F Tank Farm
Facility Annual Review of Monitoring Systems

SRR-FSH-2014-0014

Revision 0

December 2014 - December 2015

Savannah River Remediation

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1.0 Summary of Changes

- Reformatted entire FARMS document for alignment with 5Q1.2-458 section 5.1.
- Revised section 7.2 table of area radiation TLDs to include total whole body and skin dose.
- Revised all tables to meet minimum requirements of 5Q1.2-458.
- Removed decommissioned ARMs from table of active ARMs.
- Updated information in section 6.2 Air Monitors for applicability to facility.
- Updated operational status of Tank 5 and 6 in Section 6.0.

2.0 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.

3.0 Scope

The scope of this FARMS document covers F Tank Farm (FTF) and is intended for routine sampling and monitoring equipment in FTF. This report is intended to cover FTF up to one year from the date of approval.

4.0 Facility and Process Description

High-level radioactive liquid waste generated at Savannah River Site (SRS) is received and managed in large underground tanks in areas designated as Tank Farms. The two waste Tank Farms (F&H), operated in conjunction with F-Area and H-Area separations facilities, contain a total of 51 large subsurface waste tanks and related facilities required for safe handling, processing, and interim retention of the liquid wastes.

FTF 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 nonoperational, 2F Evaporator is currently out of service) 6 diversion boxes, 3 pump pits, and the Inter-area transfer system. At present FTF stores, chemically treats, and transfers liquid high-level radioactive waste to H-Area for volume reduction and final disposition to the Defense Waste Processing Facility (DWPF). In addition the facility performs final waste removal for tank closure. The mission of FTF is to prevent the escape of any radioactivity to the environment, and prevent exposure to plant workers and the public and maintain high level waste in retrievable form.

There are two separations facilities that chemically separate and purify the major products from fuel and target assemblies irradiated in the SRS reactors. The fission products that remain after the separations operations are the major radioactive wastes that are stored as liquids and solids in the waste tanks. Historically, FTF received waste from the 200-F separations facilities during the weapons material generating campaign.

During aging of the waste, some major changes that have occurred include: radiolytic decomposition of the waste, decay of radionuclides, and settlement of the waste in sludge and supernate layers. The sludge contains most of the radionuclides from the supernate as it settles to the bottom of the tank. Sludge is composed primarily of oxides and hydroxides of mercury, manganese, iron, and, to a lesser degree, aluminum. It contains almost all of the fission products originally in the irradiated fuel and almost all of

the actinides. The supernate portion of the liquid waste after aging contains dissolved salts and radioactive cesium. This supernate is transferred to H-Area for volume reduction where the concentrate will be transferred to a waste tank where cooling causes additional salt to crystallize. This process will be repeated until this portion of the waste has been converted to damp salt cake. The salt produced by evaporation of this aged supernate consists of NaNO3, NaOH, Na2CO3, and NaAlO2 and usually occupies one-third the volume of fresh supernate. The radionuclide content of salt is approximately three times that of the supernate before evaporation.

The major radionuclides of concern are Sr-90, Cs-137, Pu-238, Pu-239, Am-241, Cm-244, and H-3 exists in FTF, but not in quantities that would require tritium specific monitoring.

5.0 Air Migration Study (Air Flow Patterns)

FTF is an outdoor facility that primarily consists of underground tanks and diversion boxes that have independent ventilation systems. There have been no changes in the FTF process or ventilation systems which would impact the placement of air sampling and monitoring equipment. The review of process and ventilation systems is due anytime there are changes in the systems which would impact the placement of air sampling and monitoring equipment. The justification for not needing to make changes to the placement of air sampling and monitoring equipment is documented by the Facility Manager or designee and included with the FARMS document.

6.0 Air Sampling and Monitoring Program

The routine air sampling and monitoring program consists of air samplers and/or air monitors placed in strategic locations throughout the facility. The purpose of the program is to demonstrate regulatory compliance, verify the effectiveness of engineering controls, document radiological conditions, and detect changes in those conditions. Air samplers are placed in areas where a worker without respiratory protection is likely to receive an exposure of ≥ 40 DAC-hrs during the course of a 2000 hour work year. Air monitors are placed in areas where a worker without respiratory protection is likely to receive an exposure of ≥ 40 DAC-hrs in one week or where there is a need to alert workers

of unexpected increases in airborne radioactivity in order to mitigate inhalation of radioactive material.

There are five factors to consider when determining the optimum locations for air sampling and monitoring equipment. These factors include; airflow patterns (AMS), actual and likely release points, worker locations, occupancy times, and multiple release points. Based on these factors, air sampling and monitoring equipment is placed in locations that adequately represent the ambient air in areas with the potential for airborne radioactivity. Ideally, air sampling and monitoring equipment is placed as close to the release point as possible in a downwind direction.

Elevated tritium levels were found in ETP's 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). Radiological Protection (RP) performed tritium smears and air samples for personnel protection concerns. Since all workplace characterization results were less than action levels (1000 dpm/100cm^2, 0.1 DAC) and workplace characterization results were negative, no additional sampling for tritium air activity and/or contamination is required.

20 retrospective air samplers provide coverage for normal facility operations. The strategy for placement of outside air samplers in FTF is to ring the facility 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.

- *Tanks 1 - 8 General Area:* Primary release points are tank ventilation systems. The annuli on the Type I tanks are positive pressure designs, and are HEPA filtered on the exhaust side. The other potential release points in this area are FDB-2, FDB-3, and FDB-4.
    - Tank 6 contained 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.

- 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 ft3 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.
- Tank 5 and 6 were operational closed, grouted and ventilation systems isolated.
- Radiological Buffer Area, Radioactive Material Areas, Radiation Areas, High Radiation Areas, Contamination Areas, High Contamination Areas, Inactive Contamination Areas, and Fixed Contamination Areas are typical postings.

