H Tank Farm
Facility Annual Review of Monitoring Systems

SRR-FSH-2014-0015

Revision 0

December 2014 - December 2015

Savannah River Remediation

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1.0 Summary of Changes

- Reformatted entire FARMS document to be aligned 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.
- MCU Contactor Enclosure designated previous air sample process indicator to a FARMS sample counted to 100% DAC.
- Added FARMS location to Tank 15 Northeast
- Added FARMS location to Tank 15 Southeast

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 H Tank Farm (HTF) and is intended for routine sampling and monitoring equipment in HTF. This report is intended to cover HTF 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. The wastes are prepared for solidification at the Defense Waste Processing Facility (DWPF).

HTF is located on a 45-acre site and consists of 29 waste tanks, evaporators 242-1H (taken out of service), 242-16H, and 242-25H, 8 diversion boxes, and 10 pump pits. The mission of HTF is to prevent the escape of any radioactivity to the environment, and prevent exposure to plant workers and the public. The facility must maintain the high level waste in a retrievable form that allows the solidification of the waste to a more stable form for storage and to prepare the waste for feed to DWPF.

The mission of the evaporators is to concentrate both high-heat and low-heat liquid waste from various feed sources, therefore reducing waste storage volumes. The 242-25H Evaporator is similar in design but is approximately three times larger than 242-16H Evaporator. The 242-16H Evaporator uses Tank 43 as the feed tank and Tank 38 as the drop or concentrate receipt tank. The 242-25H Evaporator uses Tank 32 as the feed tank, Tank 29 as the vent tank and/or drop tank. Tank 37 is the primary drop tank. Tank 30 can be utilized as the evaporator drop tank as needed.

Salt removed from LWO tanks will be collected in Tank 49 and transferred to 241-96H Actinide Removal Process (ARP) for monosodium titanate (MST) striking which adsorbs the actinides and strontium into the MST. This allows those radionuclides to remain with the concentrated MST solids slurry after filtration in 512-S ARP. The strontium (Sr-90), the actinides (Pu, U, Am) and the solids will be removed or reduced at ARP by using a MST adsorption treatment followed by filtration. The MST solids slurry is sent to the DWPF for

processing into a vitrified waste form while the filtrate (containing Cs-137) is sent on to 241-278H MCU for processing. The MCU receives filtrate from 512-S ARP and uses counter-flow contactors along with an engineered solvent to strip the Cs-137 from the filtrate. The Cs-137 is sent to DWPF as strip effluent for processing while the decontaminated filtrate, known as Decontaminated Salt Solution (DSS), is transferred to Tank 50 for Saltstone feed. The Waste Transfer Line (WTL) project provides transfer paths and modifications to allow a new flow path. The overall project is known as Integrated Salt Disposition Project (ISDP).

The two separations facilities 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.

HTF receives waste through the HDB-7 and HDB-8 complex. HDB-8 is the primary diversion box in the facility. It receives waste transfers from F-Area via the Inter-area Transfer Line, and receives recycle transfers from DWPF. It also serves as an intra-area diversion facility to transfer waste within HTF. HDB-7 receives waste transfers from the 200-H Separations facilities (via HPP5 and HPP6). An above ground transfer line is in place supporting HEU transfers to Tank 41 from PP-6.

The current external feed stream for facility evaporators consist of waste from H and F-Area Separations facilities, sludge wash water, and recycle waste from DWPF. During the evaporation process in 242-16H and 242-25H, residual amounts of waste will be retained in the evaporator vessels.

HTF West Hill consists of HDB-1, HDB-2, HDB-3, HDB-4, HDB-5, HDB-6, HDB-8, 241-25H Evaporator, and Waste Tanks 9-16, 21-24, 29-32, and 35-37.

HTF East Hill consists of the 242-16H Evaporator, Pump Pits 5 & 6, HDB-7, Waste Tanks 38-43, and 48-51, 241-96H Valve Box, 241-96H ARP, 241-278H MCU and WTL Project, Tank 49 Valve Box, MCU to Tank 50 Transfer Line, and Tank 50 to Saltstone Transfer Line.

5.0 Air Migration Study (Air Flow Patterns)

HTF is an outdoor facility that primarily consists of underground tanks and diversion boxes that have independent ventilation systems. Air migration studies were performed for process buildings with radiological history that includes HDB-8, 241-92H, 241-96H, 242-25H, and 241-278H. There have been no changes in the HTF 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 that 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 five 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.

98 retrospective air samplers provide coverage for normal indoor and outdoor facility operations. Placement of these samplers was determined based on Air Migration Studies

(AMS), Wind Rose Data, and location of potential sources. The strategy for placement of outside air samplers in H-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.

- *241-92H Surveillance Monitoring and Remote Technology Building:* Primary release points are the cameras and support equipment used to perform remote monitoring of tank interiors. All used equipment is bagged to prevent the spread of contamination unless task specific decontamination is performed locally. The radiological hood exhaust is another potential release point. Mobile RAS placements were based on the facility air migration study.
    - Radiological Buffer Area, Radioactive Material Area, Radiation Area, and Contamination Area are typical postings.
    - High Contamination Area is the typical posting for the hood during camera repair activities.
- *Tanks 9 through 12 General Area:* Primary release points are tank ventilation systems. The annuli on the Type I Tanks 9 through 12 are positive pressure designs, and are HEPA filtered on the exhaust side. The other potential release points in this area are HDB-1, H Catch Tank, HDB-2 and HPP1 - HPP4.
    - In May 1967, a 242-1H “bottoms” line overflowed on top of Tank 9, which ultimately contaminated the storm sewer to HP52 outfall.
    - Radiological Buffer Area, Radioactive Material Areas, Radiation Areas, High Radiation Areas, Contamination Areas, and High Contamination Areas are typical postings.
- *Tanks 13 - 16 General Area:* Primary release points are tank ventilation systems. The annulus ventilation design on Type II tanks is a positive pressure system and is HEPA filtered on the exhaust side. There is no inlet HEPA filter on Tank 13 primary ventilation and is considered a separate potential release source.

- In 1983, a 242-1H evaporator feed line leaked through a weather-damaged valve and spilled ~300 gallons of high level waste onto the top of Tank 13. Remnants of contamination are still evident when equipment is removed or serviced.
- In 1960, contamination was discovered in water wells surrounding Tank 16, which led to the discovery that Tank 16 had a leak and de-inventory was needed.
- 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 21 - 24 General Area:* Primary release points are tank ventilation systems, passive exhausts from 242-1H evaporator, HDB-5, and HDB-3. The tank purge exhausts are not continuously monitored, but are probed in accordance with procedure 5Q1.5-314.

- In February 1969, a ruptured back flush line to the 242-1H evaporator contaminated the local area and released approximately 0.5 Curies Cs-137 to HP-52 outfall.
- 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.

➢ *CTS/Tanks 29 - 32 General Area:* Primary release points are tank ventilation systems, CTS, HDB-4, and the associated process equipment.

- The CTS area has had minor process upsets associated with: tank overflow into the storm system, tank temperature indication failure/overheating, and ventilation flush into exhaust HEPAs and fans.
- Tank 32 Feed Pump riser had process upsets associated with the seal pot.
- Tanks 29 through 32 Annulus exhausts are not HEPA filtered but have air monitors with detectors that provide indication of potential airborne release.
- 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 35 - 37 General Area:* Primary release points are tank ventilation systems, HDB-6, Tanks 35-37 gang valve house, and associated process equipment. A leaking CTS transfer loop was discovered in the subsoil in 1988, and the affected area is classified as a RCRA/RFI unit.
    - 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.
- *242-25H (3H Evaporator):* Primary release points are the ventilation system and process equipment. Mobile RAS were established for the 3H Evaporator based on an air migration study. Samplers were established to characterize the facility and to adequately monitor the perimeter of the evaporator.
    - 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.
- *HDB-8 Complex:* Primary release points are the ventilation system and process equipment. Retrospective Air Samplers were established for HDB-8 based on an air migration study and to characterize the facility.
    - 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 38-43:* This grouping includes 242-16H Evaporator, HDB-7 and Pump Pits 5 & 6. Primary release points are tank ventilation systems, 242-16H and HDB-7 exhaust ventilation.
    - 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 48-51:* Primary release points are tank ventilation systems and associated process equipment.
    - 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.

- *241-96H:* The 241-96H building was modified to house strike tanks within the shielded cells to decontaminate salt solution from Tank 49. The primary release points are from the ventilation system and process equipment. Retrospective Air Samplers were established for 241-96H based on an air migration study and to characterize the facility.
    - 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.
- *MCU*: Primary release points are from the ventilation system and process equipment. Retrospective Air Samplers were established for MCU based on an air migration study and to characterize the facility.
    - 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.

