Facility Annual Review of Monitoring Systems

(FARMS)

F-Tank Farm Facility

(FTF)

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1.0 Introduction

1.1 Purpose

A Facility Annual Review of Monitoring Systems (FARMS) documents the review of the adequacy of a facility's sampling and monitoring system (i.e., retrospective air samplers (RAS), Area Radiation Monitors (ARM), and Area Monitoring Thermoluminescent Dosimeters (TLD). This process reviews any facility or operational change that might affect radiological control. In the absence of such changes, a review should be conducted annually. Guidelines for these reviews are provided in Procedure 5Q1.2-458.

Reviewing the adequacy of a facility's sampling and monitoring systems includes providing a justification for the intent and placement of sampling and monitoring equipment. The intent of the air sampling/monitoring program is to ensure that personnel are not exposed to airborne radioactive material concentrations that would result in a CEDE in excess of the applicable regulatory limits. Justifying the placement of air sampling and monitoring equipment serves to ensure that the sampling location is representative of the ambient air to which the worker may be exposed. The intent of the area radiation monitors is to alert potentially exposed workers to unexpected increases in radiation dose rates. A verification walk down of placement for all sampling and monitoring equipment shall be performed as part of the annual review. Sampling and Monitoring equipment includes: RAS, ARMs, and Area TLDs.

1.2 Scope

This FARMS is intended to cover the F-Area Tank Farm Facility, the Inter-area Transfer Line System, and the N-Area Laydown Yard up to one year from the date of approval.

2.0 Facility

2.1 Process/Mission/Description

The F-Area Tank Farm is located on a 22-acre site and consists of 22 waste tanks (tanks 17, 18, 19 and 20 are closed and filled with grout), 2 evaporator systems (1F Evaporator is non-operational), 6 diversion boxes, 3 pump pits, and the Inter-area transfer system. The mission of the F-Area Tank Farm facility is to prevent the escape of any potentially harmful quantity of radionuclides to the environment, prevent the exposure of plant workers and the public to potentially harmful levels of radiation, maintain high level waste in retrievable form to allow solidification of the waste to a more stable form for storage, and to prepare the waste for solidification at the Defense Waste Processing Facility (DWPF).

2.2 Source of Radioactive Materials

Historically F-Area Tank Farm received waste from the 200-F separations facilities during the weapons material generating campaign. At present F-Tank Farm stores, chemically treats, reduces the volume of liquid high-level radioactive waste, and performs final waste removal for tank closure. Since the waste remains in a liquid form (or a wetted sludge), the potential for airborne radioactivity and associated uptake by site personnel is minimized. Any air activity that might occur typically is from a system or process leak or spill or the resuspension of existing surface contamination. Facility historical data and surveys indicate re-suspension of solids or solid materials is minimal under routine operation conditions.

2.3 Chemical Composition and Forms of Radioactive Materials

The waste, when historically received from the separations facilities, was allowed to cool for at least one year following tank fill. During this cooling period, the waste separated into two layers, supernate and sludge. Sludge is composed primarily of oxides and hydroxides of manganese, iron, aluminum (to a lesser degree), and mercury (to a much lesser degree).

The supernate portion of the liquid waste after aging contained dissolved salts and cesium. This supernate was transferred to an evaporator for de-watering, and the concentrate from the evaporator was transferred to a cooled waste tank which causes additional salt to crystallize. The supernate is returned to the evaporator for further concentration. This process was repeated through three evaporator cycles until this portion of the waste had been converted to damp salt cake. The salt produced by evaporation of this aged supernate consists of $NaNO_3$, NaOH, Na_2CO_3, and $NaAlO_2$. The radionuclide content of salt is approximately three times that of the supernate before evaporation.

2.4 Major Radionuclides

Sr-90	Cs-137	Pu-238
Pu-239	Am-241	Cm-244

Note: H-3 exists in FTF, but in quantities not requiring tritium specific monitoring.

An Americium/Curium sludge transfer occurred from F-Canyon through the F Tank Farm Diversion Box to Tank 51. (see section 3.3). This source term requires that Cm-244 should be considered as a major radionuclide.

3.0 Facility Air Sampling and Monitoring Systems

A Radiological Buffer Area surrounds process/operational areas in F-Tank Farm Facility. This ensures that there are no workers located in close proximity to any contamination or airborne areas. Retrospective air samplers (RAS) are positioned throughout the facility. The Central Counting Facility (CCF) counts all samples down to 0.02 DAC. The CCF flags FARMS samples and notifies the Facility, if the alpha and/or beta concentrations exceed 0.02 DAC and if a FARMS sample is greater than 8 total DAC-hrs.

Routine air sampling is performed in FTF to provide assurance that personnel are not chronically exposed to airborne levels >0.02 DAC or 40 DAC-hrs in a year. The limit of 0.02 DAC ensures that personnel would not receive a CEDE > 100 mrem (0.02 DAC x 2000 hr = 40 DAC-hrs = 100 mrem.)

Air sampling is also used to document radiological conditions, detect changes in radiological conditions, verify engineering and administrative airborne radioactivity controls by providing a reasonable assurance that unprotected radiological workers are not exposed to airborne levels >10% DAC. Respiratory protection is required at this concentration. An air monitoring program is also required in occupied areas where a person without respiratory protection is likely to be exposed to airborne radioactive material concentrations > 1 DAC.

Continuous air monitors (CAMs) are used as warning devices to alert personnel to unexpected increases in airborne radioactivity. CAMs are required in occupied areas where a person without respiratory protection is likely to be exposed to airborne radioactive material concentrations >1 DAC during normal operations. There are no occupied areas in FTF where unprotected workers would likely be exposed to this level. The need for the use of CAMs during normal operations and maintenance activities will be continuously evaluated over the life of the facility.

Members of the public are limited to an annual total effective dose equivalent (TEDE) of 100 mrem. The current site annual administrative control level (ACL) for SRR is 500 mrem. For all facilities, the placement of air samplers and monitors in strategic locations are based on operating history, facility airflow or air migration studies (AMS), occupancy times of workers, relation of the worker to the source in respect to the source of radioactive materials in the workplace, and the type of processes.

3.1 Retrospective Air Samplers (RAS)

A review of all FARMS air sample results was performed utilizing the Central Counting Facility Database for 11/24-2011 through 12/4/2012. Section 3.3 provides a table for location and justification of retrospective air samplers. Section 3.4 provides a table of retrospective air sampler DAC-hr results.

3.2 F-Tank Farm

The strategy for placement for outside air samplers in F-Area Tank Farm is to ring the individual areas to provide coverage of the workplace and locations adjacent to normally occupied areas. Justification for placement of outdoor FARMS air samplers is based on prevalent wind rose data. Annual wind rose plots are performed and compiled in the SRS Annual Meteorology Report. A review of the wind rose data provides reassurance that current FARMS air sampler locations are adequate. Additional air sampling is performed for work that has the potential to generate airborne radioactivity. Also, engineering controls are used to prevent the release of radioactive materials. It is recognized that there is always uncertainty due to dilution between the release point and the perimeter sampler; therefore, RCO investigates any perimeter sample results above established limits for both beta-gamma and alpha-emitting radionuclides. In general the outdoor areas have potential airborne release points from the tanks, diversion boxes, exposed piping and process interfaces.

