage worker exposures.

A review of procedures for installing the mixer pump into the 101-SY tank uncovered a lack of a systematic approach for addressing radiological issues. Attachment-2 is a fax to the DOE requesting more radiological data. The DOE

response to this fax (see page 20) does not adequately address the ALARA concerns listed in the fax. As an example, Item-2 of the response indicated that "workers will be informed of the shine during the pre-job briefing." This response does not reflect good ALARA practices. In the standard ALARA approach, knowledge of the "shine" and methods on how to work around it are taught in the initial classroom setting, and repeatedly re-enforced throughout all the field and mockup training sessions. The pre-job briefing is only the final reminder before the job actually starts. Item-6 does indicate that the go-no-go gauge measurement of riser roundness (Section 7.6) will be deleted and replaced by the fitting of the shield plug as the gauge. The revised procedure is expected to reflect this improvement.

ALARA and Roundtable Discussions: In discussions with the ALARA coordinator covering the 101-SY mixer pump installation project it was learned that the ALARA and health physics (HP) personnel are brought in near the end of project preparation phase. Traditionally, their function has been to prepare the necessary paperwork to write the radiation work permit (RWP) so that work could begin. As a result, the ALARA/HP review of field procedures and work packages has usually been occurring late in the approval process. The expression of serious ALARA concerns by the ALARA/HP team about the way tasks are to be performed in a radiation or contaminated environment has sometimes met with resistance from management, especially with regard to possible delays in the project schedule. In some instances the RWP has been written without the results of current radiation survey data, which in good HP practice is needed to write the RWP. Estimates of the radiological environment in the workstation area, based on data from previous entries, are used in these instances. This practice would be contrary to industry standards and subject to a citation in the nuclear power plant industry. The discussions with the ALARA coordinator were useful in understanding the lack of ALARA/HP participation in the early stages of this project.

The "roundtable" discussion with the NPOS, HPTs, the ALARA coordinator, riggers and craft supervisors centered around previous work done in tank 101-SY during window "G" operations. Three (3) highly contaminated air lances and a gas sampling tube had been removed from the tank. The multifunctional instrument tree (MIT) had been installed and the video camera had been repaired. The DNFSB team wanted to see how successful this work had been and determine if the workers were mentally prepared for the pump installation. The pump installation procedures had not yet been approved and the training and qualification of workers for the pump installation had not been completed. However, the crafts and HP team indicated that they had years of experience installing and removing equipment from the tanks and did not expect any problems. During the discussion the following facts were disclosed:

1) During the removal of the air lances, the contact dose rates ranged from

4.5 r/hr to 4.8 r/hr and 2.0 r/hr on contact with the storage container. The measurements were made with a hand-held survey meter. Radiation exposures to the HPTs were equivalent to those of the NPOs. When asked why the HPTs did not use a teletector, their response was that the one available instrument was inoperable.

2) An inquiry was made as to planning to survey the pump pit, slurry distributor and "shine" beam from the 42" riser opening. Radiation levels in the pump pit were expected to be 800 mr/hr at the top of the pit (ground level) and 3-4 r/hr at the bottom of the pit 6 feet below, before the slurry distributor was removed. The HPTs have since realized the importance of using teletectors for making these surveys and plan to have two (2) operable instruments on hand for 101-SY applications.

3) The crafts and HPTs expressed concerns regarding the wearing of supplied air respirators in the tank farm areas. Some thought the respirator requirements for the BX and BY farms in particular were a management over-reaction to the noxious vapor incident occurring in tank farms near the BX and BY tank farms. One complaint was that management has not adequately communicated to them the need for wearing respirators, nor what is being done to relax the restriction.

