(7)

RP-AA-401
Equivalent

ATTACHMENT 2
ALARA Plan

RWP Number:	OC-1-09-00054	Work Order Number:	R2119514
Job Description:	CST Clean and Inspect Using Divers		
Estimated Exposure:	0.045 Person-Rem	Estimated Time:	544 Person-hours

Exposure Analysis: (e.g., site historical data, challenge exposure goal, etc.)

RWP#	Description	Person-Rem	Person-Hours	Effective Dose Rate (mR/hr)
543096	CST Clean and Inspect	0.053	353	0.15

1) EXPECTED RADIOLOGICAL CONDITIONS

A. Dose Rates (mRem/hr.)

Whole Body	Skin	Extremity	Neutron
0.030	0.030	0.030	N/A

Maximum Expected Whole Body Dose Rate: 30 mRem/hr (Gamma)

B. Contamination (dpm/100cm^2)

β/γ	α
50 K	<20

C. Airborne (DAC)

β/γ	α
<0.3	<0.3

Current seems 5 mR/h at bottom

Was - 30 mR/h @ bottom
last time 2 mR/h @ 30 cm

Information in this record was deleted in accordance with the Freedom of Information Act, exemptions 4, 6
FOIA- 2009-0214

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3) Exposure Reduction Measures:

1) The diver and dive station shall have hard-wired communication devices. The RP Technician responsible for monitoring dose rates and the diver's exposure shall have the ability to communicate with the diver either directly (preferred) or through the diver's tender or supervisor.
2) Divers shall use tested and approved lighting **and** back-up lighting shall be available.
3) Only essential personnel will be permitted at or near the dive station. Normally, this will include a Radiations Protection Technician in addition to diving personnel.
4) Area Set up

   Stage a HEPA filtered blower of 250 scfm minimum capacity. Provide weather protection for the blower. Attach the suction to the tent/enclosure using flexible trunk.

   Scaffold platform/diver's station needs to slope toward the tank opening to allow water to drain back into the tank. Also the area needs to be equipped with a rack to hang the diver's suit and other equipment.

   Install a demineralized water supply hose for use in hosing off the diver.

   Stage 55-gallon drums with liners in the amount anticipated to be required to store spent filters.

   Stage underwater diver survey instruments – two source checked meters with probes are required – AMP 100 or equivalent.

   Attach AMP 100 or equivalent to the underwater vacuum housing. → 2 meters

   Stage an air sampler to obtain a sample when the access is opened.

   Stage an RO-20 or equivalent for hot particle checks.

   Set up a frisking station in the nearest convenient low background area.
5) Accessing the tank

   Ensure that the HEPA filtered blower is "on" before the access cover is unbolted and removed. Blower exhaust shall be directed into a building with monitored ventilation (e.g., the Turbine Building).

   Remove the access cover – obtain dose rates and an air sample at the opening. Smear, wrap, and tag the cover.

   Comply with Confined Space requirements in accordance with the Job Supervisor's instructions.

   Obtain an initial survey of the tank bottom. This will be limited by the size of the tank access opening, which will prevent surveying the entire tank bottom. If > 30 mR/hour, notify RPS and Rad Engineering. It is recommended that the RPS should be stationed at the area during initial tank opening to review and approve survey results.

   Establish a stay time for the first dive based on dose rates or the Diving Supervisor's instructions, whichever is shorter.

   Install lighting.

   or Temp for temp

Wet the diver with demin water before entry to the tank.

6) During the first dive and subsequent dives

RP: Establish communications with the diver.

RP: Have the diver move the underwater probe as required to obtain radiation dose rates as each new tank area is entered. The diver must keep the survey probe nearby at all times.

RP: Monitor the diver's stay time – the diver will be unable to see an ED (which will be inside the diving suit).

RP: Monitor the AMP 100 on the underwater filter housing during use. Require filters to be exchanged if the dose rate on the housing reaches 100 mR/hour on contact. Otherwise, filters will be changed based on dP as required by the Job Supervisor.

7) Exiting from the water

Wash the diver's suit and any equipment being brought out of the tank with demin water.

Wipe down the externals of the suit, etc. to remove residual water.