3.3 Specific Work Location Process and Hazards Overview

Elevated tritium levels were found in the ETF Waste Water Collection Tank. 2F Evaporator Overheads, Tank 26, Tank 33, Tank 34, Tank 46, and Tank 47 were sampled. The highest tritium concentrations were 3.63E+5 dpm/ml (1998 time frame). RCO performed tritium smears and air samples for personnel protection concerns. Since all workplace characterization results were less than action levels (1000 dpm/100cm2, 0.1 DAC) and workplace characterization results were negative, no additional sampling for tritium air activity and/or contamination is required.

Tanks 1 - 8 General Area: In this area, the primary release points are the purge and annulus ventilation systems. The annuli on the Type I tanks are positive pressure designs, and are HEPA filtered on the exhaust side. The purge and annulus exhausts from this area are not continuously monitored, with the exception of Tk 7 and Tk 8 Purge. The annulus exhausts are sampled using a retrospective air sampler placed directly in the exhaust stream to alert RCO of any engineered control failures. Samples are probed as designated by the RCO Facility Manager (when running) in accordance with Procedure 5Q1.5-314. Typically the Tank 1-4 area is posted as a Radiological Buffer Area while the tank 5-8 area is posted as a Contamination Area.

> Note: Tank 6 contained the tritiated liquid waste (0.011 Ci/gal) originating from Reactors and transferred from Tank 17. Tritium surveys and air samples were conducted for work involving Tank 17 with all results being less than action levels. As a result of Bulk Waste Removal Actions the tritiated waste has now been dispersed throughout the F-Area Tank Farm.

Operational incident occurrence with radiological consequences in this area:

- March/April 1961, Tank 8 was overfilled allowing 1500 gallons of waste (approximately 5000 Ci Cs-137) to be released to the soil in a 1500 ft^3 area 12 - 26 feet below grade.
- June 1974, a leaking transfer line in FDB1 ultimately resulted in contamination release from the diversion box and overfilling of 241-F Catch Tank.

Tanks 17 - 20 General Area: Tanks 17, 18, 19, and 20 are permanently closed, grouted and their ventilation systems isolated. Typically tanks 17, 18, 19, and 20 are posted as RBA, with the 1F Evaporator/CTS, posted as a Contamination Area.

Historically, operational events in this area have resulted in radiological consequences. A number of minor operational events have resulted in release of radioactivity from the 242-1F Evaporator and CTS system. Many of these events were partially caused by faulty design of the system and were remedied by the gravity drain line system employed for the 2F Evaporator system. Contamination has also occasionally been associated with the CTS loop drop valves.

Tanks 25 - 28 and 44 - 47 General Areas: The primary release points in this area are the purge and annulus exhausts from the eight type IIIA waste tanks and the exhaust from the 2F evaporator system (242-16F). The tank and evaporator exhausts are continuously monitored. This area is generally posted as an RBA, with small Contamination Areas and spots of Fixed Contamination on some tanks tops. Annulus CAMs in this area also can possibly indicate increased outdoor air activity. The tank annuli in this area are not HEPA filtered, and draw air from the local area. The nearest location with high occupancy is the 241-18F Control Room.

Historically, in May 1980, radioactive material was spilled from the Tank 25 C2 Draw off Riser. In August 1980, while performing a zeolite change in the Tank 27 CRC riser, a small resin spill occurred on the tank top. In October, 1980, miss-valving of flush water at the 2F Evaporator feed pump riser on Tank 26 resulted in a back-flow of radioactivity into the flush water system and a spill onto the tank top that was inadvertently sent to the storm sewer. Like the 1F Evaporator system, the 2F Evaporator system has a history of minor suck-back and pushback contamination occurrences, and as such, portions of the 2F Evaporator system are posted as a Contamination Area.

Tanks 33 and 34 General Area: The type III tanks 33 and 34 have purge and annulus exhausts, which are continuously monitored. Tank 33 and 34 Annuli are not HEPA filtered and draw air from the local area. The nearest location with high occupancy is the 241-18F Control Room. Several small leaks of contaminated chromate cooling water resulted in portions of this area being posted as Contamination Area (1998 timeframe).

Inter-area Transfer Line System: The inter-area transfer line system allows movement of radioactive waste to H-Area from F-Area and from H-Area to F-Area. The High Point pump pit of the inter-area transfer line is a passively ventilated pit located in the Burial Ground facility and is at the midpoint of the transfer line. Although no air samplers are located in this area for normal operation, air sampling is performed in this area for job specific coverage. On January 5, 1996, while pressure testing the line segment from F-Area to the High Point Pump Pit, a leaking pressure plug released contaminated air from the transfer line into the pit and into the surrounding area. This area is now posted inactive CA.

N-Area High Rad Storage: the High Rad Storage Area is used for long term storage of radioactive components.

Americium/Curium Transfer: A transfer occurred from F-Canyon to Tank 51. This involved a one time continuous transfer of Americium/Curium (Am/Cm) sludge, approximately 3,000 gallons, to the Extended Sludge Processing facility (Tank 51). The sludge was neutralized in F-Canyon resulting in approximately 30,000 gallons of liquid solution. LWDP mixed the 30,000 gallons of Am/Cm solution with water to aid in the transfer. In Tank 51, the Am/Cm material was mixed with other waste material to form Sludge Batch 3 for DWPF feed. The Am/Cm transfer path was identified in FTF and included waste tanks, pump tanks, diversion boxes, and the Inter-area transfer line system. ESH-HPT-2002-00089, RCO Survey Plan for The Americium-Curium Transfer (U), June 19, 2002 was developed by HPT to monitor this evolution continuously.