TAP Sub-Panel Meeting: The Waste Tank Advisory Panel (TAP) Sub-Panel met at Hanford on September 22-23, 1992 to review the status of technical issues pertaining to the 101-SY mixer pump test program. The sub-panel reviewed the test program to ensure closure of technical issues that had arisen during previous reviews. The WHC/DOE-RL discussed solutions to the following sub-panel concerns:

1) The manufacturer's specification requires that the pump shaft bearing temperatures be kept under 225
pump test run (72-hours of continuous operation) resulted in a lube oil temperature that exceeded 200
be measured directly, an indirect method of measuring the temperature is employed: monitoring the (20 gallon) bearing lubricating oil tank temperature. An alarm setpoint of 200
specified bearing temperature limits are not exceeded. Also, continuous pump operation will be limited to short run times (less than 8 hours) during the test.

2) The TAP Sub-panel indicated that the procedures for installing and operating the mixer pump needed major re-work. They were too general; not specific enough for workers to understand and follow. Also, the TAP sub-panel emphasized that workers must be adequately trained to the procedures before the start of field operations. The WHC/DOE-RL intend

to address this concern in the next procedure revision.

3) In order to get corroborating data on waste levels in the tank, the TAP Sub-panel suggested painting height marks on the pump and other equipment installed in the tank. The fixed marks could be used with video cameras to compare height measurements with level indicators. This suggestion has been implemented.

Technical Management Advisory Issues: 101-SY ALARA Deficiencies. The review of ALARA aspects of the Hanford tank 101-SY Mixer Pump Installation Project uncovered a major deficiency in the program. The DOE has not shown that it has implemented an ALARA program adequate for minimizing exposure to workers installing the 101-SY Mixer Pump. The procedures and training program for craft workers who must work in high radiation environments failed to emphasize the potential radiation hazard that could occur when the 42" riser is opened.

The mixer pump was scheduled to be installed in the tank during the window "G" burp, which occurred September 3, 1992. The project met with a number of unexpected delays involving procedure development and approvals, difficulties experienced in removing the air lances and thermocouple tree from the tank, an inadequate ALARA program and ORR incompletions. The window "G" was closed on October 16, 1992 without installing the mixer pump into the tank. From what the DNFSB technical staff has learned about the project's ALARA program, it may be fortunate that circumstances prevented the attempted installation of the pump. The review of pump installation procedures for ALARA aspects uncovered the following:

1) The procedure failed to mention the 200 r/hr dose rate expected (measured) inside the dome space of 101-SY and the estimated 47 r/hr (783 mr/min) "shine" beam in the pump pit from the open riser.

2) An estimated 31.5 r/hr (525 mr/min) "shine" beam may exist at ground level above the pump pit. A worker could receive the 300 mr/wk dose in just 34 seconds.

3) No radiation and contamination surveys were made inside the pump pit to determine radiological conditions expected for installing the mixer pump load distribution frame (LDF) structure. A dose rate of 800 mr/hr was measured at a 4" opening on top of the pump pit cover. The ALARA/HP team expected 3-4 r/hr at the bottom of the pit and 105 - 106 dpm/100 cm2 beta-gamma contamination levels on pump pit surfaces before the slurry distributor is removed.

4) No task-by-task personnel exposure estimates were available for the

project, especially for installation of the LDF. A considerable amount of hands-on work inside the pump pit is required.

5) The participation of the ALARA/HP team in the 101-SY mixer pump installation project came late in the program (primarily for RWP development) after operational decisions had already been made. Challenges to high exposure task methods would have been difficult.

6) Except for crane operators and riggers, the NPOs, HPTs and PICs had not been trained to approved procedures with only 10 days left in the initial 30-day period of the window "G" schedule.

7) Discussion with the crafts and HPTs indicated a lack of experience working with dose rates above 1.0 r/hr. ALARA/HP indicated that less than 30% of the annual jobs are done in radiation fields greater than 100 mr/hr, and there have not been any performed in the "greater than 1.0 r/hr" range.

8) The DOE has not shown that it has an adequate ALARA plan to minimize radiation exposure to workers during this project. The project should be put on hold until the deficiency is corrected.

