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ORNL/ER-429/A1

ALARA Plan for the Old Hydrofracture Facility Tanks Contents Removal Project at Oak Ridge National Laboratory, Oak Ridge, Tennessee

Amendment 1 for Appendix B: Install Flex-pipe on Tank Riser Spools

MANAGED BY
BECHTEL JACOBS COMPANY LLC
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

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APPROVAL PAGE

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Appendix B — Amendment I

ALARA Planning for Task B-6
Install Flex-pipe on Tank Riser Spools

This amendment to Appendix B contains the specific ALARA evaluations for installing flex-pipe on riser spools to accommodate ventilation duct connections to the north risers of each tank. The work will be a routine task that is part of the Equipment Installation and Mobilization phase of the project. The dose rates were estimated using the recent Radiological Surveillance Section radiological survey: SAAS-97-0635. Task B-6 has been added to the OHF Project ALARA review process to address a field decision to modify an approach to installing the tank ventilation system.

The revised approach will incorporate 12-in. diameter, 36-in. long, stainless steel flex-pipe connected to each north riser spool to address the problem of pipe fitting multiple bends and turns expected with the 12-in. PVC duct. This improved approach will reduce the time necessary to install the duct system between the tanks and the ventilation skid. However, the task includes opening the 12-in. riser spool connections to replace the currently installed blind gaskets. Since a riser spool for each tank will be opened, there is a potential for significant personnel exposure and spread of contamination that will addressed through this ALARA review process.

Tasks currently included in ALARA planning for the OHF Project include the following:

- B-1 – Install Final Riser Assemblies and Mixer
- B-2 – Open Ventilation Connections to Risers
- B-3 – Install Bubbler Tubes
- B-4 – Installing and Removing Tank Cameras
- B-5 – Installing and Removing the Sluicer
- B-6 – Install Flex-pipe on Tank Riser Spools

Table B.1 lists the personnel that are designated to perform radiological work. Their exposures will be tracked using Siemens electronic pocket dosimeters. However, their official dose record will be generated from their assigned TLDs provided by the Bechtel Jacobs Company external dosimetry program. The Construction Foreman and pipe fitters are generally involved in equipment installation and mobilization, whereas, the operations technicians will perform the work associated with sluicing and pumping operations. The ALARA goal for limiting individual worker exposures is less than 600 mrem maximum total effective dose equivalent. However, project personnel dose hold points are set at 200 and 400 mrem for cumulative exposure during the campaign.

Table B.1. Key project personnel involved in performing radiological work

Name	Badge No.	Job Title	Code	Company	Estimated dose (mrem)
Dan Brown	33132	Radiological Control Technician	RCT	LMER	44.8
Donnie McCurry	625985	Site Safety & Health Officer	SHO	CDM Federal	29.8
Bob Carroll	701350	Construction Foreman	CSF	CDM Federal	90.5
Miguel Naranjo	701344	Pipe Fitter #1	PF1	CDM Federal	499.4
Mike DeBayou	701347	Pipe Fitter #2	PF2	CDM Federal	320.8
Sergio Salcido	701351	Operations Technician #1	OT1	CDM Federal	181.9
Jay Mitchell	648671	Operations Technician #2	OT2	CDM Federal	220.3
Rick Salley	636213	Operations Technician #3	OT3	ETE	3.6
Hypothetical worker	–	Rigger/ Flagman	RG1	LMER	3.1

The summary for estimated dose totals for the tasks currently included in OHF Project ALARA planning is listed in Table B.2.

Table B.2. ALARA dose estimates for tasks associated with equipment installation, mobilization, and sluicing and pumping operations.