Table 3.4 Table of Retrospective Air Sampler DAC-hr results

Location No	Location ID	DAC Loc	Alpha DAC Avg	Alpha DAC >2%	Alpha DAC >10%	Alpha DAC >1	Alpha DAC Max	Alpha DAC Hrs	Beta DAC Avg	Beta DAC >2%	Beta DAC >10%	Beta DAC >1	Beta DAC Max	Beta DAC Hrs	Total DAC Hrs	First Filter Start Date	Last Filter Stop Date	No Filts	Filt Size
FTNKF012	Tank 18 (N)	2%	0.000				0.003	2.766	0.000				0.000	0.047	2.812	11/17/2011 09:06	11/18/2012 07:21	51	2
FTNKF013	241-84F (S)	2%	0.000				0.004	2.409	0.000				0.000	0.040	2.448	11/17/2011 09:13	11/18/2012 07:16	51	2
FTNKF014	Tank 4 (E)	2%	0.000				0.002	2.419	0.000				0.000	0.052	2.471	11/17/2011 10:12	11/18/2012 07:14	51	2
FTNKF015	241-17F (N)	2%	0.000				0.002	2.120	0.000				0.000	0.045	2.165	11/17/2011 09:20	11/18/2012 07:09	51	2
FTNKF016	Tank 34 (E)	2%	0.000				0.002	1.914	0.000				0.000	0.040	1.955	11/17/2011 09:28	11/18/2012 07:05	51	2
FTNKF019	241-18F (N)	2%	0.000				0.001	1.301	0.000				0.000	0.042	1.343	11/17/2011 09:34	11/18/2012 06:59	51	2
FTNKF020	Tank 44 (W)	2%	0.000				0.001	1.510	0.000				0.000	0.039	1.549	11/17/2011 09:42	11/18/2012 06:51	51	2
FTNKF021	Tank 45 (W)	2%	0.000				0.001	1.802	0.000				0.000	0.039	1.841	11/17/2011 09:40	11/18/2012 06:53	51	2
FTNKF022	Tank 46 (W)	2%	0.000				0.001	1.810	0.000				0.000	0.042	1.852	11/17/2011 09:39	11/18/2012 06:54	51	2
FTNKF023	Tank 47 (W)	2%	0.000				0.001	1.928	0.000				0.000	0.040	1.969	11/17/2011 09:37	11/18/2012 06:56	51	2
FTNKF024	241-58F (S)	2%	0.000				0.001	2.529	0.000				0.000	0.048	2.577	11/17/2011 09:45	11/18/2012 06:50	51	2
FTNKF025	Mid 241-62F/74F	2%	0.000				0.004	2.876	0.000				0.000	0.045	2.921	11/17/2011 09:11	11/18/2012 07:19	51	2
FTNKF029	Tank 17 North	2%	0.000				0.002	2.291	0.000				0.000	0.050	2.341	11/17/2011 09:04	11/18/2012 07:22	51	2
FTNKF030	DB-2	2%	0.000				0.003	2.062	0.000				0.000	0.051	2.113	11/17/2011 09:24	11/18/2012 07:07	51	2
FTNKF031	Tank 8 East	2%	0.000				0.001	2.435	0.000				0.000	0.046	2.481	11/17/2011 09:18	11/18/2012 07:12	51	2
FTNKF032	241-102F (E)	2%	0.000				0.003	2.656	0.000				0.000	0.043	2.699	11/17/2011 09:00	11/18/2012 06:46	51	2
FTNKF033	241-53F	2%	0.000				0.001	1.810	0.000				0.000	0.044	1.854	11/17/2011 09:33	11/18/2012 07:01	51	2
FTNKF034	241-28F West	2%	0.000				0.001	2.283	0.000				0.000	0.043	2.326	11/17/2011 08:57	11/18/2012 06:48	51	2
FTNKF035	Tk 34 West	2%	0.000				0.002	2.390	0.000				0.000	0.047	2.437	11/17/2011 09:26	11/18/2012 07:03	51	2
FTNKF036	Tank 19 West	2%	0.000				0.002	1.426	0.000				0.000	0.024	1.450	02/23/2012 07:22	09/09/2012 07:00	27	2
FTNKF037	Tank 19 South	2%	0.000				0.004	1.823	0.000				0.000	0.025	1.848	02/23/2012 10:28	09/09/2012 07:00	27	2
SUMMARY			0.005				0.042	44.559	0.000				0.000	0.892	45.451			1,023	

4.0 Facility Area Radiation Monitoring Systems

A reasonable assurance must be made that workers are not unexpectedly exposed to increases in area radiation levels. Placement of ARMs in strategic locations is based on experience obtained from other facilities with similar types of processes. Area radiation monitors provide a warning to workers of unexpected increases in area radiation rates. Area radiation monitors are placed in locations based on current Health Physics practices and the considerations listed below:

- Locations where normally accessible and occasionally accessible areas can experience significantly greater exposure rates resulting from operational or process activities.

- Locations where inadvertent shielding by structural materials are minimized.

- Locations to best measure the representative exposure rates within specific areas so to assist in minimizing exposure to personnel.

- In remote locations where there is a need for local indication of dose rates prior to personnel entering.

RPD procedures require area TLDs to be used to monitor background radiation levels. Dosimeter locations should be selected to verify that RBA boundaries are properly positioned such that personnel who do not enter RBAs are not likely to exceed 100 mrem whole body dose. Area monitoring TLDs are placed in the following areas:

- Routinely occupied areas adjacent to RBAs, areas where radiation sources are located, or areas where radiation-generating devices are located.

- Areas of high occupancy in RBAs such as offices and guard posts.

- TLD storage locations.

- Areas where area monitoring TLDs could be used to support dosimetry investigations or where emergency response data would be valuable.

4.1 Area Radiation Monitor Locations

The FTF facility diagrams and equipment database provide information and locations required for justification of placement. The installed Victoreen Area Monitoring Packets (VAMPs) at F-Tank Farm serve two purposes: to provide area radiation monitoring for personnel protection, and to provide process monitoring to detect leaks or spills of waste which occur in the facility. Documented Safety Analysis (DSA) differentiates requirements for VAMPs based on High Rem or Low Rem transfer categories.

FTF Facility is prohibited from performing High Rem transfers. All transfers in FTF are considered Low Rem. In-Service VAMPs are required for all facility transfers. These VAMPs

provide sufficient detection capability to detect a process waste spill at a distance not greater than 100 feet. Work in FTF sometimes requires numerous VAMPs to be taken out of service for a short duration. Facility Management performs an evaluation, based on Technical Safety Requirements, to ensure engineered controls are acceptable and to determine any additional personnel protection. Facility Engineering Controls provide an acceptable protection level for personnel. If VAMPs are taken out of service and the distance to an in-service VAMP is greater than 100 feet, then reliance on engineered controls is acceptable and additional personnel monitoring will not be required.

The VAMPs in F-Tank Farm were evaluated by HPT to determine the coverage area for personnel protection provided by VAMPs assuming that a spill occurred and that the dose rate at 10 feet was 30 mrem/hr. Based on a background of 0 - 5 mrem/hr for a VAMP, a normal detection radius of 42 feet was derived. If background was 6 - 10 mrem/hr, a detection radius of 34 feet was derived.

Based on the resulting coverage area maps, LWDP Engineering evaluated desired area coverage for spills against potential spill sites, and determined that no changes were necessary for F-Tank Farm.

Based on the resulting coverage area maps, LWDP Engineering evaluated desired area coverage for spills against potential spill sites, and determined that no changes were necessary for F-Tank Farm.

In support of SMP operations on selected FTF Tanks, an evaluation was performed to determine effective utilization of “project associated, temporary placement” ARMs. Individual SMP ARM placement will be determined by project management and engineering personnel, however, generic placement overview is offered by Reference 13 and summarized as follows:

Suggested placement in support of SMP operations is along a direct unshielded line of sight at a distance greater than 3 feet but less than 25 feet from the riser installation to be monitored. ARM height above the tank top is 12 inches based upon current portable ARM cart design.

Exact ARM placement and methods to secure the equipment in the specified location will be stipulated by the temporary modification documentation for each tank SMP installation. Subsequent routine verification and maintenance of placement is intended to be included in facility round sheets.

Section 6.2, “FARMS Updates/Revisions” has been designated to collect revisions prior to the next required annual revision. As these temporary placements are determined through out the SMP project, SMP ARM location will be annotated on tank top illustrations and attached to section 6.2 of this revision of the FARMS. The temporary nature of SMP project ARM placement precludes their illustration on long term tank top drawings.