9) Based on the above concerns, the DNFSB technical staff should continue to oversee this project closely to compel DOE to ensure that worker health and safety is not compromised.

FIGURE-1: 101-SY Radiation Hazard Potential; Estimate of Radiation Dose Rates from "Shine" Through 42" Mixer Pump Riser (12A)

[THE INFORMATION TO FOLLOW IS A HAND-DRAWN DIAGRAM; FOR A HARDCOPY, PLEASE CONTACT THE HYPERTEXT MANAGER ON (202) 586-1857]
FIGURE-2: 101-SY MIXER PUMP TEST INSTRUMENTATION: 241-SY-101 PLAN VIEW

[THE INFORMATION TO FOLLOW IS A HAND-DRAWN DIAGRAM; FOR A HARDCOPY, PLEASE CONTACT THE HYPERTEXT MANAGER ON (202) 586-1857]
TANK FARM WORK PLAN: SYSTEM - General [The following data taken from Document #TFPE-YP-0110, dated September 25, 1992; Rev/Mod 1; Pages 24-29 of 54]

7.2.25 RE-INSTALL containment tent over pit.

ATTACHMENT-1

7.3 Removing Slurry Distributor Assembly

7.3.1 BOND slurry distributor to riser 12A AND pit ground cable.

7.3.2 USING DMM, MEASURE resistance AND RECORD resistance from slurry distributor to riser 12A. (Allowed < 10 ohms) QC INITIAL data sheet.

7.3.3 STATION personnel WITH appropriate communications equipment to NOTIFY supervision if any limits are exceeded:

a. Call meteorological department for weather reports at 15 minute intervals.

b. Monitor 101-SY hydrogen, tank, annulus pressure, AND flow recorder.

c. Monitor 102 AND 103-SY pressure recorders.

7.3.4 REMOVE fasteners holding slurry distributor plate to riser.

7.3.5 PREPARE conductive plastic with enough length to completely cover the 7 ft slurry distributor AS distributor is removed.

7.3.6 ATTACH crane lift hook to slurry distributor lifting bail in a manner that will allow removing containment top when directed by this procedure.

7.3.7 IH&S/HPT ENSURE personnel inside of containment tent are on supplied air.

7.3.8 PIC AND HPT ENSURE air flow path is open from outside containment tent to top of riser.

7.3.9 VERIFY tank exhauster system is functioning properly. PIC INITIAL data sheet.

[NOTE 7.3.10: As the slurry distributor is raised SY-101 tank pressure is expected to alarm and drop to atmospheric pressure.]

7.3.10 LIFT slurry distribution Assembly six to twelve inches off the distribution plate leaving the plate on the riser AND HOLD this position for 5 minutes AND IH&S state riser is clear of gases.

[Handwritten note: Riser Open to Atmosphere - Steps 7.3.12 thru 7.4.6]
7.3.12 HPT SURVEY pit area AND TAKE appropriate action. (See 4.2.16 & 4.2.17). (ATTACHED, PAGE-17)

7.3.13 LIFT slurry distributor assembly clear of riser WHILE covering exposed distributor assembly with plastic.

7.3.14 HPT SURVEY pit area to allow containment tent to be opened. HPT INITIAL data sheet WHEN step 4.2.16 AND 4.2.17 criteria are met.

7.3.15 OPEN top of containment tent.

7.3.16 DISCONNECT ground bond AND LIFT slurry distribution assembly out of pit AND SWING to lay down area.

7.3.17 PLACE slurry distributor assembly in a TBM-V or LMB-V metal container for transportation to another tank farm OR designated lay down area.