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
HTNKF001	DB-1	Weekly	2%	Process / Personnel	0.001	2.625	0.000	0.050	2.675
HTNKF002	E Pumphouse	Weekly	2%	Facility Boundary/Process	0.001	1.447	0.000	0.028	1.475
HTNKF003	241-57H	Weekly	2%	Facility Boundary/Process	0.001	2.158	0.000	0.058	2.216
HTNKF006	TKS 13-16 BERM	Weekly	2%	Facility Boundary/Process	0.001	2.223	0.000	0.085	2.308
HTNKF008	DB-2 GA	Weekly	2%	Process / Personnel	0.001	1.905	0.000	0.049	1.954
HTNKF009	DB-5 GA	Weekly	2%	Process / Personnel	0.002	2.073	0.000	0.051	2.123
HTNKF010	COP #3	Weekly	2%	Process / Personnel	0.001	1.897	0.000	0.047	1.945
HTNKF012	1H EVAP GA N	Weekly	2%	Process / Personnel	0.001	2.161	0.000	0.051	2.212
HTNKF015	DB-6	Weekly	2%	Facility Boundary/Process	0.001	2.317	0.000	0.053	2.369
HTNKF018	241-92H S	Weekly	2%	Process / Personnel	0.001	2.847	0.000	0.051	2.899
HTNKF019	241-92H N	Weekly	2%	Process / Personnel	0.001	0.723	0.000	0.031	0.754
HTNKF021	TK 39 N	Weekly	2%	Process / Personnel	0.001	1.717	0.000	0.046	1.763
HTNKF022	TK 41 N	Weekly	2%	Facility Boundary/Process	0.001	2.302	0.000	0.051	2.353
HTNKF023	TK 41 E	Weekly	2%	Facility Boundary/AMS	0.001	1.931	0.000	0.051	1.982
HTNKF024	TK 42 W	Weekly	2%	Facility Boundary/AMS	0.001	1.861	0.000	0.047	1.908
HTNKF025	2H EVAP N	Weekly	2%	Facility Boundary/Process	0.001	2.432	0.000	0.057	2.489
HTNKF027	28H AC DUCT N	Weekly	2%	Facility Boundary/Process	0.001	2.080	0.000	0.050	2.129
HTNKF028	28H AC DUCT S	Weekly	2%	Facility Boundary/Process	0.001	2.575	0.000	0.052	2.627
HTNKF029	23H AC DUCT W	Weekly	2%	Process / Personnel	0.001	2.361	0.000	0.058	2.420
HTNKF030	82H AC ROOF E	Weekly	2%	Process / Personnel	0.001	1.949	0.000	0.045	1.995
HTNKF031	96H	Weekly	2%	Process / Personnel	0.001	1.769	0.000	0.050	1.819
HTNKF033	TK 48 E	Weekly	2%	Facility Boundary/Process	0.001	2.130	0.000	0.050	2.180
HTNKF034	TK 49 E	Weekly	2%	Process / Personnel	0.001	2.210	0.000	0.047	2.257
HTNKF036	TK 50 S	Weekly	2%	Process / Personnel	0.002	2.550	0.000	0.048	2.599
HTNKF037	TK 51 SE	Weekly	2%	Process / Personnel	0.001	2.108	0.000	0.059	2.167
HTNKF038	PUMP PIT 5&6	Weekly	2%	Process / Personnel	0.001	1.338	0.000	0.032	1.370
HTNKF049	DB-8 Crn Mnt	Weekly	2%	Process / Personnel	0.006	2.175	0.000	0.025	2.228
HTNKF050	DB-8 CrnCnRm	Weekly	2%	Process / Personnel	0.001	1.065	0.000	0.046	1.090
HTNKF051	DB-8 PVV-A	Weekly	2%	Process / Personnel	0.001	1.771	0.000	0.044	1.817
HTNKF052	DB-8 PVV-B	Weekly	2%	Process / Personnel	0.001	2.161	0.000	0.047	2.205

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
HTNKF053	DB-8 HB NW	Weekly	2%	Process / Personnel	0.014	2.311	0.000	0.047	2.358
HTNKF054	DB-8 HB SW	Weekly	2%	Process / Personnel	0.001	2.203	0.000	0.054	2.257
HTNKF055	DB-8 HB SC	Weekly	2%	Process / Personnel	0.006	2.154	0.000	0.050	2.204
HTNKF056	DB-8 HB SE	Weekly	2%	Facility Boundary/Process	0.013	2.428	0.000	0.056	2.483
HTNKF057	DB-8 HB NE	Weekly	2%	Process / Personnel	0.002	2.131	0.000	0.058	2.189
HTNKF059	DB-8 Inst Corr.	Weekly	2%	Process / Personnel	0.001	1.940	0.000	0.036	1.976
HTNKF069	Tnk 13 N	Weekly	2%	Process / Personnel	0.001	1.951	0.000	0.053	2.005
HTNKF070	Tnk 22 NW	Weekly	2%	Process / Personnel	0.001	2.136	0.000	0.058	2.194
HTNKF072	Tnk 31 GA	Weekly	2%	Process / Personnel	0.001	1.802	0.000	0.046	1.848
HTNKF075	Tnk 35 SE	Weekly	2%	Process / Personnel	0.001	1.919	0.000	0.045	1.964
HTNKF078	Tnk 40 N	Weekly	2%	Process / Personnel	0.001	2.112	0.000	0.058	2.170
HTNKF079	241-2H CR	Weekly	2%	Process / Personnel	0.001	2.537	0.000	0.054	2.592
HTNKF080	241-90H Annex	Weekly	2%	Process / Personnel	0.001	2.615	0.000	0.055	2.670
HTNKF081	RHLWE OH Rm	Weekly	2%	Process / Personnel	0.001	2.227	0.000	0.043	2.269
HTNKF082	RHLWE Con Cell Hall	Weekly	2%	Process / Personnel	0.001	1.430	0.000	0.038	1.468
HTNKF083	RHLWE Evap Cell Area	Weekly	2%	Process / AMS	0.001	2.821	0.000	0.109	2.930
HTNKF084	RHLWE Gang Vlv Rm	Weekly	2%	Process / AMS	0.001	2.247	0.000	0.065	2.312
HTNKF085	704-178H RCO Trail NW	Weekly	2%	Facility Boundary/Process	0.001	2.545	0.000	0.052	2.597
HTNKF086	Gate T NW 241-92H	Weekly	2%	Facility Boundary/Process	0.001	2.217	0.000	0.050	2.267
HTNKF087	701-24H	Weekly	2%	Facility Boundary/Process	0.001	2.122	0.000	0.047	2.170
HTNKF090	Tnk 30 C-2 Riser	Weekly	2%	Process / Personnel	0.001	2.006	0.000	0.124	2.130
HTNKF092	2H Evap S. CatWlk	Weekly	2%	Process / Personnel	0.008	2.165	0.000	0.057	3.222
HTNKF094	Tank 32 South	Weekly	2%	Process / Personnel	0.001	2.330	0.000	0.061	2.391
HTNKF107	Tnk 37 C-2 Riser	Weekly	2%	Process / Personnel	0.001	1.747	0.000	0.119	1.866
HTNKF108	242-9H Pri Vent Sys	Weekly	2%	Process / Personnel	0.001	2.436	0.000	0.051	2.487
HTNKF111	3H Truckwell	Weekly	2%	Process / Personnel	0.001	2.385	0.000	0.065	2.450
HTNKF112	241-92H Hood Room	Weekly	2%	Personnel Entry/AMS	0.001	1.002	0.000	0.026	1.028
HTNKF114	TK-13 South	Weekly	2%	Process / Personnel	0.001	2.069	0.000	0.065	2.135