RP: After the suit and helmet are removed, hang them and check the external surfaces for hot particles (hot particles are not anticipated, but this check still must be performed). Check the diver's ED for dose.

If the suit, helmet, etc. are to be reused, check for contamination on inside and outside areas. Acceptable contamination levels for reuse of the suit are:

Outside < 50 mRad/hour open window

Outside 10 mrem/hr gamma

Outside < 50,000 dpm/100 cm^2 $\beta\ \gamma$

Outside < 22 dpm/100 cm^2 α

Inside < 1000 dpm /100 cm^2 $\beta\ \gamma$

Inside < 22 dpm/100 cm^2 α

RWP office or Turbine Build, @ MAC

Have the diver proceed to the frisking station and perform a whole body frisk.

The diver must then monitor for contamination using a PCM and PM7 (MAC).

8) Used Filters

Filters will be surveyed by RP and allowed to drip dry inside the tent – filters are not required to be completely dry..

Bag and label the filters as Radioactive Material.

Place filters in 55 gallon drums labeled as Radioactive Material.

4) Contamination Control Measures:

1) Utilize demin water to hose divers off when entering and exiting the tank.
2) Decontaminate the dive platform as necessary to prevent general area contamination levels from elevating.
3) Stage a catch basin or a plastic covered area that can drain back to the CST large enough to hold the drivers tether and air line and for the driver to step into safely.
4) All tools and material removed from the area will be dried, surveyed, and if necessary, bagged.
5) Dive tethers, dive suits and other materials used by the divers could become a source of contamination to the diving station and support personnel if not maintained properly. These items will be dried and monitored for contamination after each use.
6) Maintain work area contamination levels to less than 1000 dpm/100 cm^2 by drying up water. Handle used wipes as radioactive material.

RAM

5) Airborne Radioactivity Mitigation Techniques:

1) HEPA filtered ventilation of 250 scfm minimum capacity will be attached to the enclosure using elephant trunk.. The HEPA filtered blower shall be in operation at all times when the tank is open. Weather protection shall be provided for the blower unit. Direct exhaust into a building with monitored ventilation (TB).

6) Protective Clothing Requirements:

1) The divers normally have special clothing to be worn under the diving suit. If not, OREX modesty garments may be used.

7). High Risk /Task Activities:

1) Removal and decontamination of diver upon exit from water based upon survey results.
2) Working on an elevated wet surface.
3) Diving (The dive will be performed without performing a complete pre-job underwater survey as per step 3.3.7 of RP-AA-461 Radiological Controls for Contaminated Water Diving Operations).

8) "Stop Work" Criteria/Conditions:

a. Dose Rate: 100 mRem/hr

b. Contamination Level: 50 kdpm/100cm^2

c. Airborne Concentration: 0.3 DAC

d. Additional Criteria:

1) If any ED alarm is received, then stop work and place work area in a safe condition, report to RP to resolve the alarm.

2) If accumulated dose is higher than expected, then stop work and place work area in a safe condition, report to RP Supervisor.

3) Any observed radiological condition is different than expected, then stop work and place work area in a safe condition, report to RP.

4) Any spill or unexpected spread of contamination, then stop work and place work area in a safe condition, report to RP.

5) If the work cannot be performed as planned, then stop work and place work area in a safe condition, decide on a new course of action and document as required prior to continuing work.

6) If an injury or unsafe condition occurs, then stop work and place work area in a safe condition, report to RP and job supervisor.

7) If FME is found in a system, then stop work and place work area in a safe condition, contact RP and job supervisor. Do **not** handle items that have not been surveyed by RP.

8) If any HOT particles > 500 K dpm are discovered, then stop work and report to RP Supervisor and Rad Engineering.

9) If any equipment failures during the dive, the dive supervisor will invoke the necessary procedures to ensure the safety of the diver.

10) Components/systems used to drain, fill or circulate water in the dive work area **and** transit areas, shall be verified by the Dive Supervisor and RP Dive Coordinator to have a clearance/clearance order applied or shall be approved by the Dive Supervisor to be operating.

11) Loss of diver air supply (primary or backup) or quality of air supply.