4.2 Table of Area Radiation Monitor Locations and Justifications

	Location ID	Sample Locations	Instrument Type	Bkg (mRem/hr)	Alarm Set-pt (mRem/hr)	Purpose/ Justification
1	6554	Tank 1	VAMP	0.4	5.0	Process/Personnel Entry
2	8832	Tank 2	VAMP	0.4	5.0	Process/Personnel Entry
3	8864	Tank 3	VAMP	0.2	5.0	Process/Personnel Entry
4	8077	Tank 4	VAMP	0.3	5.0	Process/Personnel Entry
5	8847	Tank 5	VAMP	Out of Service		
6	8505	Tank 6	VAMP	Out of Service		
7	8022	Tank 7	VAMP	0.4	5.0	Process/Personnel Entry
8	8033	Tank 8	VAMP	0.4	5.0	Process/Personnel Entry
9	N/A	FDB-1	VAMP	Out of Service		
10	6705	FDB-6	VAMP	0.2	5.0	Process/Personnel Entry
11	8082	Tank 19	VAMP	Out of Service		
12	N/A	1F Evaporator East	VAMP	Out of Service		
13	NA	1F Evaporator GVH	VAMP	Out of Service		
14	N/A	F CTS E	VAMP	Out of Service		
15	N/A	F CTS W	VAMP	Out of Service		
16	7103	Tank 25, C-1	VAMP	0.5	5.0	Process/Personnel Entry
17	N/A	Tank 25, C-2 A	VAMP	Out of Service		
18	N/A	Tank 25, C-2 B	VAMP	Out of Service		
19	7119(A)	Tank 25, C-3	VAMP	0.3	5.0	Process/Personnel Entry
20	7301	Tank 25, GVH	VAMP	0.2	5.0	Process/Personnel Entry
21	150	Tank 26, C-1	VAMP	0.2	5.0	Process/Personnel Entry
22	167	Tank 26, C-2	VAMP	0.2	5.0	Process/Personnel Entry
23	169	Tank 26, C-3	VAMP	0.3	5.0	Process/Personnel Entry

4.2 Table of Area Radiation Monitor Locations and Justifications (Continued)

	Location ID	Sample Locations	Instrument Type	Bkg (mRem/hr)	Alarm Set-pt (mRem/hr)	Purpose/ Justification
24	154	Tank 26, R1	VAMP	0.3	5.0	Process/Personnel Entry
25	8030	Tank 26, GVH	VAMP	0.2	5.0	Process/Personnel Entry
26	205	Tank 27, C-1	VAMP	0.2	5.0	Process/Personnel Entry
27	216(A)	Tank 27, C-2 A	VAMP	0.4	5.0	Process/Personnel Entry
28	216(B)	Tank 27, C-2 B	VAMP	0.2	5.0	Process/Personnel Entry
29	204(A)	Tank 27, C-3 A	VAMP	0.3	5.0	Process/Personnel Entry
30	204(B)	Tank 27, C-3 B	VAMP	0.3	5.0	Process/Personnel Entry
31	6502	Tank 27, GVH	VAMP	0.2	5.0	Process/Personnel Entry
32	7250	Tank 28, C-1	VAMP	0.2	5.0	Process/Personnel Entry
33	7267(A)	Tank 28, C-2 A	VAMP	0.2	5.0	Process/Personnel Entry
34	7267(B)	Tank 28, C-2 B	VAMP	0.4	5.0	Process/Personnel Entry
35	7254(A)	Tank 28, C-3 A	VAMP	0.4	5.0	Process/Personnel Entry
36	7254(B)	Tank 28, C-3 B	VAMP	0.3	5.0	Process/Personnel Entry
37	8008	Tank 28, GVH	VAMP	0.3	5.0	Process/Personnel Entry
38	2002	Tank 18	VAMP	Out of Service		
39	2004	Tank 18 NE	VAMP	Out of Service		
40	N/A	FDB-5	VAMP	Out of Service		
41	1002	Tank 44, C-1	VAMP	0.2	5.0	Process/Personnel Entry
42	6532	Tank 44, C-3	VAMP	0.2	5.0	Process/Personnel Entry
43	6531	Tank 44, GVH	VAMP	0.2	5.0	Process/Personnel Entry
44	8048(A)	Tank 45, C-3A	VAMP	0.2	5.0	Process/Personnel Entry
45	1050	Tank 45, C-1	VAMP	0.3	5.0	Process/Personnel Entry

4.2 Table of Area Radiation Monitor Locations and Justifications (Continued)

	Location ID	Sample Locations	Instrument Type	Bkg (mRem/hr)	Alarm Set-pt (mRem/hr)	Purpose/ Justification
46	8049	Tank 45, GVH	VAMP	0.2	5.0	Process/Personnel Entry
47	1100	Tank 46, C-1	VAMP	0.3	5.0	Process/Personnel Entry
48	6545(A)	Tank 46, C-3 A	VAMP	0.3	5.0	Process/Personnel Entry
49	6545(B)	Tank 46, C-3 B	VAMP	0.3	5.0	Process/Personnel Entry
50	6544	Tank 46, GVH	VAMP	0.3	5.0	Process/Personnel Entry
51	1150	Tank 47, C-1	VAMP	0.3	5.0	Process/Personnel Entry
52	8065(A)	Tank 47, C-3 A	VAMP	0.3	5.0	Process/Personnel Entry
53	8065(B)	Tank 47, C-3 B	VAMP	0.3	5.0	Process/Personnel Entry
54	8064	Tank 47, GVH	VAMP	0.3	5.0	Process/Personnel Entry
55	5055	2F Evaporator Receiver Cell	VAMP	2.5	5.0	Process/Personnel Entry
56	5050	2F Evaporator, GVH	VAMP	0.3	5.0	Process/Personnel Entry
57	8600	Tank 33	VAMP	0.3	5.0	Process/Personnel Entry
58	7265	Tank 34	VAMP	0.3	5.0	Process/Personnel Entry
59	6691	Tank 33/34, GVH	VAMP	0.3	5.0	Process/Personnel Entry
60	6684	FDB-2 North	VAMP	0.3	5.0	Process/Personnel Entry
61	6685	FDB-2 South	VAMP	0.3	5.0	Process/Personnel Entry
62	520(A)	FDB-4	VAMP	0.3	5.0	Process/Personnel Entry
63	520(B)	PP 2/3	VAMP	0.3	5.0	Process/Personnel Entry
64	8619	FDB-3	VAMP	1.0	5.0	Process/Personnel Entry
65	3442	F Pump House W	VAMP	0.3	5.0	Process/Personnel Entry
66	803	F Pump House E	VAMP	0.3	5.0	Process/Personnel Entry
67	6097(A)	IAL, High Point	VAMP	Out of Service		
68	6097(B)	IAL, High point	VAMP	0.3	5.0	Process/Personnel Entry
69	7119(B)	Tank 25, C-3	VAMP	0.3	5.0	Process/Personnel Entry

*Note: VAMP #67 (6097A) was deemed unnecessarily redundant and has been removed from service.

4.3 Area Radiation Monitoring TLD Locations

Table 4.4 contains area radiation monitoring TLDs within F-tank farm facility. Justifications for placement and positioning are found in 5Q1.2-217.

4.4 Table of Area Monitoring TLD Locations and Justifications

Location ID	Sample Locations	Purpose/Justification
F059	242-21F (Inside on wall)	Background Data / Facility Boundary
F062	SW of Tank 47 @ walkway chain	Background Data / Facility Boundary
F063	SW of Tank 46 @ walkway chain	Background Data / Facility Boundary
F064	SW-TANK 44@CORNER 241-91F	Background Data / Facility Boundary
F065	W OF TANK 19 @ ROCK BANK	Background Data / Facility Boundary
F066	RCO Trailer storage room	Background Data / RCO TLD Storage
F067	N OF TANK 17 @ ROCK BANK	Background Data / Facility Boundary
F068	N OF TANK 18 @ ROCK BANK	Background Data / Facility Boundary
F069	South of 11F at rock bank	Background Data / Facility Boundary
F070	@241-84F STEAM STN	Background Data / Facility Boundary
F071	E of Tank 2 @ top of rock bank	Background Data / Facility Boundary
F072	E of Tank 4 @ top of rock bank	Background Data / Facility Boundary
F073	On fence south of West Pump house	Background Data / Facility Boundary
F074	E OF TANK 34 ON FENCE POST	Background Data / Facility Boundary
F075	S OF TANK 33 ON FENCELINE	Background Data / Facility Boundary
F076	OUTSIDE North WALL 241-18F CTRL	Background Data / Facility Boundary
F098	241-74F CONT. W. RM. 0002	Background Data / Personnel LOA
F099	241-74F CONT. E. RM. 0002	Background Data / Personnel HOA
F100	241-74F E&I SHOP W. 0001	Background Data / Personnel LOA
F101	242-1F CONTROL ROOM	Background Data / Personnel HOA
F102	RCO MST/CR TRAILER	Background Data / RCO Workstation in RBA
F111	G-241001 WOW SKID	Background Data / Personnel LOA
F122	N-Area North-East of RR Tracks	Background Data / Facility Boundary LOA
F123	N-Area North-West of RR Tracks	Background Data / Facility Boundary LOA
F145	242-13F (on lexan window)	Background Data / Source Storage Area MOA
F146	RCO instrument shack (on source cabinet door)	Background Data / Source Storage Area LOA