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
HTNKF115	96H 1st Level Hold Tank R	Weekly	2%	Process / Personnel	0.001	2.525	0.000	0.047	2.572
HTNKF118	96H 3rd Level Stripper Co	Weekly	2%	Process / Personnel	0.001	1.913	0.000	0.064	1.977
HTNKF119	241-96H Truck Bay	Weekly	2%	Process / Personnel	0.001	1.794	0.000	0.045	1.839
HTNKF121	241-96H SW Boundary	Weekly	2%	Facility Boundary/Process	0.002	2.740	0.000	0.052	2.793
HTNKF122	241-96H Truck Bay AL	Weekly	2%	Process / Personnel	0.001	2.008	0.000	0.047	2.055
HTNKF123	241-278H Proc Enclosure C	Weekly	2%	Process / Personnel	0.001	2.129	0.000	0.046	2.175
HTNKF124	241-278H NW Proc Enclosur	Weekly	2%	Process / Personnel	0.001	2.056	0.000	0.049	2.105
HTNKF125	241-278H NE of MCU Bldg	Weekly	2%	Process / Personnel	0.001	2.614	0.000	0.054	2.668
HTNKF126	241-278H Contactor Enclos	Weekly	2%	Process / Personnel	0.000	0.857	0.000	0.050	0.907
HTNKF127	241-278H East Wall of MCU	Weekly	2%	Process / Personnel	0.001	2.354	0.000	0.042	2.396
HTNKF128	241-278H S End of Cold Fe	Weekly	2%	Facility Boundary/Process	0.001	2.715	0.000	0.054	2.769
HTNKF129	241-278H Sample Enclosure	Weekly	2%	Process / Personnel	0.052	3.179	0.010	0.139	3.318
HTNKF130	241-278H Sample Enclosure	Weekly	2%	Process / Personnel	0.052	2.617	0.002	0.110	2.727
HTNKF131	RHLWE 4th Level Hepa Filter	Weekly	2%	Process History / AMS	0.032	2.558	0.001	0.088	2.646
HTNKF132	RHLWE 2nd Level	Weekly	2%	Process History / AMS	0.001	1.956	0.000	0.049	2.005
HTNKF133	Tank 15 South West	Weekly	2%	Process / Personnel	0.001	2.444	0.000	0.055	2.500
HTNKF134	Tank 12 South East	Weekly	2%	Process / Personnel	0.001	2.654	0.000	0.061	2.715
HTNKF135	TK-13 South West	Weekly	2%	Process / Personnel	0.001	2.415	0.000	0.054	2.468
HTNKF136	Tank 9 West	Weekly	2%	Facility Boundary/Process	0.001	2.514	0.000	0.055	2.569
HTNKF137	Tank 10 East	Weekly	2%	Facility Boundary/Process	0.001	2.622	0.000	0.068	2.690
HTNKF138	HDB-2 South	Weekly	2%	Facility Boundary/Process	0.001	2.746	0.000	0.063	2.809

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
HTNKF139	Tank 14 East	Weekly	2%	Facility Boundary/Process	0.001	1.751	0.000	0.049	1.800
HTNKF140	Tank 16 East	Weekly	2%	Facility Boundary/Process	0.001	2.341	0.000	0.054	2.395
HTNKF141	TKS-21/23 East	Weekly	2%	Facility Boundary/Process	0.001	2.476	0.000	0.059	2.534
HTNKF142	TKS-21/22 South	Weekly	2%	Facility Boundary/Process	0.001	2.034	0.000	0.062	2.096
HTNKF143	Tank 22 SW	Weekly	2%	Facility Boundary/Process	0.001	2.745	0.000	0.058	2.803
HTNKF144	Tank 24 NW	Weekly	2%	Facility Boundary/Process	0.002	2.675	0.000	0.057	2.732
HTNKF145	Tank 29 East	Weekly	2%	Facility Boundary/Process	0.001	2.052	0.000	0.050	2.102
HTNKF146	Tank 32 East	Weekly	2%	Facility Boundary/Process	0.001	2.531	0.000	0.059	2.590
HTNKF147	Tank 37 NW	Weekly	2%	Facility Boundary/Process	0.001	1.862	0.000	0.052	1.915
HTNKF148	Tank 36 NW	Weekly	2%	Facility Boundary/Process	0.001	2.086	0.000	0.052	2.138
HTNKF149	Tank 35 West	Weekly	2%	Facility Boundary/Process	0.001	2.262	0.000	0.052	2.313
HTNKF150	Tank 35 NE	Weekly	2%	Facility Boundary/Process	0.001	1.625	0.000	0.038	1.663
HTNKF151	Tank 38 NW	Weekly	2%	Facility Boundary/Process	0.001	1.873	0.000	0.033	1.907
HTNKF152	Tank 43 East	Weekly	2%	Facility Boundary/Process	0.001	1.539	0.000	0.049	1.588
HTNKF153	Tank 48 NW	Weekly	2%	Facility Boundary/Process	0.001	2.113	0.000	0.044	2.157
HTNKF154	Tank 50 SW	Weekly	2%	Facility Boundary/Process	0.001	1.947	0.000	0.048	1.995
HTNKF155	MCU Contactor Enclosure	Weekly	2%	Process / AMS	0.001	0.201	0.000	0.047	0.248
HTNKF156	Tank 15 NE	Weekly	2%	Process / Personnel	0.000	0.000	0.000	0.000	0.000
HTNKF157	Tank 15 SE	Weekly	2%	Process / Personnel	0.000	0.000	0.000	0.000	0.000
				Totals >	**0.267**	**205.38**	**0.017**	**5.261**	**210.64**

6.2 Air Monitors

The HTF 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 H-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. HTF Facility is prohibited from performing High Rem transfers and all transfers are considered Low Rem.

Radiological Engineering & Health Physics (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. Table 7.1 details the justifications and locations of VAMPs and RMS-3s, as well as their background, and alarm set points. 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 HTF 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 HTF, 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. Radiological Protection (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
6029	HDB-1	VAMP	0.5	2.0	Process/Personnel
6021	HDB-2	VAMP	0.4	2.0	Process/Personnel
3106	Tank 9	VAMP	0.3	2.0	Process/Personnel
3129	Tank 10	VAMP	0.2	2.0	Process/Personnel
3156	Tank 11	VAMP	0.5	2.0	Process/Personnel
3181	Tank 12	VAMP	0.4	2.0	Process/Personnel
3034	Tank 13 East	VAMP	0.4	2.0	Process/Personnel
3061	Tank 14	VAMP	0.5	2.0	Process/Personnel
7241	Tank 15	VAMP	0.8	2.0	Process/Personnel
6003	HDB-3	VAMP	0.7	5.0	Process/Personnel
* 3342A	HDB-4	VAMP	0.9	2.0	Process/Personnel
3342B	HDB-4	VAMP	0.3	2.0	Process/Personnel
6000	HDB-5	VAMP	0.3	2.0	Process/Personnel
2011	Tank 21	VAMP	0.8	2.0	Process/Personnel
2029	Tank 22	VAMP	0.3	2.0	Process/Personnel
8213	Tank 23	VAMP	0.8	2.0	Process/Personnel
3327	Tank 24	VAMP	0.5	2.0	Process/Personnel
3411	HDB-6	VAMP	0.5	2.0	Process/Personnel
* Note: Area Radiation Monitors considered redundant and identified for removal.					

Monitor ID	Location	Instrument Type	Bkgd (mrem/hr)	Alarm Setpoint (mrem/hr)	Purpose/ Justification
5126	Tank 29 Center	VAMP	0.3	2.0	Process/Personnel
* 5127A	Tank 29 C2 Riser	VAMP	0.3	2.0	Process/Personnel
5127B	Tank 29 C2 Riser	VAMP	0.3	2.0	Process/Personnel
6256	Tank 30 Center	VAMP	0.6	2.0	Process/Personnel
6257A	Tank 30 C2 Riser	VAMP	1.0	2.0	Process/Personnel
6556	Tank 31 Center	VAMP	0.4	2.0	Process/Personnel
* 6557A	Tank 31 C2 Riser	VAMP	0.3	2.0	Process/Personnel
6557B	Tank 31 C2 Riser	VAMP	0.3	2.0	Process/Personnel
6856	Tank 32 Center	VAMP	0.3	2.0	Process/Personnel
263	Tank 35 C2 Riser	VAMP	0.3	2.0	Process/Personnel
6030	Tank 35 Gang Valve House	VAMP	0.3	2.0	Process/Personnel
* 311A	Tank 36 C2 Riser	VAMP	0.3	2.0	Process/Personnel
311B	Tank 36 C2 Riser	VAMP	0.4	2.0	Process/Personnel
6031	Tank 36 Gang Valve House	VAMP	0.4	2.0	Process/Personnel
* 358A	Tank 37 C2 Riser	VAMP	0.3	2.0	Process/Personnel
358B	Tank 37 C2 Riser	VAMP	0.3	2.0	Process/Personnel
6032	Tank 37 Gang Valve House	VAMP	0.3	2.0	Process/Personnel
3442	241-13H West Pump House	VAMP	0.3	2.0	Process/Personnel
* Note: Area Radiation Monitors considered redundant and identified for removal.					