7.3.18 DETACH crane lift hook from slurry distributor lifting bail.

7.3.19 RE-ESTABLISH containment tent IF directed by HPT.

7.3.20 PREPARE conductive plastic large enough to completely cover slurry distributor plate during removal.

7.3.21 CONNECT slurry distributor plate lifting hook (equipment) to plate center hole.

7.3.22 REMOVE slurry distributor plate AND gasket from riser AND wrap in plastic.

7.3.23 HPT SURVEY pit area to allow containment tent to be opened HPT INITIAL data sheet WHEN criteria of step 4.2.16 AND 4.2.17 are met.

7.3.24 OPEN top of containment tent IF established.

7.3.25 LIFT slurry distribution plate out of pit AND SWING to lay down area.

7.4 Installation of the Load Distribution Frame (LDF)

7.4.1 IF not previously accomplished, PLACE seal plug fixture inside of load frame.

7.4.2 POSITION LDF WITH plug fixture installed AND leveling screws backed out next to pump pit.

7.4.3 ATTACH crane lift hook to LDF lifting sling.

7.4.4 LIFT LDF AND FASTEN gasket to underside of LDF OR riser flange USING an approved gasket cement OR light string AS directed by PIC.

7.4.5 LIFT LDF AND MOVE to above pump pit.

7.4.6 LOWER AND POSITION LDF assembly per drawings H-2-89956 and H-2- 89963.
NOTE: NO SURVEY MADE PRIOR TO INITIATION OF THIS WORK

[Handwritten note: No Survey Made - Steps 7.4.7 thru 7.5.4]

7.4.7 PIC VERIFY LDF is centered within 0.250 inches.

7.4.8 USING appropriate gage blocks AND level, LEVEL LDF to within 0.1 inches/foot).

7.4.9 USING appropriate shims, ADJUST LDF adjusting plate mechanisms to tightly hold LDF in place.

7.4.10 REPEAT step 7.4.7, 7.4.8, AND 7.4.9 AS necessary.

7 4.11 PIC/QC VERIFY LDF centered within 0.250 inches, level within 0.1 inches/foot), AND tightly held in place. PIC INITIAL data sheet. QC INITIAL data sheet.

*(MPA = MIXER PUMP ASSEMBLY)

NOTE 7.5: This section may be performed at any time after LDF installation but prior to cover block installation. IF delayed UNTIL after MPA* installation, access may be restricted.

7.5 Installation of LDF Hold Down Clips

7.5.1 USING a rebar scanner, DETERMINE rebar configuration for installation of LDF hold down clips. REBAR shall not be cut; REPOSITION hold down clip as necessary to clear rebar. (See Figures 2 AND 3, Appendices 2 AND 3).

7.5.2 MARK dril1 points .

7.5.3 PERFORM M20 HSL Metric Hilti Heavy-Duty Expansion Anchors installation per Attachment 2, USING the following steps for each anchor point.

QC RECORD required information on appendix D of Attachment 2, (Pg 93).

a. USING a TE-FY 28/37 drill bit, with a stop set at 5.9, AND hammer drill, drill a hole 90
(SPRAY water on bit to minimize free dust).

b. CLEAN hole USING a metal brush AND low pressure air.

c. INSTALL M20 HSL Metric Hilti drilled in expansion anchor per Attachment 2 for each anchor location.

[NOTE 7.5.4: Torque value in this strep is an approved deviation from the installation torque indicated in Attachment 2.]

7.5.4 QC WITNESS torquing AND INITIAL data sheet. TORQUE fasteners to 130 (155 - 165) Ft-Lbs.

7.6 Riser 12A Roundness Testing

7.6.1 SET containment tent over pit area. OHS Supervisor INITIAL data sheet indicating approval of containment tent.

[NOTE 7.6.2: This is a go / no go test of the minimum diameter of riser 12A that will allow the MPA to pass through the riser and into the tank. IF the riser plug OD size was Ç 41.5 inches AND extends through the riser, it suffices as a substitute AND acceptance shall be indicated in step 7.6.9 BEFORE proceeding to section 7.7.]