Area monitoring badges are established to provide passive monitoring of F-Tank Farm.
HOA = High Occupancy Area
MOA = Medium Occupancy Area
LOA = Low Occupancy Area

5.0 Facility Diagrams

5.1 Attachment 1 - FTF Mobile RAS Locations

5.2 Attachment 2 – FTF Area Monitoring TLD Locations

5.3 Attachment 3 – FTF Area Monitoring TLD Results

5.4 Attachment 4 – N-Area High Rad Storage Area Yard TLD Locations

5.5 Attachment 5 - FTF Area Radiation Monitor Locations

5.6 Attachment 6 – 641-E VAMP Locations

6.0 Attachments

6.1 Bioassay Program Review

Bioassay programs verify that personnel have not been internally exposed to radioactive materials. Bioassay sample requirements should be reviewed whenever facility waste characterization plans are revised or if significant facility source term changes occur (i.e., due to new or modified processes). At a minimum, the routine bioassay sampling program should be re-evaluated annually.

ESH-HPT-99-0051, "Specification of Urine Bioassay Requirements On Radiological Work Permits (U)" provides the baseline for each facility bioassay requirements. The applicable facility specific memorandum required by ESH-HPT-99-0051 should become part of the FARMS document. CBU-SHP-2007-00047, “Urine Bioassay Review for Liquid Waste Disposition F&H Area Tank Farms and Waste Management Maintenance Facility, 299-H (U)” is provided as an attachment.

The RCO Facility Manager shall request a memorandum from the Facility Manager stating if there have been changes in the facility process, which would impact the current routine facility bioassay requirements, since the previous review was performed. A request was made to the Facility Manager to state approval for the adequacy of this document to meet the annual bioassay review requirement. The approval is maintained with the FARMS document.

6.2 HPT FARMS Assessment

In addition to the bioassay program review detailed in Reference 9, HPT provided evaluation/assessment of the following areas (Reference 13)

- Low Level Radiation Exposure
- Air Migration Study

6.3 FARMS Updates/Revisions

This section has been designated to collect all required revisions that occur during the course of a year, prior to the next required annual revision. Normally, these changes are minor and can wait to be processed with the scheduled annual revision. The RCO Facility Manager decides whether a change will be incorporated as soon as practical or can wait for the annual revision.

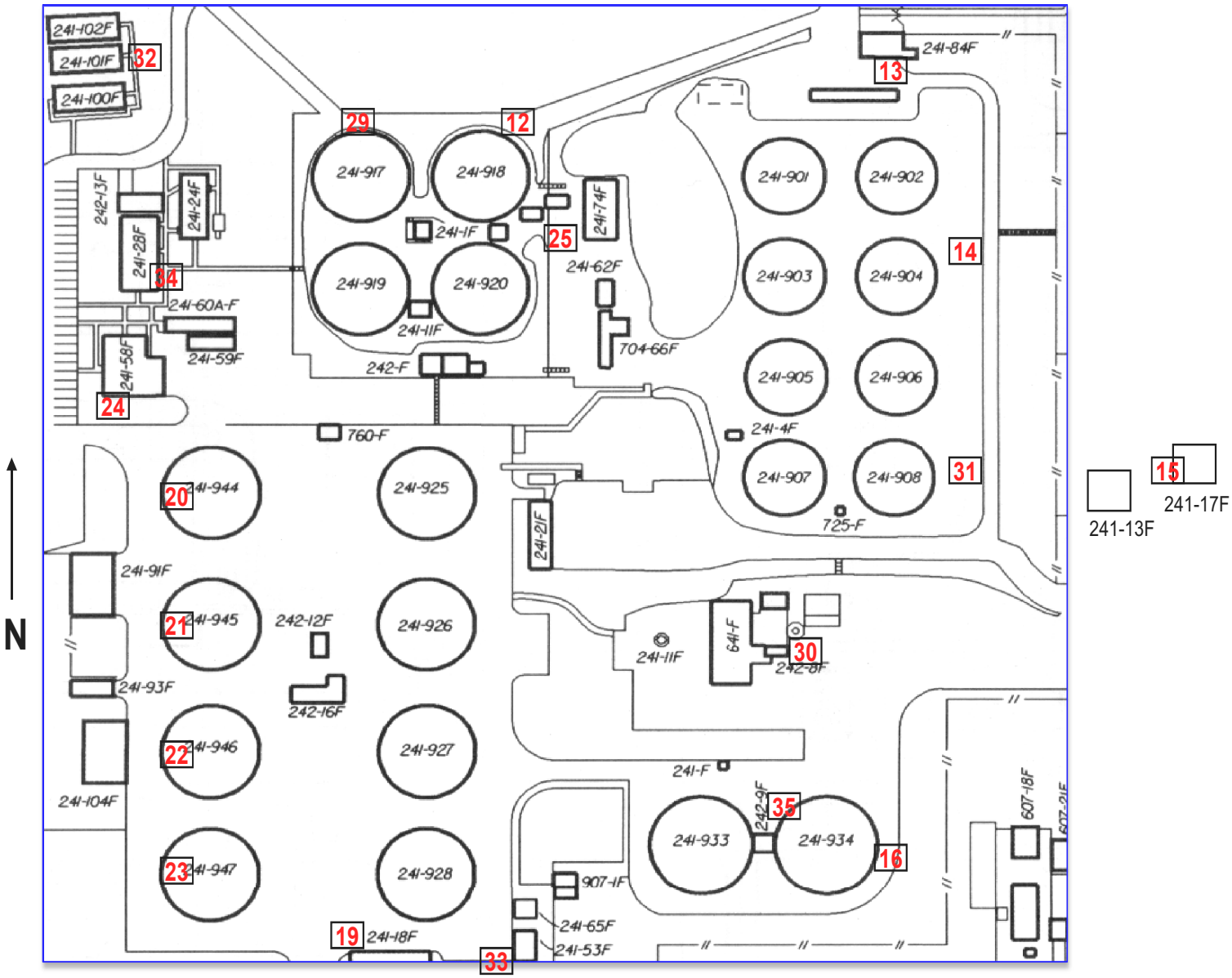
FY-12 revisions included the following:

- Removal of Retrospective Air Samplers FTNKF036 and FTNKF037 due to the permanent closure of tanks 18 and 19.
- Removal of VAMP #67 (6097(A)) at the Inter-Area High Point due to it being deemed redundant.