Monitor ID	Location	Instrument Type	Bkgd (mrem/hr)	Alarm Setpoint (mrem/hr)	Purpose/ Justification
3542	241-14H East Pump House	VAMP	0.4	2.0	Process/Personnel
3513A	CTS North West	VAMP	0.1	2.0	Process/Personnel
3513B	CTS South East	VAMP	0.3	2.0	Process/Personnel
8795	HDB-8 PVV HEPA Room	VAMP	8.0	12.0	Process/Personnel
8796	HDB-8 Building H&V Room	VAMP	0.3	2.0	Process/Personnel
8797	HDB-8 Crane Control Room	VMAP	0.3	2.0	Process/Personnel
8800	HDB-8 North East Passage	VAMP	0.2	2.0	Process/Personnel
8801	HDB-8 South West Passage	VAMP	0.3	2.0	Process/Personnel
10825A	Overhead Condenser Cell	VAMP	0.3	2.0	Process/Personnel
10825B	Overhead Condenser Cell	VAMP	0.3	2.0	Process/Personnel
10826A	Evaporator Upper Level	VAMP	0.9	2.0	Process/Personnel
10826B	Evaporator Upper Level	VAMP	0.9	2.0	Process/Personnel
10827A	Overhead Receiver Cell	VAMP	0.3	2.0	Process/Personnel
10827B	Overhead Receiver Cell	VAMP	0.3	2.0	Process/Personnel
10828A	Service Bldg. 2nd Floor	VAMP	0.9	2.0	Process/Personnel
10828B	Service Bldg. 2nd Floor	VAMP	0.9	2.0	Process/Personnel
10829A	Lift Gang Valve	VAMP	0.3	2.0	Process/Personnel

Monitor ID	Location	Instrument Type	Bkgd (mrem/hr)	Alarm Setpoint (mrem/hr)	Purpose/ Justification
10829B	Lift Gang Valve	VAMP	0.3	2.0	Process/Personnel
10830A	Service Bldg. 4th Floor	VAMP	1.5	4.0	Process/Personnel
10830B	Service Bldg. 4th Floor	VAMP	3.0	5.0	Process/Personnel
* 10837A	Tanks 29-31 COP 102-104	VAMP	0.3	2.0	Process/Personnel
10837B	Tanks 29-31 COP 102-104	VAMP	0.3	2.0	Process/Personnel
* 10838A	Tanks 29-30 COP 105	VAMP	0.4	2.0	Process/Personnel
10838B	Tks. 29-30 COP 105	VAMP	0.4	2.0	Process/Personnel
* 10841A	Tank 32 Riser C-2 Area	VAMP	0.7	2.0	Process/Personnel
10841B	Tank 32 Riser C-2 Area	VAMP	0.9	3.0	Process/Personnel
* 10842A	Tank 32 COP 112	VAMP	0.3	2.0	Process/Personnel
10842B	Tank 32 COP 112	VAMP	0.3	2.0	Process/Personnel
* 10843A	Tank 32 COP 111	VAMP	0.3	2.0	Process/Personnel
10843B	Tank 32 COP 111	VAMP	0.3	2.0	Process/Personnel
* 10844A	Tank 32 COP 110	VAMP	0.5	2.0	Process/Personnel
10844B	Tank 32 COP 110	VAMP	0.6	2.0	Process/Personnel
* 10845A	Tank 32 COP 109	VAMP	0.3	2.0	Process/Personnel
10845B	Tank 32 COP 109	VAMP	0.3	2.0	Process/Personnel
10846A	Bldg. 242-009 HEPA Area	VAMP	6.0	8.0	Process/Personnel
* Note: Area Radiation Monitors considered redundant and identified for removal.					

Monitor ID	Location	Instrument Type	Bkgd (mrem/hr)	Alarm Setpoint (mrem/hr)	Purpose/ Justification
10846B	Bldg. 242-009 HEPA Area	VAMP	8.0	11.0	Process/Personnel
10847A	Evaporator Southside	VAMP	0.5	2.0	Process/Personnel
10847B	Evaporator Southside	VAMP	0.5	2.0	Process/Personnel
* 10833A	Evaporator West COP-107	VAMP	0.5	2.0	Process/Personnel
10833B	Evaporator West COP-107	VAMP	0.5	2.0	Process/Personnel
2044	Far East Pump House	VAMP	0.4	2.0	Process/Personnel
2065	Pump Pit 5&6 East Side	VAMP	0.6	2.0	Process/Personnel
2066	Pump Pit 5&6 West Side	VAMP	0.5	2.0	Process/Personnel
2026	Tank 38 Gang Valve House	VAMP	0.3	2.0	Process/Personnel
2027	Tank 38 C1 Riser	VAMP	0.4	2.0	Process/Personnel
2028A	Tank 38A C3 Riser	VAMP	0.2	2.0	Process/Personnel
2028B	Tank 38B C3 Riser	VAMP	0.3	2.0	Process/Personnel
* 2020A	Tank 39 Gang Valve House	VAMP	0.3	2.0	Process/Personnel
2020B	Tank 39 Gang Valve House	VAMP	0.3	2.0	Process/Personnel
2021	Tank 39 C1 Riser	VAMP	0.2	2.0	Process/Personnel
* 2022A	Tank 39A C3 Riser	VAMP	0.3	2.0	Process/Personnel
2022B	Tank 39B C3 Riser	VAMP	0.3	2.0	Process/Personnel
2026A	Tank 43 Feed Pump Riser	VAMP	0.4	2.0	Process/Personnel
* Note: Area Radiation Monitors considered redundant and identified for removal.					

Monitor ID	Location	Instrument Type	Bkgd (mrem/hr)	Alarm Setpoint (mrem/hr)	Purpose/ Justification
2026B	Tank 43 Feed Pump Riser	VAMP	0.4	2.0	Process/Personnel
* 2014A	Tank 43 C3 Riser	VAMP	0.4	2.0	Process/Personnel
2014B	Tank 43 C3 Riser	VAMP	0.5	2.0	Process/Personnel
2027	Tank 43 C1 Riser	VAMP	0.5	2.0	Process/Personnel
* 2028A	Tank 43 Gang Valve House	VAMP	0.5	2.0	Process/Personnel
2028B	Tank 43 Gang Valve House	VAMP	0.2	2.0	Process/Personnel
2090	16H Evap S Upper Walkway	VAMP	0.2	2.0	Process/Personnel
2095	16H Evap S Upper Walkway	VAMP	0.2	2.0	Process/Personnel
2075	2H Evaporator GVH A	VAMP	0.5	2.0	Process/Personnel
2080	2H Evaporator GVH B	VAMP	0.4	2.0	Process/Personnel
2085	2H Evaporator North	VAMP	0.3	2.0	Process/Personnel
2069A	HDB-7 North East	VAMP	0.2	2.0	Process/Personnel
2069B	HDB-7 South West	VAMP	0.3	2.0	Process/Personnel
5134	Tank 40 C-1 Riser	VAMP	0.3	2.0	Process/Personnel
5135	Tank 40 C-3 Riser	VAMP	0.3	2.0	Process/Personnel
5133B	Tank 40 Gang Valve House	VAMP	0.4	2.0	Process/Personnel
* 5133A	Tank 40 Gang Valve House	VAMP	0.5	2.0	Process/Personnel
5136	Tank 41 C-1 Riser	VAMP	0.4	2.0	Process/Personnel
* Note: Area Radiation Monitors considered redundant and identified for removal.					

Monitor ID	Location	Instrument Type	Bkgd (mrem/hr)	Alarm Setpoint (mrem/hr)	Purpose/ Justification
5137A	Tank 41 C-3 Riser	VAMP	0.2	2.0	Process/Personnel
* 5138A	Tank 41 Gang Valve House	VAMP	0.4	2.0	Process/Personnel
5138B	Tank 41 Gang Valve House	VAMP	0.3	2.0	Process/Personnel
5054	Tank 42 C-1 Riser	VAMP	0.4	2.0	Process/Personnel
5055	Tank 42 C-3 Riser	VAMP	0.5	2.0	Process/Personnel
5053	Tank 42 Gang Valve House	VAMP	0.2	2.0	Process/Personnel
5105	Tank 48 B-3 Riser	VAMP	0.3	2.0	Process/Personnel
5103	Tank 48 C-1 Riser	VAMP	0.6	2.0	Process/Personnel
5104	Tank 48 C-3 Riser	VAMP	1.0	8.0	Process/Personnel
5102	Tank 48 Gang Valve House	VAMP	0.4	2.0	Process/Personnel
5106	Tank 49 C-1 Riser	VAMP	0.2	2.0	Process/Personnel
5107	Tank 49 C-3 Riser	VAMP	0.2	2.0	Process/Personnel
5105	Tank 49 Gang Valve	VAMP	0.2	2.0	Process/Personnel
5200	Tank 49 Valve Box	VAMP	0.3	2.0	Process/Personnel
5110	Tank 50 Gang Valve House	VAMP	0.3	2.0	Process/Personnel
5111	Tank 50 C-1 Riser	VAMP	0.3	2.0	Process/Personnel
5112	Tank 50 C-3 Riser	VAMP	0.2	2.0	Process/Personnel
5063	Tank 51 C-1 Riser	VAMP	0.4	2.0	Process/Personnel
* Note: Area Radiation Monitors considered redundant and identified for removal.					