➢ *Tanks 17 - 20 General Area:* Tanks 17, 18, 19, and 20 are permanently closed, grouted and ventilation systems isolated.

- Radiological Buffer Area, Radiation Areas, High Radiation Areas, Contamination Areas, High Contamination Areas, Inactive Contamination Areas, and Fixed Contamination Areas are typical postings.

➢ *Tanks 25 - 28 and 44 - 47 General Areas:* The primary release points in this area are tank ventilation systems and exhaust from the 2F evaporator system (242-16F).

- May 1980, radioactive material was spilled from the Tank 25 C2 Draw off Riser.
- August 1980, while performing a zeolite change in the Tank 27 CRC riser, a small resin spill occurred on the tank top.
- October, 1980, improper 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.
- The 2F Evaporator system has a history of minor suck-back and pushback contamination occurrences.
- 2F Evaporator is out of service.
- Radiological Buffer Area, Radioactive Material Areas, Radiation Areas, High Radiation Areas, Contamination Areas, High Contamination Areas,

Inactive Contamination Areas, and Fixed Contamination Areas are typical postings.

- *Tanks 33 and 34 General Area:* Primary release points are tank ventilation systems. Tank 33 and 34 Annuli are not HEPA filtered and draw air from the local area.
    - Radiological Buffer Area, Radioactive Material Areas, Radiation Areas, Contamination Areas, and Fixed Contamination Areas are typical postings.
- *Inter-area Transfer Line System:* The inter-area transfer line system allows movement of radioactive waste between H-Area and 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.
    - 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 the surrounding area. This area is posted as a Contamination Area.
    - Radiological Buffer Area, Radioactive Material Areas, Radiation Areas, and Contamination Areas are typical postings.
- *N-Area High Rad Storage:* the High Rad Storage Area is used for long term storage of radioactive components.
    - Radiological Buffer Area, Radioactive Material Areas, Radiation Areas, High Radiation Areas are typical postings.

6.1 Air Samplers

Sample ID	Location ID	Sample Frequency	DAC Flag Level	Purpose / Justification	Alpha DAC Max	Alpha DAC Hrs	Beta DAC Max	Beta DAC Hrs	Total DAC Hrs
FTNKF012	Tank 18 (N)	Weekly	2%	Release Point / Personnel	0.001	2.526	0.000	0.045	2.571
FTNKF013	241-84F (S)	Weekly	2%	Release Point / Personnel	0.001	1.743	0.000	0.040	1.783
FTNKF014	Tank 4 (E)	Weekly	2%	Release Point / Personnel	0.001	1.801	0.000	0.049	1.850
FTNKF015	241-17F (N)	Weekly	2%	Release Point / Personnel	0.001	1.750	0.000	0.044	1.794
FTNKF016	Tank 34 (E)	Weekly	2%	Release Point / Personnel	0.001	1.976	0.000	0.035	2.011
FTNKF019	241-18F (N)	Weekly	2%	Release Point / Personnel	0.001	1.956	0.000	0.040	1.996
FTNKF020	Tank 44 (W)	Weekly	2%	Release Point / Personnel	0.001	2.003	0.000	0.043	2.047
FTNKF021	Tank 45 (W)	Weekly	2%	Release Point / Personnel	0.001	1.897	0.000	0.045	1.942
FTNKF022	Tank 46 (W)	Weekly	2%	Release Point / Personnel	0.001	2.039	0.000	0.044	2.082
FTNKF023	Tank 47 (W)	Weekly	2%	Release Point / Personnel	0.001	2.228	0.000	0.037	2.265
FTNKF024	241-58F (S)	Weekly	2%	Release Point / Personnel	0.001	1.662	0.000	0.047	1.710
FTNKF025	Mid 241-62F/74F	Weekly	2%	Release Point / Personnel	0.001	1.991	0.000	0.058	2.048
FTNKF029	Tank 17 (N)	Weekly	2%	Release Point / Personnel	0.001	1.223	0.000	0.047	1.270
FTNKF030	DB-2	Weekly	2%	Release Point / Personnel	0.001	2.248	0.000	0.050	2.298
FTNKF031	Tank 8 East	Weekly	2%	Release Point / Personnel	0.001	2.517	0.000	0.054	2.571
FTNKF032	241-102F (E)	Weekly	2%	Release Point / Personnel	0.001	2.755	0.000	0.047	2.802
FTNKF033	241-53F	Weekly	2%	Release Point / Personnel	0.001	2.337	0.000	0.047	2.384
FTNKF034	241-28F West	Weekly	2%	Release Point / Personnel	0.001	1.916	0.000	0.051	1.967
FTNKF035	Tank 34 West	Weekly	2%	Release Point / Personnel	0.001	1.422	0.000	0.042	1.464
FTNKF038	West of Tank 5	Weekly	2%	Release Point / Personnel	0.001	2.013	0.000	0.047	2.060
				Totals >	0.020	40.003	0.000	0.912	40.915

6.2 Air Monitors

The FTF facility does not have Continuous Air Monitors (CAMs), however the facility has stack effluent monitoring points for environmental release data from defined process systems. The words "continuous air monitor" are used in LWO Facilities to specifically indicate a stack effluent air sampling system with a radiation detector. A stack effluent air sampling system is not the same as workplace CAMs or air samplers established for personnel monitoring. Stack CAMs do not provide direct personnel exposure level, since LWO facility CAMs are sampling/monitoring the exhaust emissions from a stack. The information provided by stack effluent air sampling systems is used indirectly by the Facility for potential airborne and contamination control purposes.