7.6.2 IH&S/HPT ENSURE personnel inside of containment tent are on supplied air.

7.6.3 PIC AND HPT ENSURE air flow path is open from outside containment tent to top of riser.

7.6.4 TIE cable lanyard to ground cable AND plug gage tool.

7.6.5 USING DMM, MEASURE resistance AND RECORD resistance from slurry distributor to riser 12A or site ground. (Allowed < 10 ohms). QC INITIAL data sheet.

7.6.6 PREPARE plastic bag to receive riser gage tool after use.

7.6.7 HPT SURVEY pit area to allow containment tent to be opened. HPT INITIAL data sheet WHEN criteria of step 4.2.16 is met.

7.6.8 REMOVE containment tent top.

[Handwritten note: Riser Open - Steps 7.6.9 thru 7.6.11]

7.6.9 REMOVE riser seal plug. (See step 4.2 17).

[NOTE 7.6.10: There are three riser roundness plug gage tools available sized 41, 41-1/2, and 42. Start with the 41-1/2, work down until the size that fits is found. IT is not necessary to try one smaller than one that works.]

7.6.10 TEST riser 12A roundness with riser plug gage tool. PIC INDICATE test results on data sheet.

7.6.11 PLACE riser plug gage in plastic bag.

7.6.12 INSTALL riser shield plug.

7.6.13 IF riser plug gage passes through, PROCEED to MPA installation. REPORT negative test results to Operations Shift Supervisor for further directions.

7.7 MPA Installation

[NOTE 7.7.1: Step 7.7.1 will test circuits from pump to DAC, one instrument at a time and be used as an aid insetting up equipment. This step is highly desirable to perform but is not considered necessary for MPA installation and may be terminated at PIC's discretion.]

7.7.1 TEST DAC System equipment by performing the following steps.

a. VERIFY HMT Mixing Pump lnstrument Cabinet is lock and tagged.
TANK FARM WORK PLAN: SYSTEM - General [The following data taken from Document #TFPE-YP-0110, dated September 25, 1992; Rev/Mod 1; Page 15 of 54]

4.2.16 IF containment contamination levels become greater than 10000 DPM/100CM2 beta/gamma (1000 dpm/100cm2 alpha) decontamination should commence WHILE work continues. HOWEVER, IF contamination levels become greater than 100,000 DPM/100CM2 Beta/Gamma in the pit OR 10,000 DPM/100CM2 Beta/Gamma (200 dpm/100cm2 alpha) outside the pit, stop the job and decontaminate before proceeding on with work.

[NOTE: NO ESTIMATE OF, OR LIMITS ON, HIGH DOSE RATES IN THESE CRITERIA.]

4.2.17 Prior to breaching containment tent roof for equipment removal/entry the following conditions shall be met:

a. Removable contamination on the exterior of packages to be removed shall be less than 1000 dpm/100cm2 beta/gamma (20 dpm/100cm2 alpha) .

b. Interior of containment shall be below the contamination control action level .

c. Wind speeds shall be less than 15mph .

d. Pit shall be less than 100,000 dpm/100cm2 or waiver of WHC-CM-4-10 Section 12, paragraph 4.4.3.2 step 2.

4.2.18 Containment Tent Criteria:

a. Containment tent shall be approved by the OHS Supervisor prior to initial entry.

b. Containment construction shall include framing, sealed seams and ante room and should have a five foot clearance from the pit to tent wall.

c. Containment floor shall be covered with sisal paper.

d. HPT shall post exterior of containment structure as "Airborne Radioactivity Area".

e. Containment integrity shall be verified by performing a visual inspection and a contamination survey every 4 hours, on shifts when containment is in use, and documented on the radiation survey report.