Monitor ID	Location	Instrument Type	Bkgd (mrem/hr)	Alarm Setpoint (mrem/hr)	Purpose/ Justification
5064	Tank 51 C-3 Riser	VAMP	0.4	2.0	Process/Personnel
5065	Tank 51 Gang Valve House	VAMP	0.4	2.0	Process/Personnel
CHW-RIT-5	ARP Chiller Unit	VAMP	0.3	2.0	Process/Personnel
HTF-002	ARP Bldg HEPA Bank	RMS-3	0.0	5.0	Process/Personnel
HTF-003	ARP PVV Hepa Bank on Skid	RMS-3	12	61.0	Process/Personnel
HTF-004	ARP PVV Line in Truckwell	RMS-3	0.1	5.0	Process/Personnel
9100	MCU Hepa Filter Bank	RMS-3	4.5	10.0	Process/Personnel
9101	MCU Sample Enclosure	RMS-3	1.2	5.0	Process/Personnel
9103	MCU Chiller Unit System	RMS-3	0.4	5.0	Process/Personnel
9113	MCU Tepid Water System	RMS-3	0.5	5.0	Process/Personnel
9114	MCU PVV Line	RMS-3	2.4	5.0	Process/Personnel
8410	Tank 13 SMP Riser-2A	RMS-3	0.5	5.0	Process/Personnel
9410	Tank 13 SMP Riser-4	RMS-3	0.2	5.0	Process/Personnel
10410	Tank 13 SMP Riser-8	RMS-3	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)
H051	241-92H North Wall	Background / Personnel	121	121
H063	704-178H RPD Trailer West	Background / Personnel	48	48
H064	Gate T-22 NW 241-92H	Background / Personnel	98	98
H065	241-24H Count RM	Background / Personnel	78	78
H069	242-25H South Wall	Background / Shielding	607	607
H073	242-25H Evap 337 level	Background / Shielding	645	645
H074	242-009H MCC SW Wall	Background / Shielding	0	0
H076	242-11H Truck Bay South Wall	Background / Shielding	4866	4866
H082	241-82H	Background / Personnel	0	0
H083	241-28H Control Room	Background / Personnel	0	0
H084	242-1H Control Room	Background / Personnel	747	747
H085	241-85H North Gate	Background / Personnel	15	15
H086	241-93H South Gate	Background / Personnel	48	48
H097	242-11H Overhead Cells Room	Background / Process	1212	1212
H098	242-11H 322 Level	Background / Process	198	198
H099	242-11H 337 Level	Background / Process	794	794
H127	242-24H Hallway	Background / Personnel	81	81
H129	241-2H Control Room	Background / Personnel	0	0
H130	HDB-8 Change Room	Background / Process	35	35
H131	HDB-8 Crane Control Room	Background / Process	0	0
H132	241-251H	Background / Process	257	257

Monitor ID	Location	Purpose / Justification	Total Whole Body Dose (mrem)	Total Skin Dose (mrem)
H135	North between Tank 29 & Tank 30	Background / Personnel	178	178
H136	South West between Tank 35 & Tank 36	Background / Personnel	91	91
H137	Fence Line North East of 241-14H	Background / Personnel	57	57
H138	Fence Line next to Coal Car Unloading Station	Background / Personnel	107	107
H139	Bottom of Steps from East Hill	Background / Process	102	102
H140	URMA Boundary South West of Tank 22	Background / Process	930	930
H141	East Hill RBA Perimeter between Tank 39 & Tank 40	Background / Personnel	133	133
H151	241-156H Room 12	Background / Personnel	47	47
H152	704-56H Room 146	Background / Personnel	0	0
H153	241-161H Room 2	Background / Personnel	68	68
H228	701-23H	Background / Personnel	16	16
H231	Truck Bay Entrance PVV Lines (241-96H)	Background / Process	376	376
H232	Crane Control Room N. Wall (241-96H)	Background / Personnel	23	23
H233	N. End of 96H Near 241-23H	Background / Personnel	85	85
H234	South End of 96H Near Stack (Stairs to PVV Skid)	Background / Personnel	1604	1604
H235	96H Hold Tank Rm. 2nd Level S. Wall West	Background / Process	62	62
H236	96H Hold Tank Rm. 2nd Level S. Wall East	Background / Process	71	71
H237	West of MCU at Fence	Background / Personnel	3989	3989
H242	East of MCU Center at Fence	Background / Personnel	121	121
H243	NW Corner Process Enclosure Above Line (MCU)	Background / Process	35	35
H246	RPD Trailer 241-252H	Background / Personnel	163	163

Monitor ID	Location	Purpose / Justification	Total Whole Body Dose (mrem)	Total Skin Dose (mrem)
H247	Trailer 241-254H	Background / Personnel	140	140
H248	Trailer 241-253H	Background / Personnel	174	174
H249	South Center RBA (MCU)	Background / Personnel	179	179
H250	South East Corner of MCU at RBA (241-146H)	Background / Personnel	132	132
H251	East of MCU at N. Quonset Hut	Background / Personnel	106	106
H252	North East Corner of MCU at RBA	Background / Personnel	473	473
H253	North East RBA at Nitrogen Tanks (MCU)	Background / Personnel	100	100
H254	Above Transfer Line Tie-in (MCU)	Background / Shielding	99	99
H255	Transfer Line Above Concrete (MCU)	Background / Shielding	89	89
H256	Contactor Enclosure Airlock (MCU)	Background / Process	8	8
H257	East Center Wall Contactor Enclosure (MCU)	Background / Process	24	24
H258	West Center Wall Contactor Enclosure (MCU)	Background / Process	5137	5137
H259	North Center Wall Process Enclosure (MCU)	Background / Process	6	6
H260	Building 241-146H	Background / Personnel	41	41
H262	MCU Catwalk	Background / Process	484	484
H263	West Wall at PVV Lines (241-96H)	Background / Process	1232	1232
H267	Low Point Drain Tank at Fence	Background / Shielding	27	27
H268	Low Point Drain Tank at grating over top of piping	Background / Process	989	989
H269	Clean Out Port 1	Background / Shielding	210	210
H270	Clean Out Port 2	Background / Shielding	96	96
H271	Clean Out Port 3	Background / Shielding	48	48

Monitor ID	Location	Purpose / Justification	Total Whole Body Dose (mrem)	Total Skin Dose (mrem)
H272	Clean Out Port 4	Background / Shielding	0	0
H273	Clean Out Port 5	Background / Shielding	0	0
H274	Clean Out Port 6	Background / Shielding	0	0
H275	Clean Out Port 7	Background / Shielding	5	5
H276	Clean Out Port 8	Background / Shielding	73	73
H277	Transfer Line South of Clean Out Port 6	Background / Shielding	0	0
H278	Between Clean Out Port 4 and Railroad Tracks	Background / Shielding	0	0
H279	Transfer Line North of Low Point Drain Tank	Background / Shielding	0	0
H281	241-78H Count Room	Background / Personnel	35	35
H282	241-90H Northwest	Background / Personnel	106	106
H296	241-226H CTS Change Shack	Background / Personnel	333	333
H297	241-225H 1H Change Shack	Background / Personnel	261	261

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. HTF does not have any locations where unmonitored personnel could have received 100 mrem/year neutron exposures.