6.3 Annual Review of Routine Air Samplers

A review of all FARMS air sample results was performed utilizing the Central Counting Facility Database. All sample results were < 350 DAC-hrs, indicating that little potential exists for a worker to exceed 100 mrem in a year.

7.0 Area Radiation Monitoring Program

The purpose of the area radiation monitoring program is to demonstrate regulatory compliance, document radiological conditions and verify the effectiveness of engineering controls, detect the gradual buildup of radioactive materials, and alert personnel of significant changes in ambient exposure rates. Area radiation monitors (ARMs) can be active or passive. Active ARMs provide real time monitoring and alarm capabilities when elevated exposure rates are experienced. Passive ARMs collect data which is analyzed at a later date (i.e., area monitoring TLD/TLNDs and CNDs). These monitors do not have alarm capabilities.

Active ARMs are strategically located to provide a fast and reliable warning of a significant increase in exposure rates due to the buildup of radioactive materials or a process upset. When there are multiple source locations and there are a limited number of active ARMs, such that each area associated with a likely source term cannot be monitored, then the active ARMs should be placed at a location expected to provide the

most reliable indication of an increased source term with the least time delay. The objective is to provide a fast and reliable warning to the greatest number of personnel that dose rates have increased. The goal is to set the alarm set point low enough to provide a warning to personnel before the dose rate at the source gets to an undesirable level. ESH-HPT-97-0101, *Area Radiation Monitor Technical Guidance Document*, provides additional guidance.

Installed VAMPs and RMS-3s at F-Tank Farm serve two purposes: to provide process monitors for leak and spill detection in the facility, and to provide area radiation monitoring for personnel protection. 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 and all transfers are considered Low Rem.

RE&HP determined the coverage area for ARMs to have a normal detection radius of 42 feet assuming a spill with a dose rate of 30 mrem/hr at 10 feet and a background of 0-5 mrem/hr. If background is between 6 - 10 mrem/hr, the detection radius is reduced to 34 feet. This evaluation is used as the basis for ARM placement. In-Service ARMs are required for all facility transfers. The majority of these instruments are either used for general monitoring or for monitoring areas that have potential for unexpected radiation dose rate increases. These areas include HEPA filtration units and process components at risk for radioactive material buildup or leaks.

Work in FTF sometimes requires ARMs to be taken out of service for a short duration. Facility Management performs an evaluation, based on Technical Safety Requirements (TSRs), to ensure engineered controls are acceptable and to determine if any additional personnel protection measures are required. If ARMs are taken out of service and the distance to an in service ARM is greater than 100 feet, then reliance on engineered controls is acceptable and additional compensatory personnel monitoring will not be required.

Passive area monitoring TLDs are placed in areas to monitor for the buildup of radioactive material, monitor radiological conditions in high occupancy areas within Radiological Buffer Areas (RBA) boundaries, and to verify that unmonitored personnel at RBA boundaries are unlikely to exceed 100 mrem/yr. Manual 5Q1.2 Procedure 217, *Use of External Dosimetry*, and Manual 5Q1.1 Procedure 518, *Radiological Posting*, provides

additional guidance. Based on isotope quantity and make up at FTF, NIMs and/or CNDs are not required.

LWO facilities evaluated the beta-gamma to alpha ratios to determine if routine alpha personnel monitoring is needed; SRR-RPE-2014-00018, Rev. 0 documents this evaluation. RP personnel should be aware that there are occasions when workplace beta-gamma to alpha ratios less than 10:1 could exist. RP should take appropriate actions to ensure that PCMs are operational and understand that additional personnel alpha monitoring may be necessary. The LWO Facilities were evaluated for the potential to have low-level neutron exposure. SRR-RPE-2014-00019, Rev. 0 documents this evaluation. The tank farm facilities do not have any locations of elevated potential where unmonitored personnel can receive 100 mrem per year neutron exposure.

7.1 Table of Active Area Radiation Monitors

Monitor ID	Location	Instrument Type	Bkgd (mrem/hr)	Alarm Setpoint (mrem/hr)	Purpose/ Justification
6554	Tank 1	VAMP	0.3	5.0	Process / Personnel
8832	Tank 2	VAMP	0.4	5.0	Process / Personnel
8864	Tank 3	VAMP	0.3	5.0	Process / Personnel
8077	Tank 4	VAMP	0.3	5.0	Process / Personnel
8022	Tank 7	VAMP	0.3	5.0	Process / Personnel
8033	Tank 8	VAMP	0.3	5.0	Process / Personnel
6705	FDB-6	VAMP	0.3	5.0	Process / Personnel
7103	Tank 25, C-1	VAMP	0.6	5.0	Process / Personnel
7119(A)	Tank 25, C-3	VAMP	0.3	5.0	Process / Personnel
7119(B)	Tank 25, C-3	VAMP	0.3	5.0	Process / Personnel
7301	Tank 25, GVH	VAMP	0.3	5.0	Process / Personnel
150	Tank 26, C-1	VAMP	0.3	5.0	Process / Personnel
167	Tank 26, C-2	VAMP	0.3	5.0	Process / Personnel
169	Tank 26, C-3	VAMP	0.3	5.0	Process / Personnel
154	Tank 26, R1	VAMP	0.5	5.0	Process / Personnel
8030	Tank 26, GVH	VAMP	0.3	5.0	Process / Personnel
205	Tank 27, C-1	VAMP	0.3	5.0	Process / Personnel
216(A)	Tank 27, C-2 A	VAMP	0.2	5.0	Process / Personnel
216(B)	Tank 27, C-2 B	VAMP	0.3	5.0	Process / Personnel