Task Description	Estimated Dose (mrem)
Phase I - Install riser spool assemblies and submersible pumps (T-1, T-3, and T-4)	524
B-1 – Install Final Riser Assemblies and Mixer	124
B-2 – Open Ventilation Connections to Risers	210
B-3 – Install Bubbler Tubes	52
B-4 – Installing and Removing Tank Cameras	261
B-5 – Installing and Removing the Sluicer	51
B-6 – Install Flex-pipe on Tank Riser Spools	173
Project Total	1,394

Task B-6. Install Flex-pipe on Tank Riser Spools

Task Description

This task is part of the equipment installation and mobilization phase of field activity for the OHF tanks contents removal campaign. The work involves installing 12-in. diameter stainless steel flex-pipe to tank riser spools to accommodate tank ventilation duct connections. Each flex-pipe piece to be installed is 36 in. long and weighs about 120 lbs. Flex-pipe will be installed on the north end 12-in. horizontal opening on the north riser spool for each of the five OHF tanks. The connection will be made by removing the PVC flange and blind gasket, preparing the surface, and installing the flex-pipe with a replacement blind gasket to the riser spool flange. Since the blind gasket will be replaced, the tanks should remain sealed after this task until the ventillation skid becomes operational. The key steps for flex-pipe installation are as follows:

- **Remove PVC flange and blind gasket**—The flange bolts between the PVC flange and the riser spool will be removed with an air impact wrench. However, since the original flange was installed on the riser spool before the spool was installed, the restricted space may not accommodate an impact wrench for each bolt. The removed PVC flange will be placed in a separate bag and stored for possible future use. The blind gasket will be double bagged and disposed as radiological waste. If necessary, the riser spool flange surface will be prepared to accept a new blind gasket.

- **Install flex-pipe and "hot bolt"**—After the riser spool flange is prepared, the flex-pipe is placed over the open flange. The replacement blind gasket should already be attached to the flex-pipe before it is lifted by the crane. (The inside surface of the blind gasket should be treated with anti-seize.) Once the flex-pipe is positioned on the riser spool flange and bolt holes are aligned, at least two opposing bolts will be installed to secure the connection.

- **Complete bolt installation**—The remaining bolts will be installed and tightened.

Dose Estimates

The maximum whole body dose expected for this task is as follows:

Position	Whole body dose (mrem)
Construction Foreman (CSF)	21.8
Operations Technician #1 (OT1)	74.8
Operations Technician #2 (OT2)	74.8
Radiological Control Technician (RCT)	1.1
Total	172.5

Radiological Hold Points

Field Measurements

- **Preliminary dose rate measurements at the tank riser**—Dose rate measurements will be made before the beginning of work (i.e., loosening bolts). If the dose rate is unexpectedly high (e.g., greater than 20% over the expected dose rate), further job planning is necessary before beginning work on the tank riser. For example, the ALARA dose estimates will be revised and precautionary steps may be added to further reduce personnel exposure.

Personnel Exposure

Workers will use Siemens electronic pocket dosimeters with the alarm set point at 70 mrem cumulative dose and dose rate set point at approximately 20% over the maximum expected dose rate. Depending on the alarm, the RCT and SSHO will direct the worker to complete the specific step under way when the alarm sounds. If a worker's cumulative dose triggers an alarm, the RCT and SSHO will advise whether work assignments should be shifted between workers before proceeding. An alarm occurring near the end of the job may not result in work assignment adjustments.

Walkdown or Dry Run

The original PVC flanges were installed on the riser spools in a low background area. All riser spool are currently installed on OHF tanks. There is no practical way to stage a mock up exercise. However, the task is not particularly complicated, exterior surfaces should be relatively free of contamination, and the riser spool provides an additional measure of shielding.

Maximum Prefabrication

The replacement blind gasket will be attached to the flex-pipe before the pipe is lifted into the radiological area.

Staging Necessary Materials and Tools

Staging of materials and tools will be outside the radiological area. With exception of an air impact wrench for bolt removal, no special tools will be necessary. Duplicate tools and additional blind gaskets, nuts, and bolts will be on hand.

Radioactive Material Reduction

Waste materials from the job (e.g., gaskets, plastic, PPE, etc.) will be bagged and disposed. Recyclable items, such as overboots, will be segregated at the contamination reduction zone for survey. No unnecessary items will be introduced into the radiological area.

Engineered Controls

No engineered controls are necessary. Plastic may be used around each opening to minimize the potential for spreading contamination.

Special Tooling or Work Processes

There are no unique work processes or tooling identified to reduce time in the work area. An impact wrench will be used when possible to reduce exposure time.

Training

Workers are required to complete Radiological Worker II training and be respirator qualified.

Temporary Shielding

No temporary shielding will be used.