8.0 Routine Bioassay Program

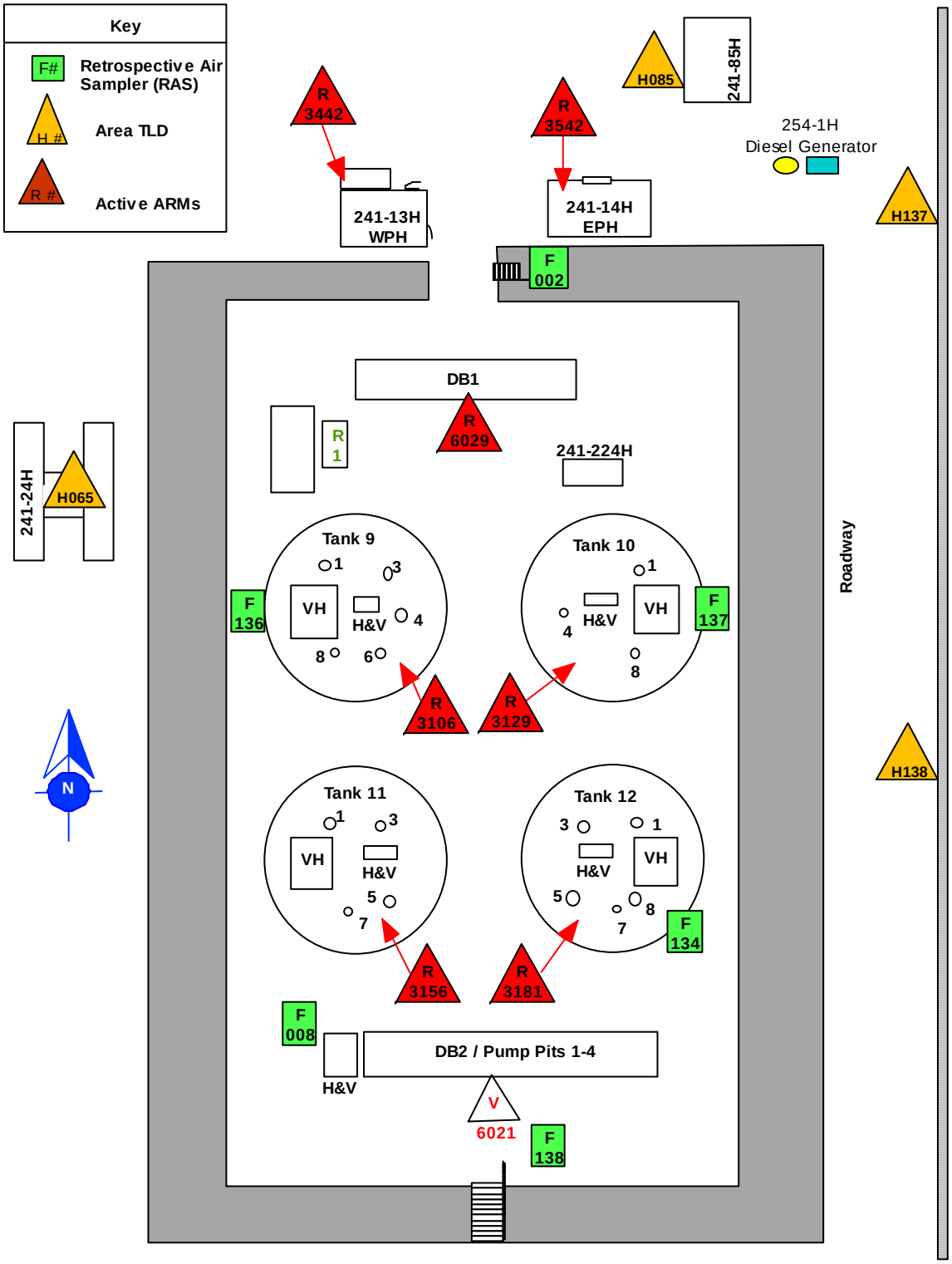
The purpose of the routine bioassay program is to verify that personnel have not been internally exposed to radioactive materials. When personnel perform work in an ARA, they are required to participate in a surveillance program for the radionuclide(s) of concern. Thus, the bioassay requirements must 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

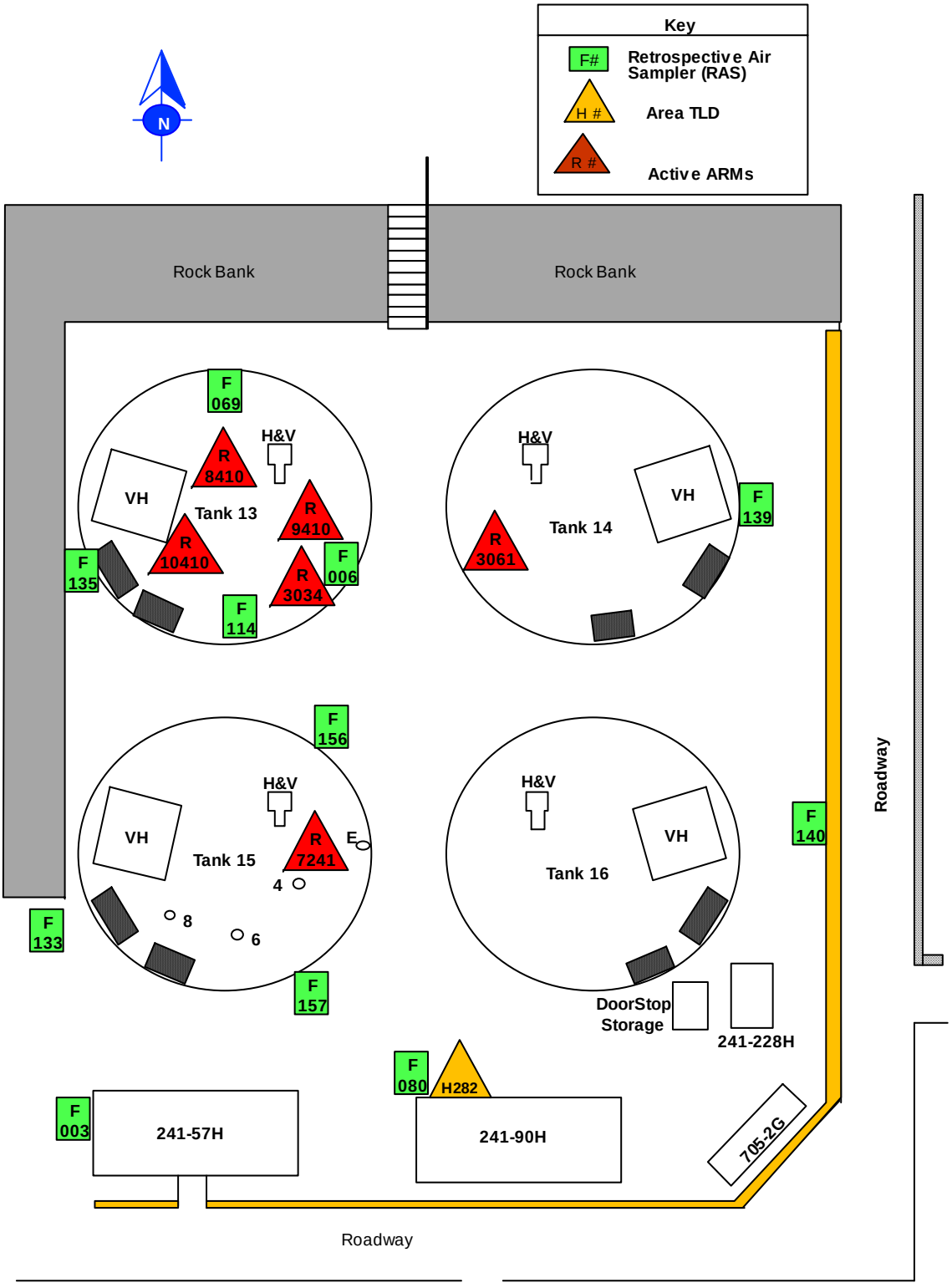
A routine bioassay review was performed for F & H Tank Farms, ETP, and 299-H and documented in SRR-RPE-2014-00020, Rev. 0. Procedures require bioassay measurement of radionuclides expected to contribute at least 10% of the internal dose to personnel using respiratory protection. The current screening 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

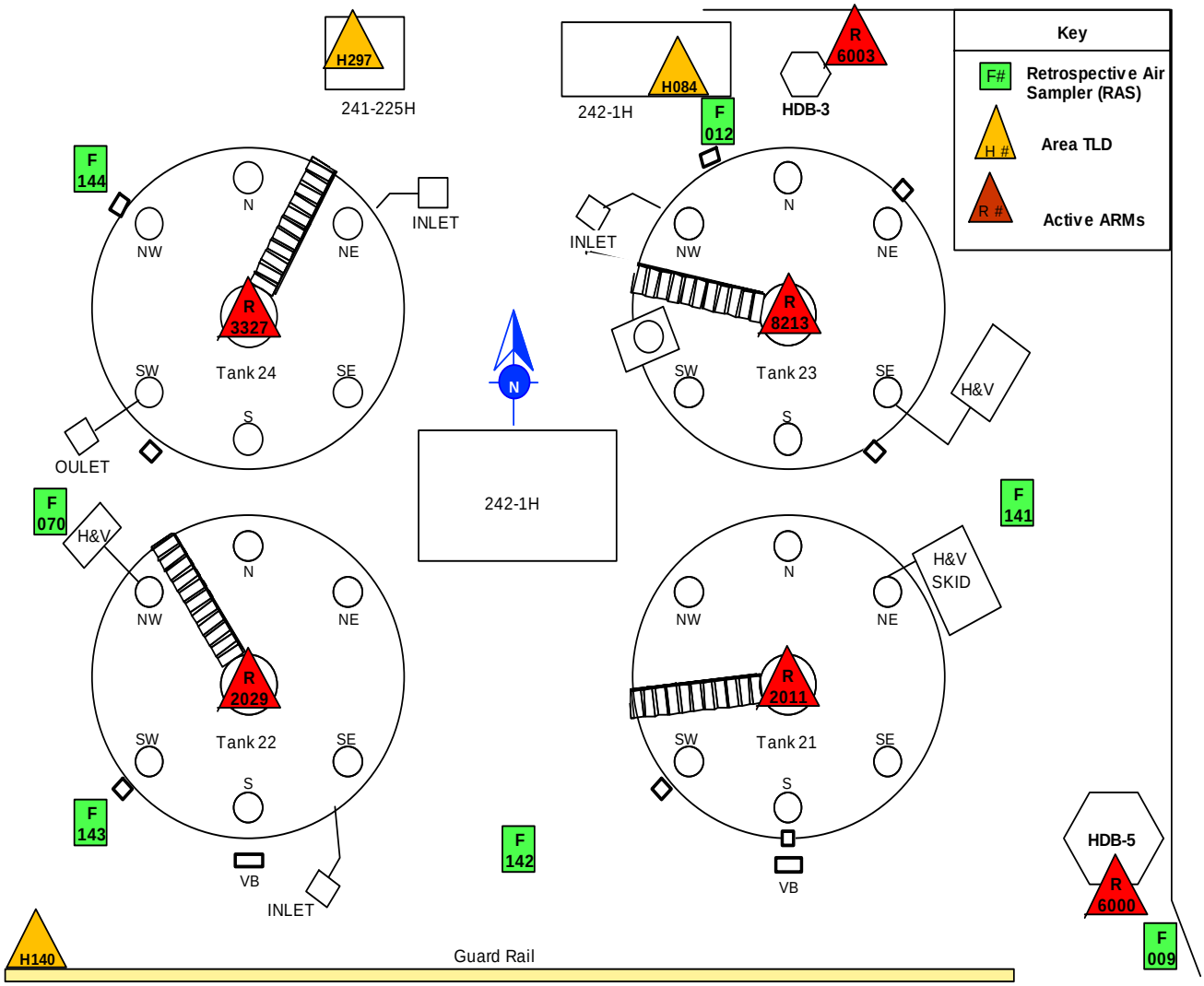
9.1 Diagram 1 - HTF West Hill Tank 9 – 12