Monitor ID	Location	Instrument Type	Bkgd (mrem/hr)	Alarm Setpoint (mrem/hr)	Purpose/ Justification
204(A)	Tank 27, C-3 A	VAMP	0.3	5.0	Process / Personnel
204(B)	Tank 27, C-3 B	VAMP	0.3	5.0	Process / Personnel
6502	Tank 27, GVH	VAMP	0.3	5.0	Process / Personnel
7250	Tank 28, C-1	VAMP	0.3	5.0	Process / Personnel
7267(A)	Tank 28, C-2 A	VAMP	0.3	5.0	Process / Personnel
7267(B)	Tank 28, C-2 B	VAMP	0.3	5.0	Process / Personnel
7254(A)	Tank 28, C-3 A	VAMP	0.4	5.0	Process / Personnel
7254(B)	Tank 28, C-3 B	VAMP	0.6	5.0	Process / Personnel
8008	Tank 28, GVH	VAMP	0.3	5.0	Process / Personnel
1002	Tank 44, C-1	VAMP	0.3	5.0	Process / Personnel
6532	Tank 44, C-3	VAMP	0.2	5.0	Process / Personnel
6531	Tank 44, GVH	VAMP	0.2	5.0	Process / Personnel
8048(A)	Tank 45, C-3A	VAMP	0.3	5.0	Process / Personnel
1050	Tank 45, C-1	VAMP	0.4	5.0	Process / Personnel
8049	Tank 45, GVH	VAMP	0.3	5.0	Process / Personnel
1100	Tank 46, C-1	VAMP	0.3	5.0	Process / Personnel
6545(A)	Tank 46, C-3 A	VAMP	0.3	5.0	Process / Personnel
6545(B)	Tank 46, C-3 B	VAMP	0.3	5.0	Process / Personnel

Monitor ID	Location	Instrument Type	Bkgd (mrem/hr)	Alarm Setpoint (mrem/hr)	Purpose/ Justification
6544	Tank 46, GVH	VAMP	0.3	5.0	Process / Personnel
1150	Tank 47, C-1	VAMP	0.3	5.0	Process / Personnel
8065(A)	Tank 47, C-3 A	VAMP	0.3	5.0	Process / Personnel
8065(B)	Tank 47, C-3 B	VAMP	0.3	5.0	Process / Personnel
8064	Tank 47, GVH	VAMP	0.3	5.0	Process / Personnel
5055	2F Evaporator Receiver Cell	VAMP	0.4	5.0	Process / Personnel
5050	2F Evaporator, GVH	VAMP	0.3	5.0	Process / Personnel
8600	Tank 33	VAMP	0.3	5.0	Process / Personnel
7265	Tank 34	VAMP	0.3	5.0	Process / Personnel
6691	Tank 33/34, GVH	VAMP	0.3	5.0	Process / Personnel
6684	FDB-2 North	VAMP	0.3	5.0	Process / Personnel
6685	FDB-2 South	VAMP	0.3	5.0	Process / Personnel
520(A)	FDB-4	VAMP	0.3	5.0	Process / Personnel
520(B)	PP 2/3	VAMP	0.3	5.0	Process / Personnel
8619	FDB-3	VAMP	0.3	5.0	Process / Personnel
3442	F Pump House W	VAMP	3.0	5.0	Process / Personnel
803	F Pump House E	VAMP	0.4	5.0	Process / Personnel
6097(A)	IAL	VAMP	0.3	5.0	Process / Personnel
6097(B)	IAL	VAMP	0.3	5.0	Process / Personnel

7.2 Table of Area Radiation TLDs

Monitor ID	Location	Purpose / Justification	Total Whole Body Dose (mrem)	Total Skin Dose (mrem)
F059	242-21F (Inside on wall)	Background / Personnel	454	454
F062	SW of Tank 47 @ walkway chain	Background / Personnel	36	36
F063	SW of Tank 46 @ walkway chain	Background / Personnel	41	41
F064	SW-TANK 44@CORNER 241-91F	Background / Personnel	5	5
F065	W OF TANK 19 @ ROCK BANK	Background / Personnel	76	76
F066	RCO Trailer storage room	Background / TLD Storage	5	5
F067	N OF TANK 17 @ ROCK BANK	Background / Personnel	67	67
F068	N OF TANK 18 @ ROCK BANK	Background / Personnel	75	75
F069	South of 11F at rock bank	Background / Personnel	53	53
F070	@241-84F STEAM STN	Background / Personnel	64	64
F071	E of Tank 2 @ top of rock bank	Background / Personnel	95	95
F072	E of Tank 4 @ top of rock bank	Background / Personnel	160	160
F073	On fence south of West Pump house	Background / Personnel	144	144
F074	E OF TANK 34 ON FENCE POST	Background / Personnel	78	78
F075	S OF TANK 33 ON FENCELINE	Background / Personnel	55	55
F076	OUTSIDE North WALL 241-18F CTRL	Background / Personnel	31	31
F098	241-74F CONT. W. RM. 0002	Background / Personnel	175	175
F099	241-74F CONT. E. RM. 0002	Background / Personnel	51	51
F100	241-74F E&I SHOP W. 0001	Background / Personnel	325	325
F101	242-1F CONTROL ROOM	Background / Personnel	71	71
F102	RCO MST/CR TRAILER	Background / Personnel	0	0
F111	G-241001 WOW SKID	Background / Personnel	104	104

Monitor ID	Location	Purpose / Justification	Total Whole Body Dose (mrem)	Total Skin Dose (mrem)
F122	N-Area North-East of RR Tracks	Background / Rad Material Storage	544	544
F123	N-Area North-West of RR Tracks	Background / Rad Material Storage	559	559
F145	242-13F (on Lexan window)	Background / Source Storage	5	5
F146	RCO instrument shack (on source cabinet door)	Background / Source Storage	1654	1654

7.3 Annual Review of External Exposure Potential

Area Monitoring TLDs are considered "passive" area radiation monitors and have been placed in locations based on considerations listed in 5Q1.2-217. Dosimeter locations are 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 and 5000 mrem skin dose during the year. Any changes in facility activities are considered during the review of area monitoring results. The annual review of external exposure potential did not determine the need for changes. If results are trending up, the causes are determined and changes are made as needed. FTF does not have any locations where unmonitored personnel could have received 100 mrem/year neutron exposures.