7.0 References

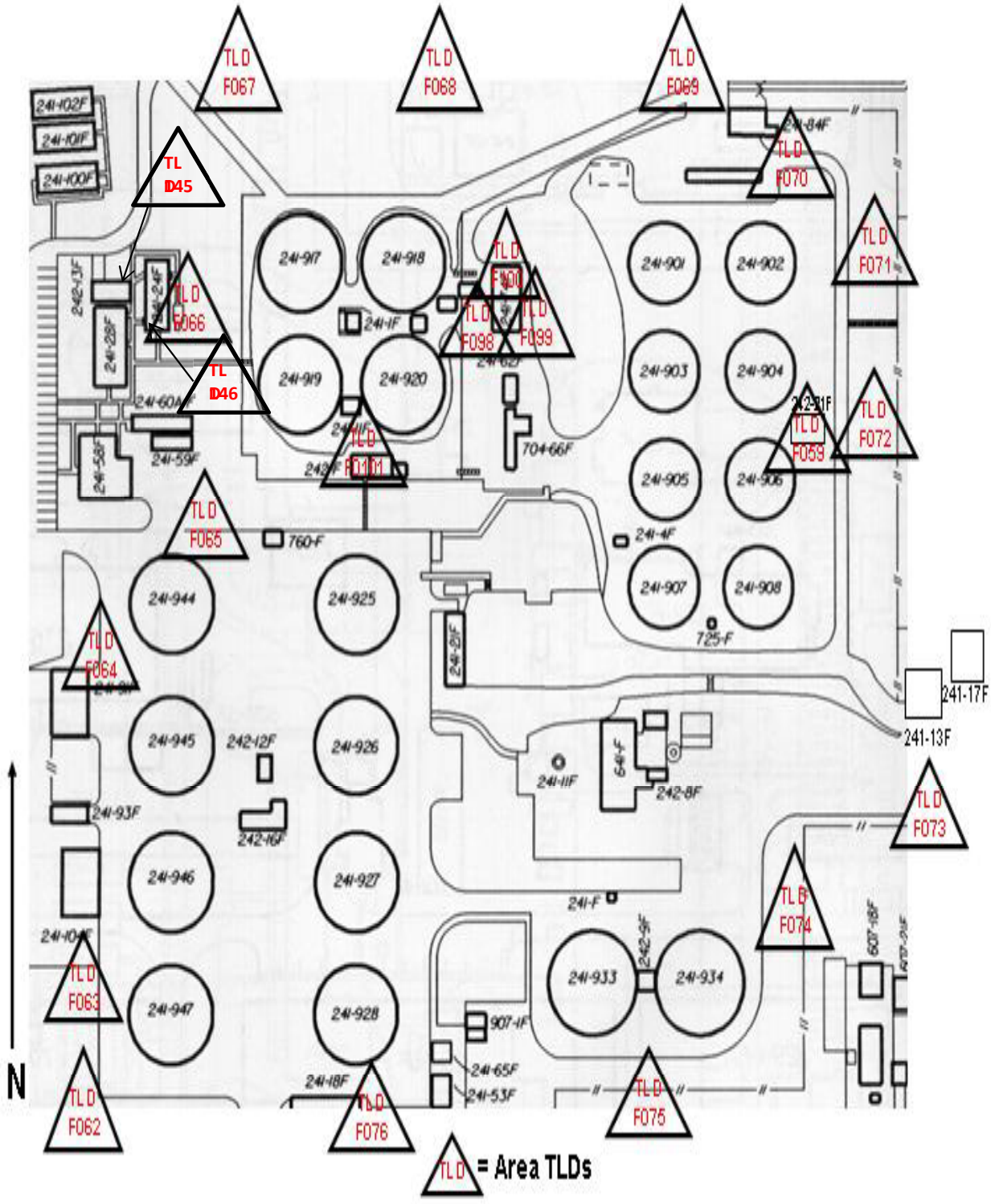
1. SRR 5Q, "Radiological Control Manual"
2. Manual 5Q1.2, Procedure 458, "Review of Sampling and Monitoring Systems"
3. Manual 5Q1.2, Procedure 309, "Air Sample Calculations and Data Sheets"
4. Manual 5Q1.5, Procedure 314, "241-F and 241-H Exhaust Monitoring and Sampling Systems."
5. Manual 5Q1.2, Procedure 217, "Use of External Dosimetry"
6. 10 CFR 835, "Radiation Protection"
7. ESH-HPT-2002-00089, "RCO Survey Plan for The Americium-Curium Transfer (U)"
8. ESH-HPT-99-0051, "Specification of Urine Bioassay Requirements on Radiological Work Permits (U)"
9. LWO-RPE-2011-00020, "Urine Bioassay Review for Liquid Waste Disposition F&H Tank Farms and Waste Management Maintenance Facility, 299-H (U)"
10. ESH-HPT-2001-00172, "HPT Assessment of F-Tank Farm Retrospective Air Sampler Locations (U)"
11. CBU-SHP-2004-00019, "F-Tank Farm Dosimetry Posting/Occupancy Time Evaluation 10-26-04"
12. CBU-SHP-2005-00005, "Submersible Mixing Pump Project Area Radiation Monitor Placement", March 23, 2005.
13. CBU-SHP-2005-00021, "Facility Annual Review of Monitoring Systems (FARMS) Health Physics Technical Support Review", December 19, 2005.