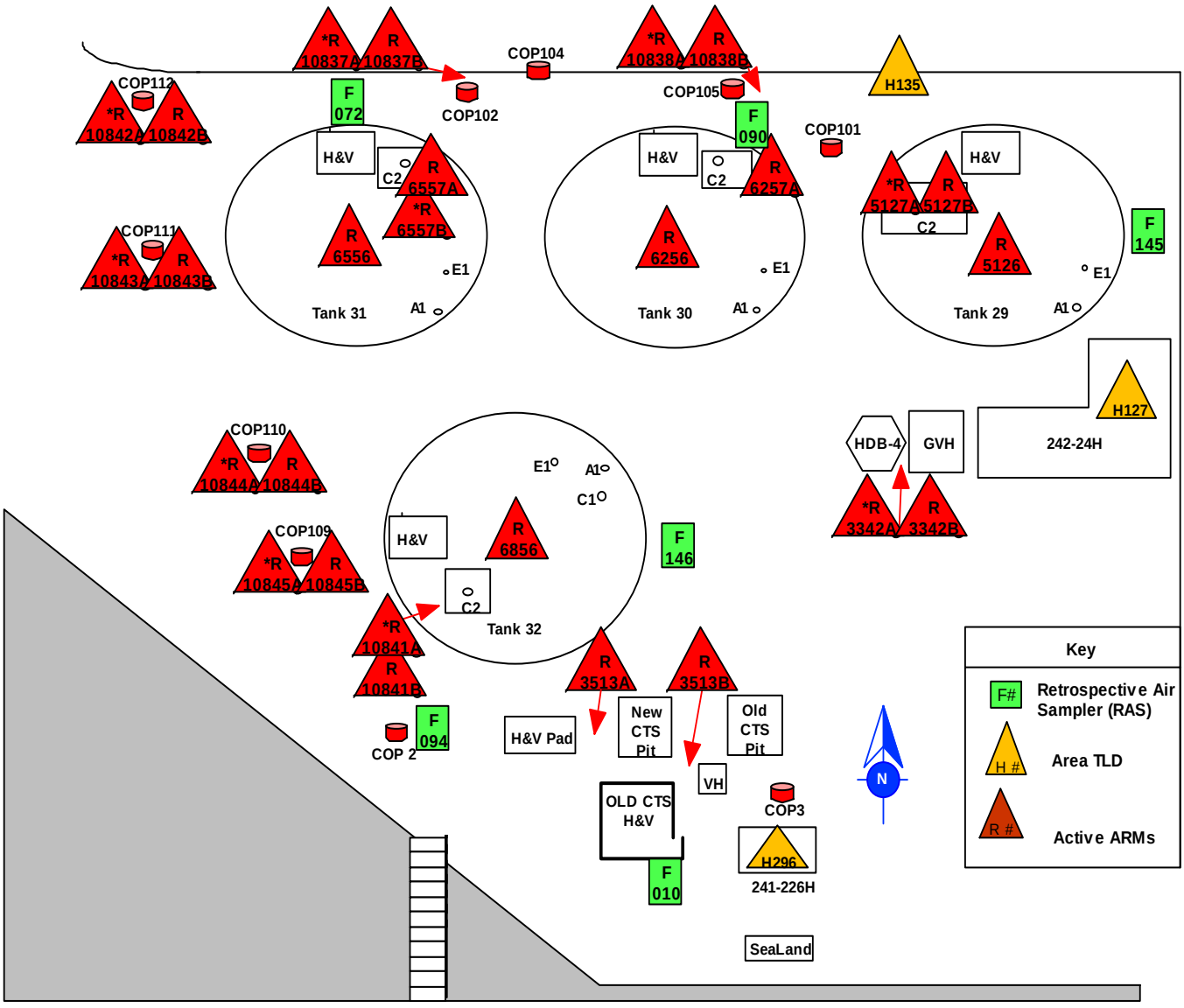
9.2 Diagram 2 - HTF West Hill Tank 13 – 16