12) Loss of audible communication between diver and tender.

13) Loss of diver's freedom of movement.

14) Breach of the dive suit, such as seal failure or suit degradation (i.e. rips, holes, tears, etc.)

15) Diver distress, fatigue or impaired performance.

16) Diver injury of any kind.

17) Failure or perceived failure of necessary radiation monitoring equipment.

18) Unanticipated change in water level.

19) The unanticipated operation of any equipment that could affect the safety of the diver (industrial or radiological).

20) Actual fire in the area.

21) As deemed necessary by the diver, dive supervisor, tender, Shift Supervisor or RPT. (i.e., activation of emergency plan requiring evacuation/plant configuration changes that could effect dive site).

9) Hold Points:

1) RP to be present for removal of CST lid. Obtain a radiation survey and air sample at the opening. Lower the underwater survey instrument probe to the tank bottom and obtain at least one dose rate.

2) RP will obtain a complete radiation survey of each tank area to be entered by the diver. Diver assistance will be required to reposition the underwater survey probe in areas not directly below the tank access opening.

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11) Evaluation Discussions as applicable:

a. TEDE ALARA Evaluation: N/A

b. Recognized Risk Personnel Contaminations: None

c. The need for extremity dosimetry was evaluated in accordance with RP-AA-210, paragraph 4.2.3. The extremity dose rate is not anticipated to be greater than five times the whole body dose rate and the extremity dose is expected to be less than 500 mrem. Extremity dosimetry is not required.

d. Placement of the TLD and ED inside or outside of the dive suit was evaluated in accordance with RP-AA-210, paragraph 4.3.3. Beta exposure is not expected to be significant and the diver's entire body will be covered by the dive suit and helmet. The TLD and ED shall be worn inside the suit.

e. The difference between the dose equivalents at the chest and any other body location was evaluated in accordance with RP-AA-210, paragraph 4.5.1. This difference is not expected to exceed 50% and the dose rates are anticipated to be less than 100 mR/hour. Therefore, the diver's dosimetry shall be worn in the normal (chest) location.

f. The dose rate difference between body locations was evaluated in accordance with RP-AA-210, paragraph 4.6.1. This difference is anticipated to be less than 30% and the dose equivalent is expected to be less than 100 mrem at any location. Therefore, multiple whole body TLDs are not required.

12) Plan for Transport of High Dose Rate Components:

1) None required; however, 55-gallon drums with drum liners shall be staged to accept spent filters from the vacuum/filter operation. These drums shall be labeled as Radioactive Material and expeditiously relocated into a pre-designated location in the RCA. An escort by RP is required when moving drums to the RCA.

13) Special Dosimetry Requirements:

1) Pre-dive and post-dive bioassay is required. The divers shall report to the dosimetry office to arrange for submission of urine samples.

2) The diver's dose and the dose rates in the work area are expected to be low; therefore, remote reading teledosimetry is not required. The diver will have an underwater survey probe connected to an operating AMP 100 (or equivalent) at his location at all times.

14)Contingency Plans:

A. Backup diver on station during dive activities (if required by the Dive Supervisor).

B. If the primary work plan fails, then take the following action:

a. Suspend work and determine an alternate course of action.
b. Meet with RP to receive their concurrence, and to ensure the proper Rad controls will be in place, and to allow them to make the necessary revisions to the RWP, ALARA Plan, Dose Estimate, etc.
c. Resume work with the concurrence and cooperation of all parties involved in the job.

15) Briefing Requirements:

A. ALARA Briefings

a) Personnel involved with the diving operations are to understand and comply with the instructions stated in RP-AA-461, associated RWPs, and any additional requirements stated in a pre-job briefing, and shall be briefed in accordance with RP-AA-461 (contaminated water diving procedure) and this ALARA plan prior to commencement of diving activities.

ALARA Plan

Approvals:

Task Manager: Date: 5/5/09

RPS: (b)(6) Date: 5/6/09

Originator: Date: 5/5/09

Rad Eng Mgr (or designee): Date: 5/6/09

SAC Chair (if > 5 Person-Rem): **N/A** Date: **N/A**