[DNFSB LETTERHEAD]

ATTACHMENT-2

FAX TRANSMITTAL COVER SHEET

[NOTICE: OFFICIAL GOVERNMENT BUSINESS: THIS COMMUNICATION IS INTENDED FOR THE SOLE USE OF THE INDIVIDUAL OR ENTITY TO WHICH IT IS ADDRESSED AND MAY CONTAIN UNCLASSIFIED CONTROLLED NUCLEAR INFORMATION, INFORMATION THAT IS PRIVILEGED OR OTHERWISE EXEMPT FROM DISCLOSURE UNDER APPLICATION LAW. If the reader of this communication is not the intended recipient or the employee or agent responsible for delivering the message to the intended recipient, you are hereby notified that any dissemination, distribution, or copying of this communication may be strictly prohibited. If you have received this communication in error, please notify me immediately by FTS or collect call, and return the communication to me at the address listed above via United States Postal Service. Thank you.]

DATE: 10/9/92 TIME: 3:15 PM

TO: D. PEPSON/J. TSENG/EM-36/(301) 903-7432

FAX NO: 301-903-7604

FROM: LESTER CLEMONS/DNFSB/(202) 208-6560

ThiS transmittal consists of 7 page(s) (excluding cover sheet).

REMARKS ATTACHED ARE ALARA CONCERNS PERTAINING TO THE 101-SY MIXER PUMP INSTALLATION PROJECT. YOUR RESPONSE IS REQUESTED BY THE DNFSB TECH STAFF.

October 9, 1992

101-SY Mixer Pump Installation: ALARA Concerns

Reference: Work Instructions for Installation of Mixer Pump in Tank SY-101, TFPEYP-0110, Rev. 1, and Radiation Work Permit.

A review of the referenced document has resulted in the following questions. These questions pertain to sections 7.3 Removing Slurry Distributor Assembly, and 7.6 Riser 12A Roundness Testing, of the referenced document (attached).

1) It is understood that the radiation dose rates in the dome space of the Hanford HLW storage tanks could be in the 150 r/hr to 200 r/hr dose rate range.

   What are the dose rates in the dome space of tank 101-SY?

2) Assuming a dose rate of 150 r/hr inside the dome space, the "shine" beam through the open 42" riser, after removal of the slurry distributor, could be in the 20 r/hr to 50 r/hr range inside the pump pit.

   In steps 7.3.10, 7.3.12, 7.3.13 (7.3.11 omitted), are the workers aware of the potential intensity of the "shine"?

3) In step 7.3.13, are the workers that are installing plastic around the slurry distributor aware of the potential contact dose rates of 5-20 r/hr from the slurry distributor, depending upon the number of crud traps inside the slurry distributor?

Note: Dose rates of 4.5 - 4.8 r/hr at a distance of 4" (contact) from the 2" pipe-shaped air lances have already been recorded.

4) Is the metal container (TMB-V or LMB-V) for transporting the slurry distributor a shielded container? (step 7.3.17)

5) At the completion of step 7.3.25, is there a plan to install a shield plug over the open 42" riser?

6) In section 7.6, step 7.6.10, is the riser roundness plug gauge tool operated remotely, or manually at the risers edge?

Note: If the measured dose rate inside the 101-SY dome space is less than 150 r/hr, the "shine" beam through the 42" riser is expected to be similarly reduced.
Westinghouse Hanford Company: Internal Memo

From: Fluid Systems Engineering MIT92-401
Phone: 376-4862 HS-09
Date: October 14, 1992
SubJect: DOE COMMENTS

To: J. W. Lentsch HS-09

cc: C. E. Hanson, HS-09

Project Files (2)
TRB file/LB

In response to your request to address the latest DOE comments the following responses are

provided.

In response to L. Clemons ALARA comments for installation of the mixer pump, see Attachment 1, the following dispositions are provided. (Note that the number of the answer corresponds to the question number or an explanation is provided as to which comment the disposition refers.)

1. The dose rates in the dome space was measured to be in the range of 200 rads/hour

2. The estimated dose rate through the riser is calculated to be 47 R. Workers will be informed of the shine during the pre-job briefing. The task will also be done remotely.