Attachment 1 – FTF Mobile RAS Locations



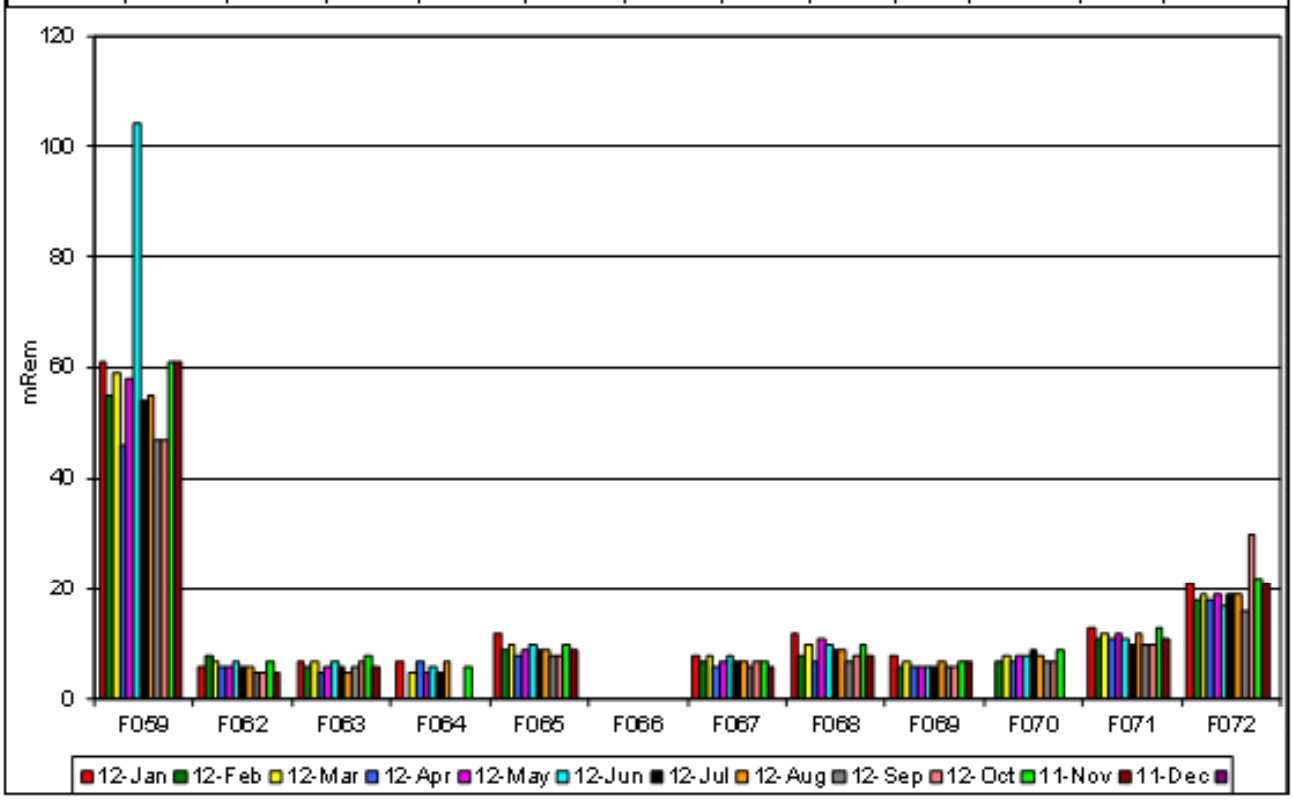
= Mobile Retrospective Air Sampler

Attachment 2 – FTF Area Monitoring TLD Locations



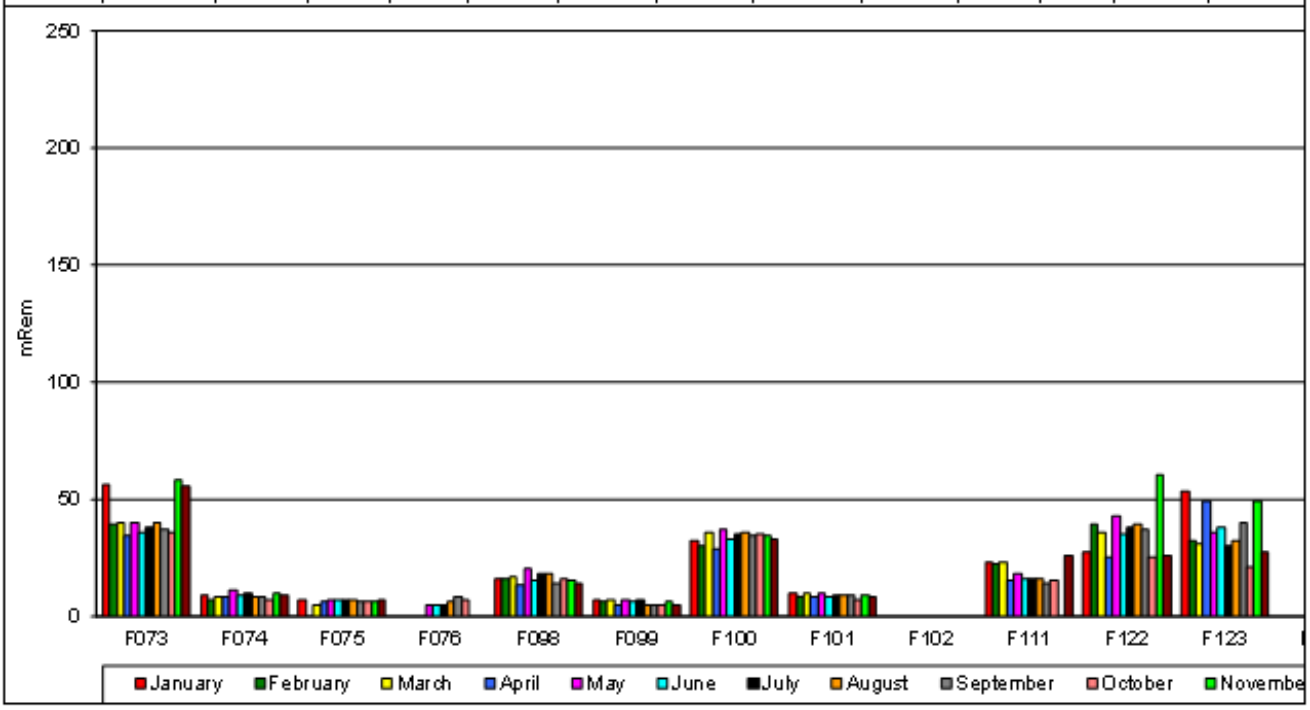
Attachment 3 - FTF Area Monitoring TLD Results in mREM

	F059	F062	F063	F064	F065	F066	F067	F068	F069	F070	F071	F072
12-Jan	61	6	7	7	12	0	8	12	8	N/A	13	21
12-Feb	55	8	6	0	9	0	7	8	6	7	11	18
12-Mar	59	7	7	5	10	0	8	10	7	8	12	19
12-Apr	46	6	5	7	8	0	6	7	6	7	11	18
12-May	58	6	6	5	9	0	7	11	6	8	12	19
12-Jun	104	7	7	6	10	0	8	10	6	8	11	17
12-Jul	54	6	6	5	9	0	7	9	6	9	10	19
12-Aug	55	6	5	7	9	0	7	9	7	8	12	19
12-Sep	47	5	6	0	8	0	6	7	6	7	10	16
12-Oct	47	5	7	0	8	0	7	8	6	7	10	30
11-Nov	61	7	8	6	10	0	7	10	7	9	13	22
11-Dec	61	5	6	0	9	0	6	8	7	N/A	11	21
	242-21F	TK 47 SW	TK 46 SW	TK 44 SW	TK 19 W	24F E WALL	TK 17 N	TK 18 N	TK 1 N	84F STM STN	TK 2 E	TK 4 E