8.0 Routine Bioassay Program

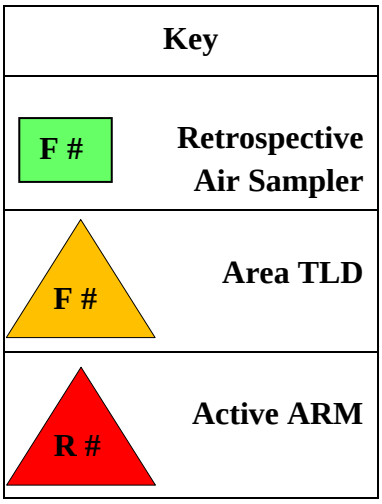
The purpose of the routine bioassay program is to verify that personnel have not been internally exposed to radioactive materials. When personnel perform work in an Airborne Radioactivity Area (ARA), they are required to participate in a surveillance program for the radionuclide(s) of concern. Thus, the bioassay requirements must correlate with the radionuclides that can potentially contribute to personnel dose. Bioassay 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 program requirements should be reviewed and the radionuclide(s) of concern should be verified annually.

8.1 Annual review of bioassay requirements

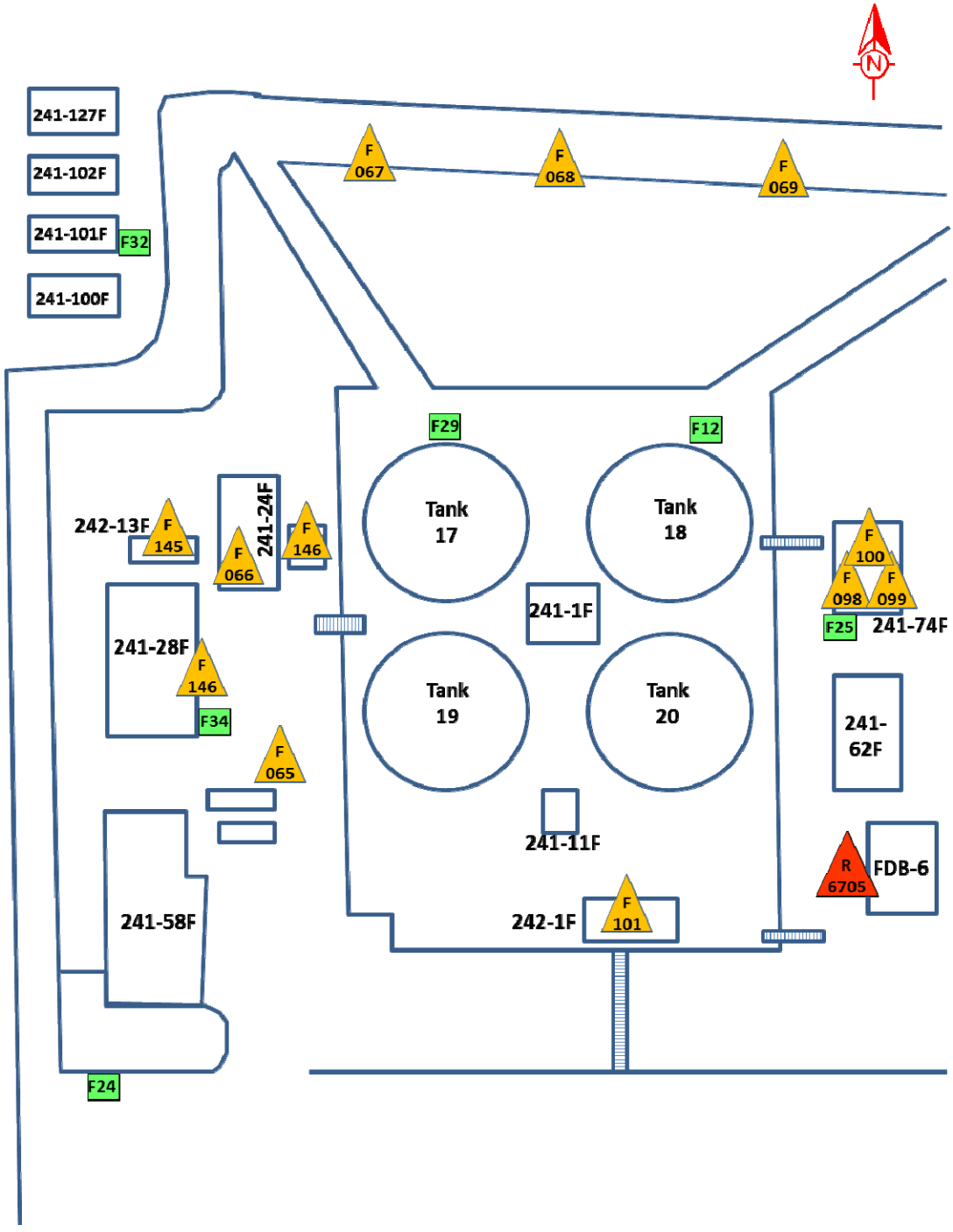
A routine bioassay review was performed for F & H Tank Farms, ETP, and 299-H and documented in SRR-RPE-2014-00020, Rev. 0. Procedures require bioassay measurement of radionuclides expected to contribute at least 10% of the internal dose to personnel using respiratory protection. The current screening requirements are: Strontium (Sr-90), Plutonium (Pu-238, Pu-239, Pu-240 and Pu-241), Americium (Am-241 and Am-242), and Curium (Cm-244). The current bioassay program screens for all of these radionuclides and is sufficient for the Tank Farms given the current knowledge of the source term. Internal surveillance for Cesium (Cs-137) is accomplished through the in-vivo bioassay program.