3. The slurry distributor wrap will also be done remotely. The distributor will be bagged to catch any loose contamination.

4. The TMB-V or LMB-V is a shielded container.

5. A shield plug will go in with the LDF.

6. The go-no go gauge has been deleted. The shield plug which will be mounted on the load frame will be used as a gauge.

Disposition to comments written on various sections of the Installation Procedure.

Section 7.3, Removing Slurry Distributor Assembly

The slurry distributor does not include any valves or piping. There are no components installed or connected to the slurry distributor.

Section 4.2.16

The procedure was changed to limit entry if background is more than 500 mR/hr.

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Internal Memorandum

Date: September 30, 1992

From: T. Dwyer

To: L. Clemons

Subj: NOTES FROM THURSDAY, 24 SEP 92, MORNING MEETING

Attendees: DNFSB staff -- Clemons, Dwyer, Gubanc

101-SY Pump Installation Workers -- see attached list

101-SY Mitigation Pump Project: Upon removal, it was discovered that the nozzles on the 1A lance were ½ inch longer than shown on the prints. This resulted in the nozzle getting stuck and forced a re-engineering of the pulling rig to include a shear plate. More than 300 man-mrem were expended on the pulling of the 1A lance. By comparison, only about 30 man-mrem were expended in pulling subsequent lances. Contact surveys of the lance cases yielded about 2.2 Rad as a maximum, while surveys inside the case (lance contact) yielded 8-9 Rad.

Most 42 inch riser jobs (e.g., the camera work) involve the use of a knife-edge assembly which C-clamps onto the riser frame. This means the riser does not stay open to atmosphere, and prevents loss of control of ventilation flow. However, when pulling the 42 inch slurry distributor (where the mitigation pump is to be installed), the knife-edge assembly will not be usable. Further, due to the crane/rigging requirements for pump installation, it will not be feasible to use a containment tent.

The Tank Farms HP Manager noted that mitigation pump installation is not a problem -- it is the pit preparation work that is difficult. Readings of 800 mrem/hr, (Ç Ç, no detectable Ç) have been obtained at the top of the pit. No readings from the bottom (six feet down) are yet available, although they will be obtained today or tomorrow (Thursday or Friday). The pump installation project will require installing six hilte bolts for the load distribution frame in the bottom of the pit.

At issue is whether the work plan is organized in an effective manner, including an evaluation of how to actually do the work. At this point, ALARA concerns are not being engineered on the front end -- they are at the tail-end of the program.

Training: To date, only the riggers have been trained for the mitigation pump installation project. Training of other individuals is awaiting approval of the work plan, although the proposed roster of workers has been developed.

With regard to work already done (camera, lance removal, etc.), both the HPTs and the NOs present felt they were well-trained. One added that he thought "it might be useful if we had made a full-length video of the removals for future reference." The HPTs did complain that mock-ups are only used for technical purposes, not ALARA. Also, no final full dress rehearsals are usually run.

Technical issue (?): The Tank Farms Operations Coordinator (not sure if title correct) discussed forcing an ECN to put the shielding plug (?) in first. "If it fits, then they will know that the pump will fit." Does this mean they don't know if the pump will fit?!

Generic Tank Farms: Operators complained about the inconsistency of fresh air requirements. In particular, since the BX/BY tank vapor problem is "known" to be a battery overheat incident, fresh air should not be a requirement here (given a long history with no known vapor problems). Going from masks to fresh air has taken easy tasks and made them "scary-dangerous." Enforcing fresh air requirements where they are not necessary is resulting in a loss of management credibility

among the operators.

Further, the operators see no progress on safety issues over the past year. They receive no communications on such issues as tank sampling results (both cores and vapor domes), and installation and use of CAMS systems (since policy is that if constant monitoring is available, they do not have to have the fresh air requirement). On the plus side, the operators did state that they believe WHC would rather shut the job down and do it right than violate MPRs or jeopardize worker safety.