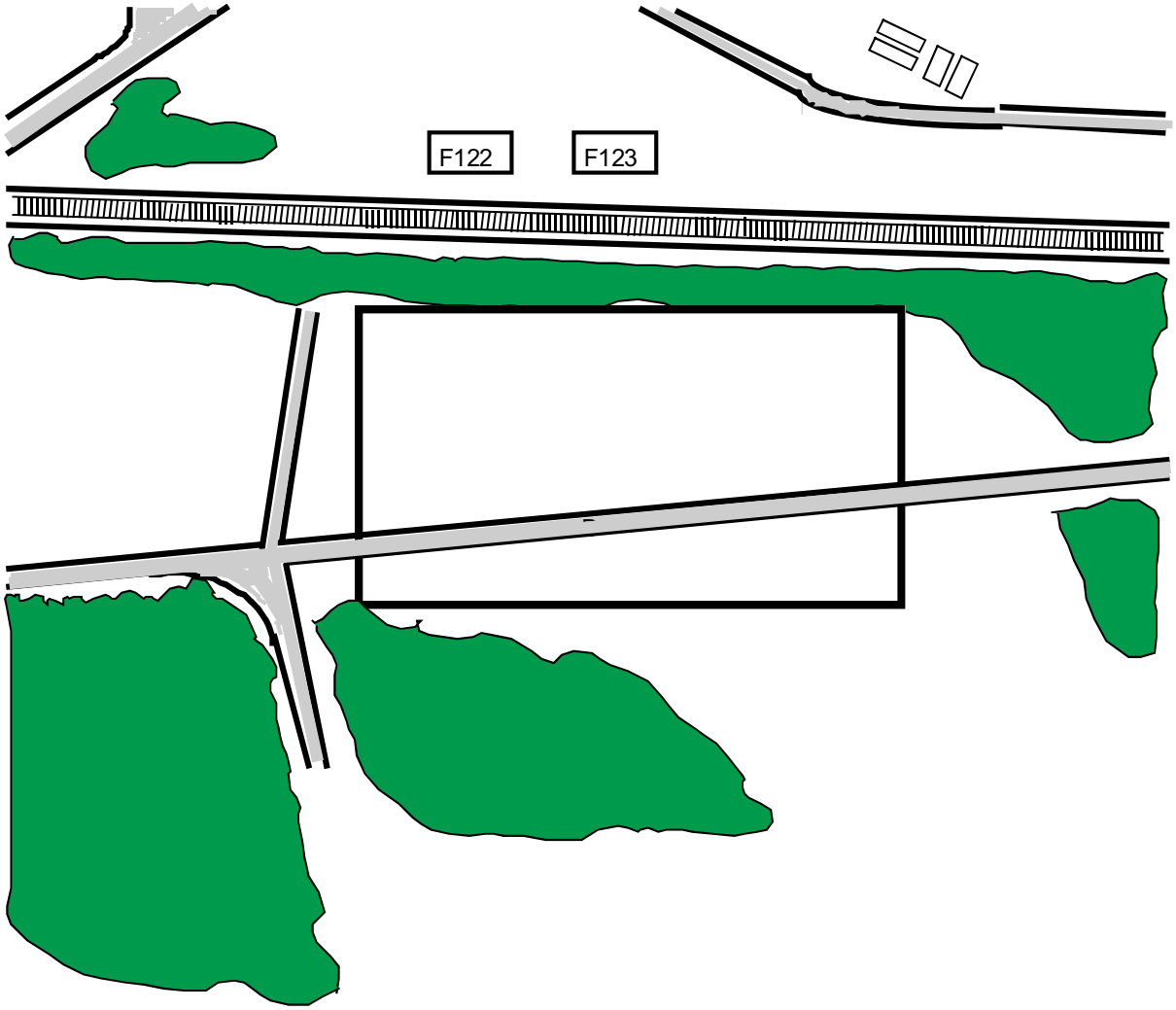


Attachment 3 - FTF Area Monitoring TLD Results in mREM (continued)

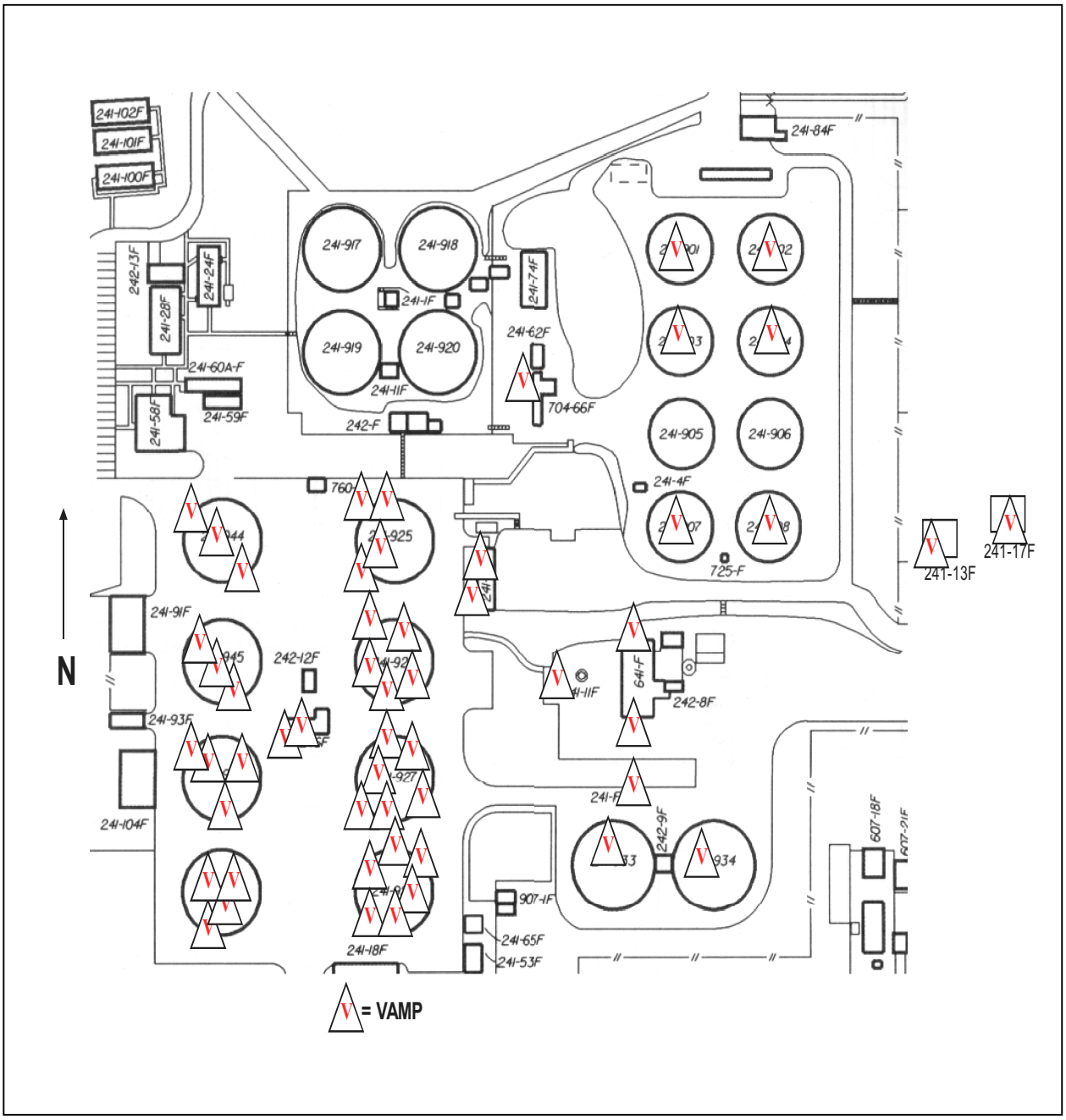
	F073	F074	F075	F076	F098	F099	F100	F101	F102	F111	F122	F123	F127
12-Jan	56	9	7	0	16	7	32	10	0	23	27	53	N/A
12-Feb	39	7	0	0	16	6	30	8	0	22	39	32	N/A
12-Mar	40	8	5	0	17	7	36	10	0	23	36	31	N/A
12-Apr	34	8	6	0	13	5	29	8	0	15	25	49	N/A
12-May	40	11	7	5	20	7	37	10	0	18	43	36	N/A
12-Jun	36	9	7	5	15	6	33	8	0	16	35	38	N/A
12-Jul	38	10	7	5	18	7	35	9	0	16	38	30	N/A
12-Aug	40	8	7	6	18	5	36	9	0	16	39	32	N/A
12-Sep	37	8	6	8	14	5	34	9	0	14	37	40	N/A
12-Oct	36	7	6	7	16	5	35	7	0	15	25	21	N/A
11-Nov	58	10	6	0	15	6	34	9	0	N/A	60	49	N/A
11-Dec	55	9	7	0	14	5	33	8	0	26	26	27	N/A
	TK 8 SE	TK 34 E	TK 33 S	18F ONW	74F W. RM	74F E. RM	74F MCC	242-1F CR	MST/CR TRLR	WOW SKID	N-HE RR	N-NW RR	TMR CON



Attachment 42 – N-Area High Rad Storage Area Monitoring TLD Locations.



Attachment 5 – FTF ARM Locations



Attachment 6 – 641-E VAMP Locations

641-E High Point Flush Pit and Flush Water Tank