9.0 Facility Diagrams

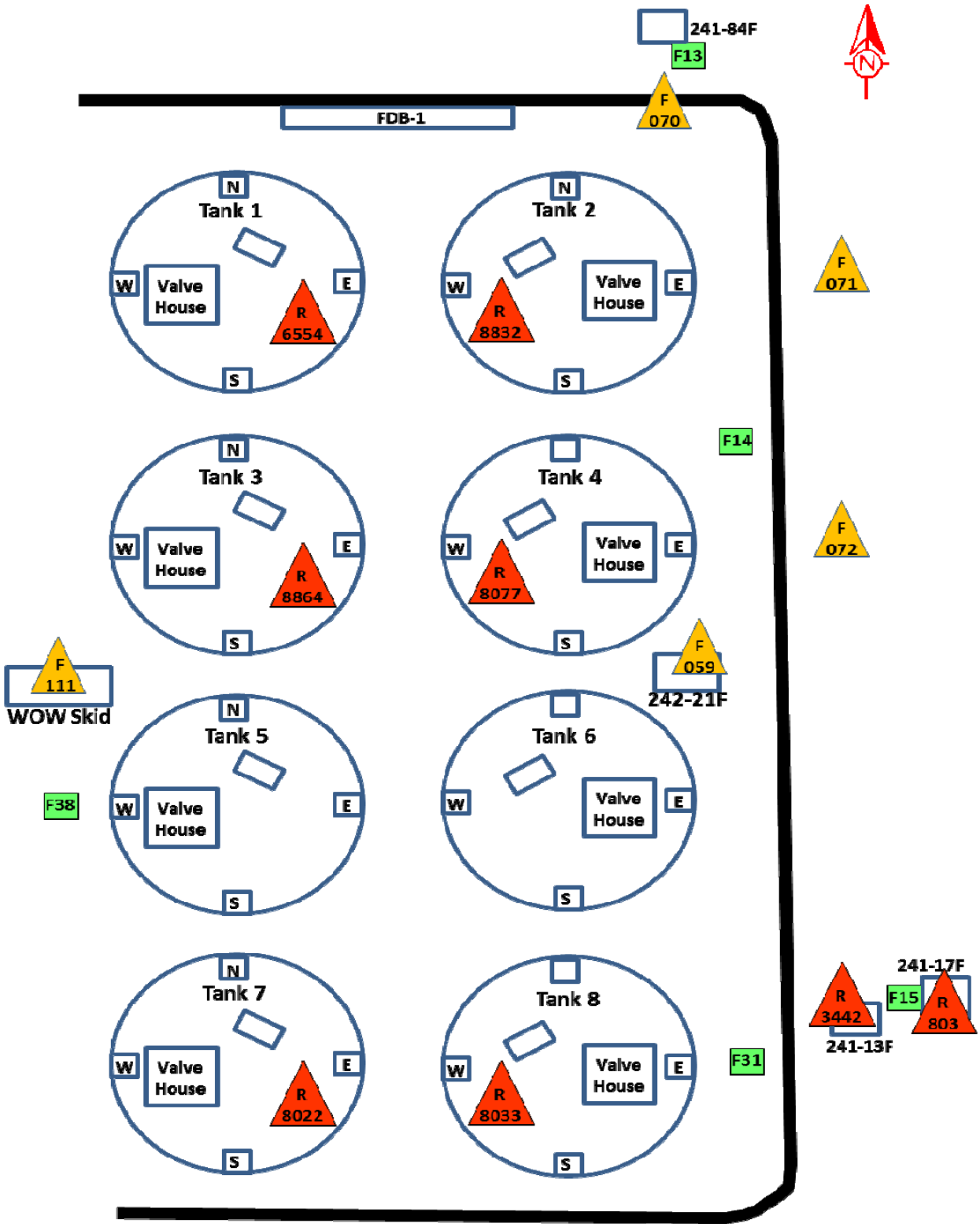
9.1 Diagram Key



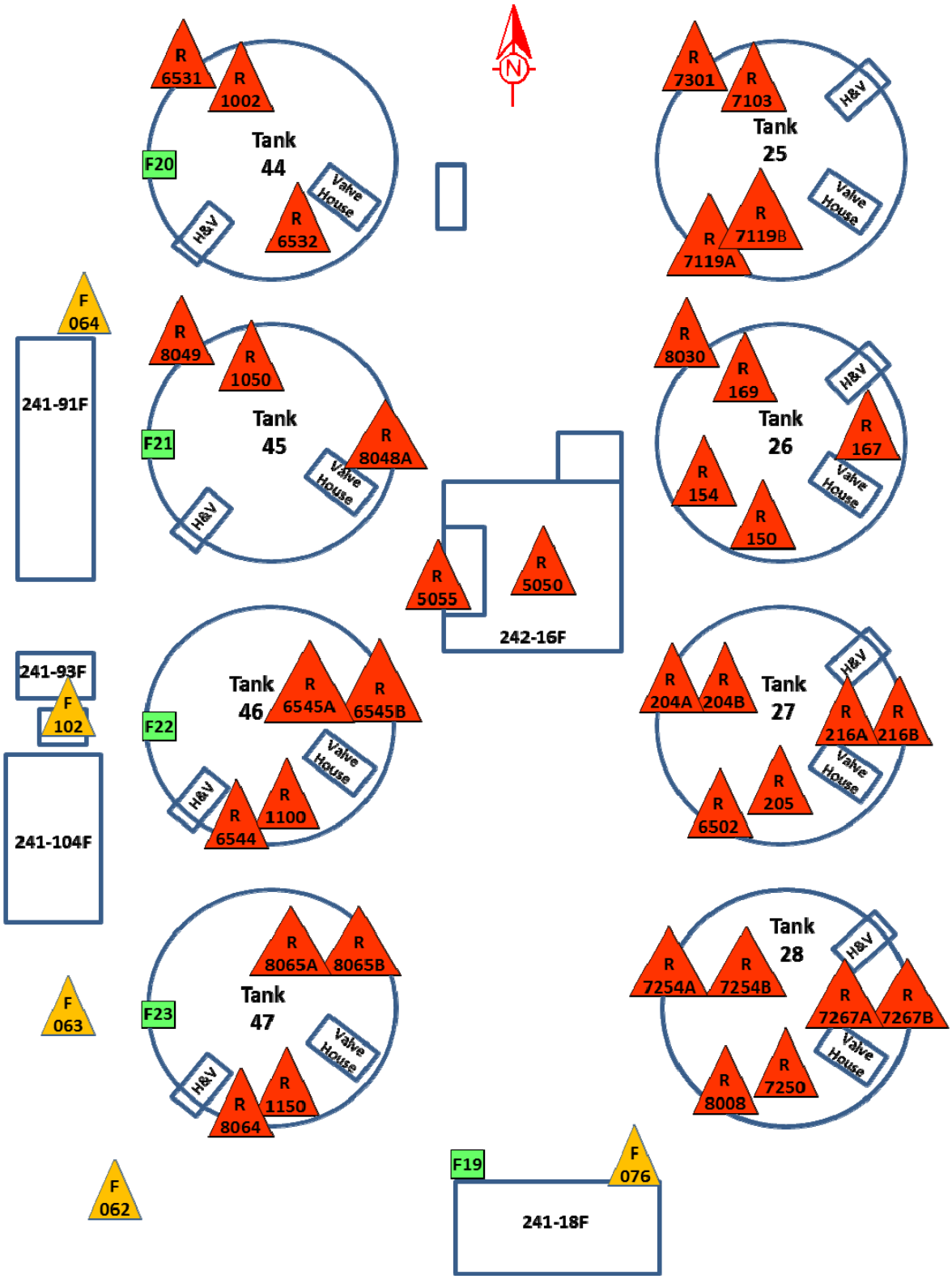
9.2 Diagram 1 – FTF Admin, Tanks 17-20



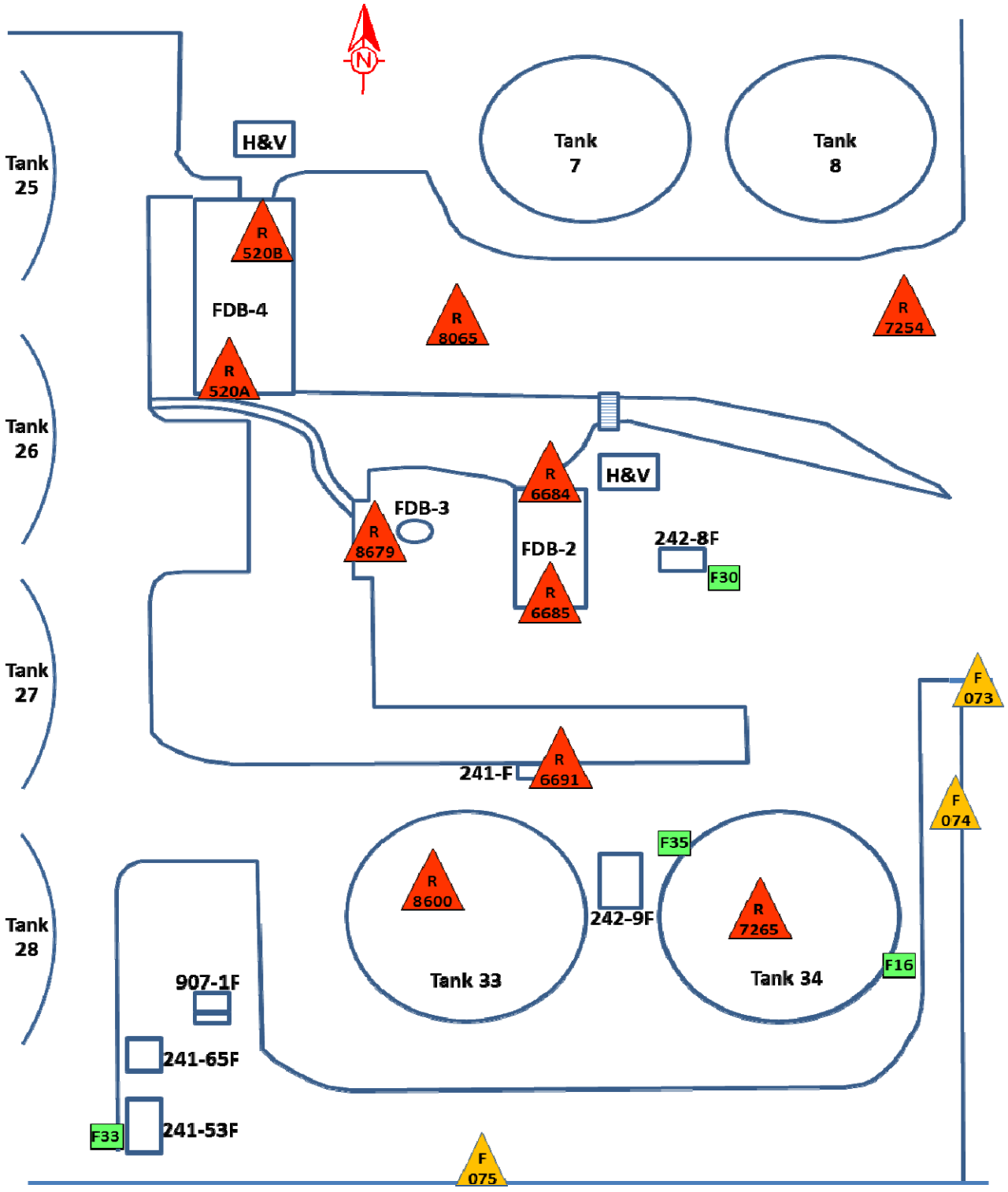
9.3 Diagram 2 – FTF Tanks 1-8, WPH, EPH



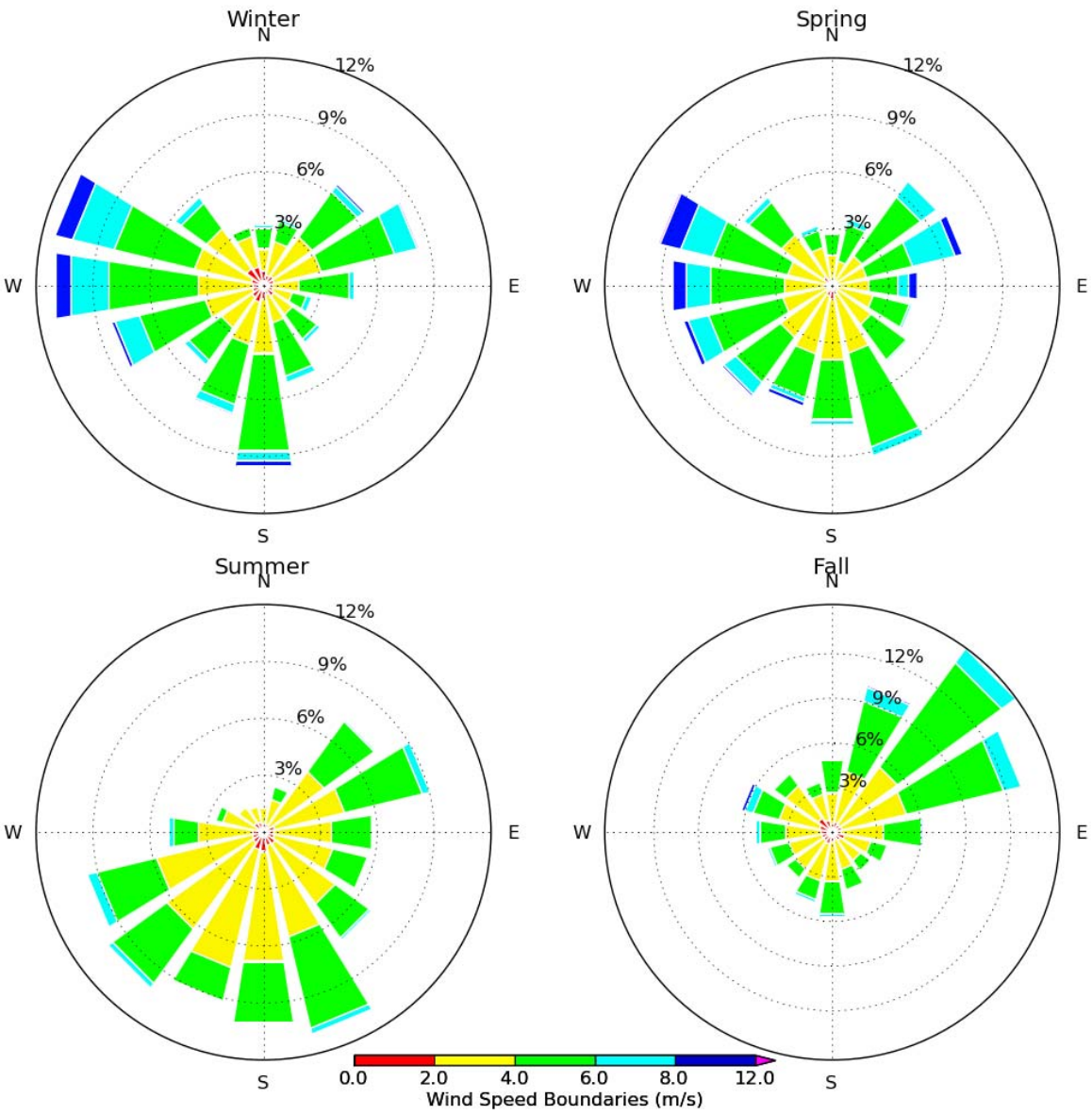
9.4 Diagram 3 – FTF Support Bldgs, Tanks 25-28, Tanks 44-47



9.5 Diagram 4 – FTF Tanks 33-34, FDB-2, FDB-3, FDB-4



9.6 Seasonal Wind Rose Plots



10.0 References

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SRR-RPE-2011-00026, *Justification for Placement of Outdoor Facility Annual Review of Monitoring Systems (FARMS) Air Samplers*

SRNL-RP-2014-00139, *Seasonal Wind Rose Plots for 2013*

11.0 FARMS Change Form

The FARMS change form is used to document any changes to the FARMS that occur throughout the year. All completed forms are kept with the original FARMS document so the changes can be included in the next annual review.