Emergency Procedures and Contingency Plans

The work will be performed under the guidelines in the Site-Specific HASP for the OHF Tanks Contents Removal Project (ORNL/ER-427, Energy Systems 1997c). If an ORNL emergency alarm sounds, the SSHO will ensure that work stops immediately and that all workers are aware of the alarm and are taking the appropriate action. The Field Operations Superintendent will ensure that all equipment is secure and shutdown in a safe state. Chapter 7 of the Site-Specific HASP discusses evacuation plans and routes in more detail.

- **Wind and inclement weather**—Wind gusts must not exceed 15 mph. The SSHO will monitor the wind conditions and periodically contact the LSS for weather updates. The SSHO or RCT will terminate the job if conditions deteriorate in a way that prevents safe work or proper deactivation of the worksite. The SSHO will also decide if wind breaks should be used to reduce the wind effects.

Install flex-pipe on tank north risers

Tank T-1 north riser	Personnel	No.	dose rate (mrem/hr)	time (hr)	collective dose (person-mrem)	RCT	CSF	OT1	OT2
perform rad survey	RCT	1	17	0.01	0.17	0.17			
remove PVC flange & blind gasket	OT1,OT2	2	17	0.25	8.50			4.25	4.25
install flex-pipe and hot bolt	OT1,OT2,CSF	3	17	0.20	10.20		3.40	3.40	3.40
complete bolt installation	OT1,OT2	2	17	0.25	8.50			4.25	4.25
subtotal					27.37	0.17	3.40	11.90	11.90
Tank T-2 north riser	Personnel	No.	dose rate (mrem/hr)	time (hr)	collective dose (person-rem)	RCT	CSF	OT1	OT2
perform rad survey	RCT	1	17	0.01	0.17	0.17			
remove PVC flange & blind gasket	OT1,OT2	2	17	0.25	8.50			4.25	4.25
install flex-pipe and hot bolt	OT1,OT2,CSF	3	17	0.20	10.20		3.40	3.40	3.40
complete bolt installation	OT1,OT2	2	17	0.25	8.50			4.25	4.25
subtotal					27.37	0.17	3.40	11.90	11.90
Tank T-9 north riser	Personnel	No.	dose rate (mrem/hr)	time (hr)	collective dose (person-rem)	RCT	CSF	OT1	OT2
perform rad survey	RCT	1	5	0.01	0.05	0.05			
remove PVC flange & blind gasket	OT1,OT2	2	5	0.25	2.50			1.25	1.25
install flex-pipe and hot bolt	OT1,OT2,CSF	3	5	0.20	3.00		1.00	1.00	1.00
complete bolt installation	OT1,OT2	2	5	0.25	2.50			1.25	1.25
subtotal					8.05	0.05	1.00	3.50	3.50
Tank T-3 north riser	Personnel	No.	dose rate (mrem/hr)	time (hr)	collective dose (person-rem)	RCT	CSF	OT1	OT2
perform rad survey	RCT	1	40	0.01	0.40	0.40			
remove PVC flange & blind gasket	OT1,OT2	2	40	0.25	20.00			10.00	10.00
install flex-pipe and hot bolt	OT1,OT2,CSF	3	40	0.20	24.00		8.00	8.00	8.00
complete bolt installation	OT1,OT2	2	40	0.25	20.00			10.00	10.00
subtotal					64.40	0.40	8.00	28.00	28.00
Tank T-4 north riser	Personnel	No.	dose rate (mrem/hr)	time (hr)	collective dose (person-rem)	RCT	CSF	OT1	OT2
perform rad survey	RCT	1	30	0.01	0.30	0.30			
remove PVC flange & blind gasket	OT1,OT2	2	30	0.20	12.00			6.00	6.00
install flex-pipe and hot bolt	OT1,OT2,CSF	3	30	0.20	18.00		6.00	6.00	6.00
complete bolt installation	OT1,OT2	2	30	0.25	15.00			7.50	7.50
subtotal					45.30	0.30	6.00	19.50	19.50
Total task collective dose (person-mrem)					**172.5**				
Maximum dose per individual (mrem)						**1.1**	**21.8**	**74.8**	**74.8**

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