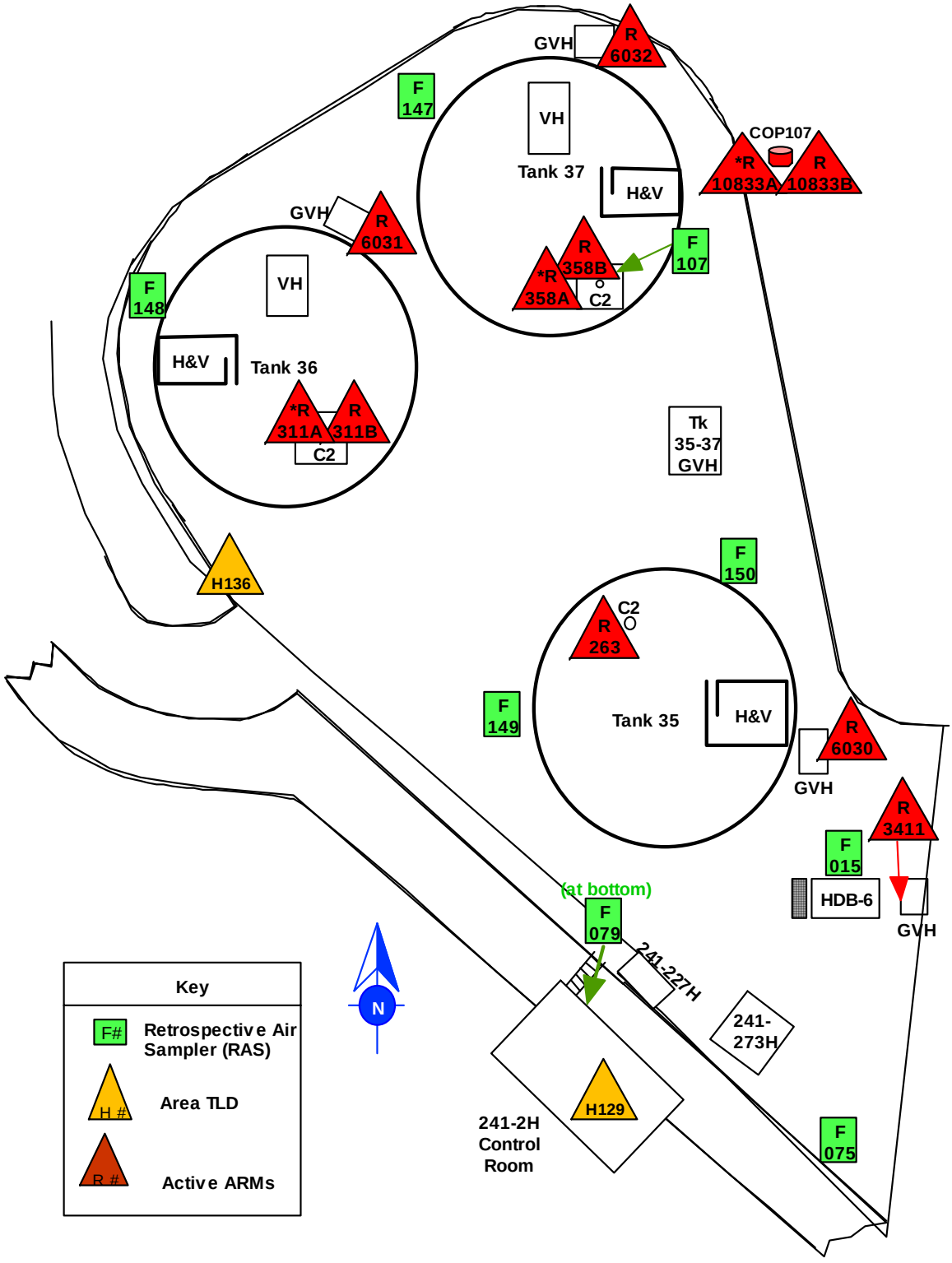
9.3 HTF West Hill Tank 21 – 24



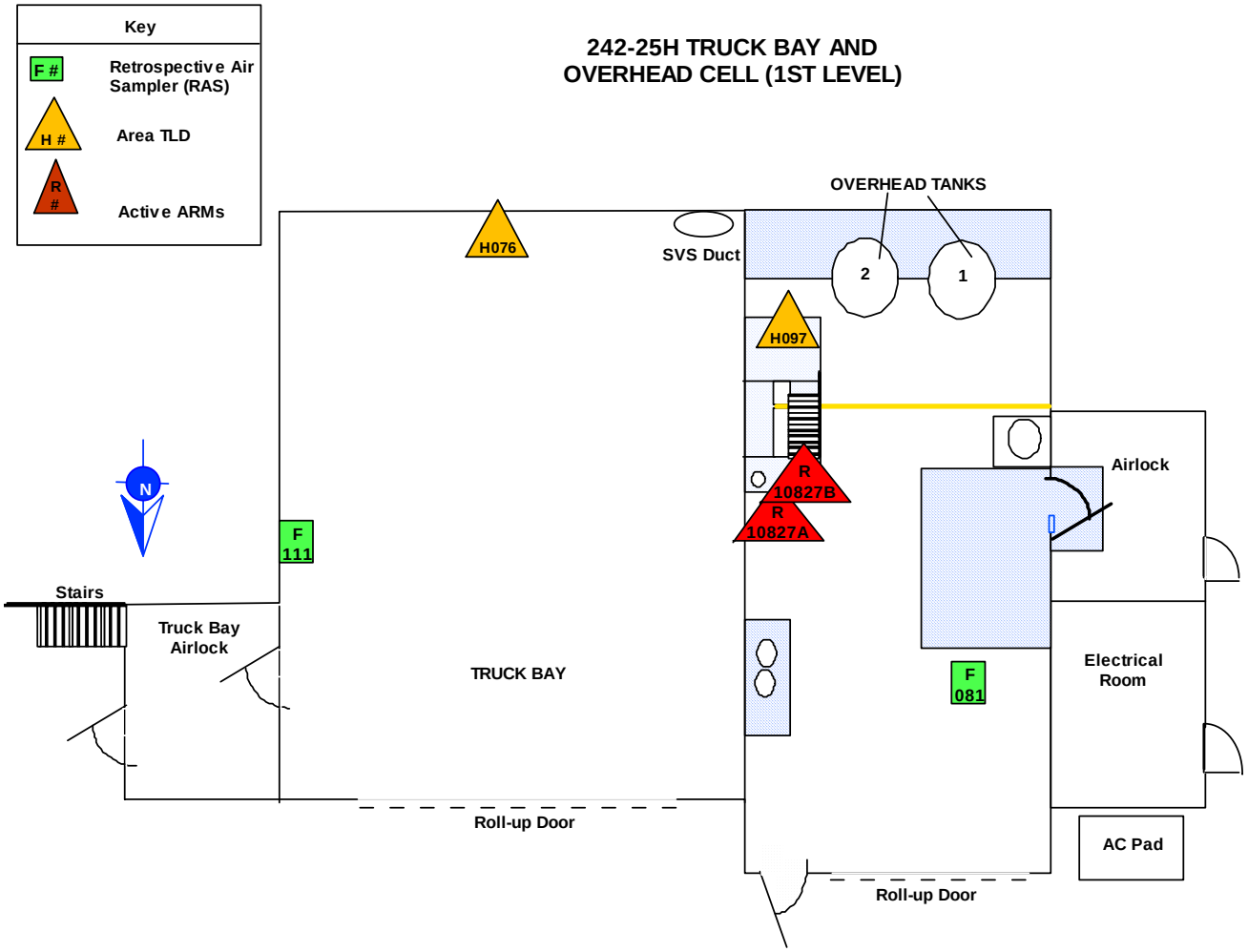
9.4 HTF West Hill Tank 29 – 32



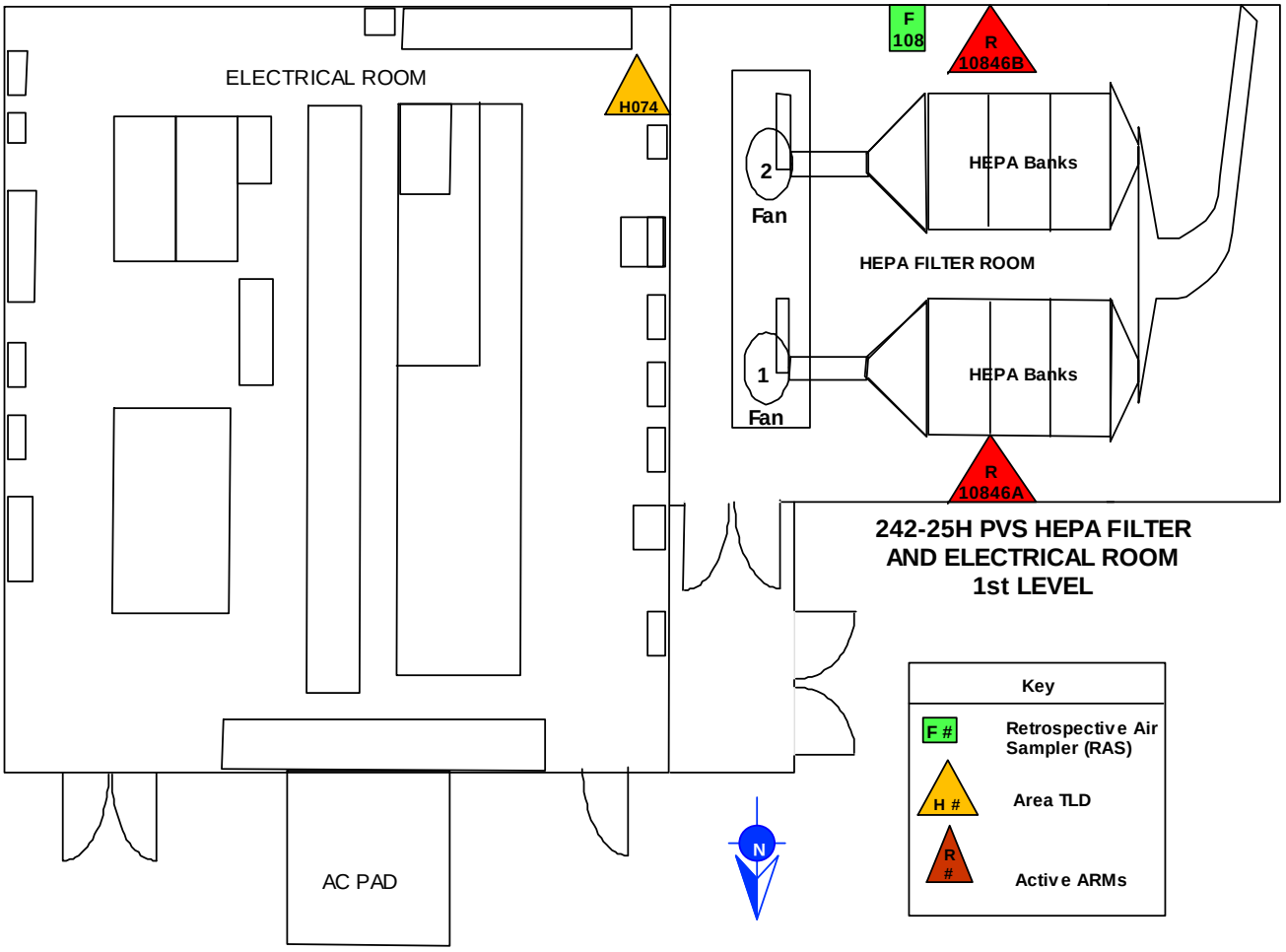
9.5 HTF West Hill Tank 35 – 37



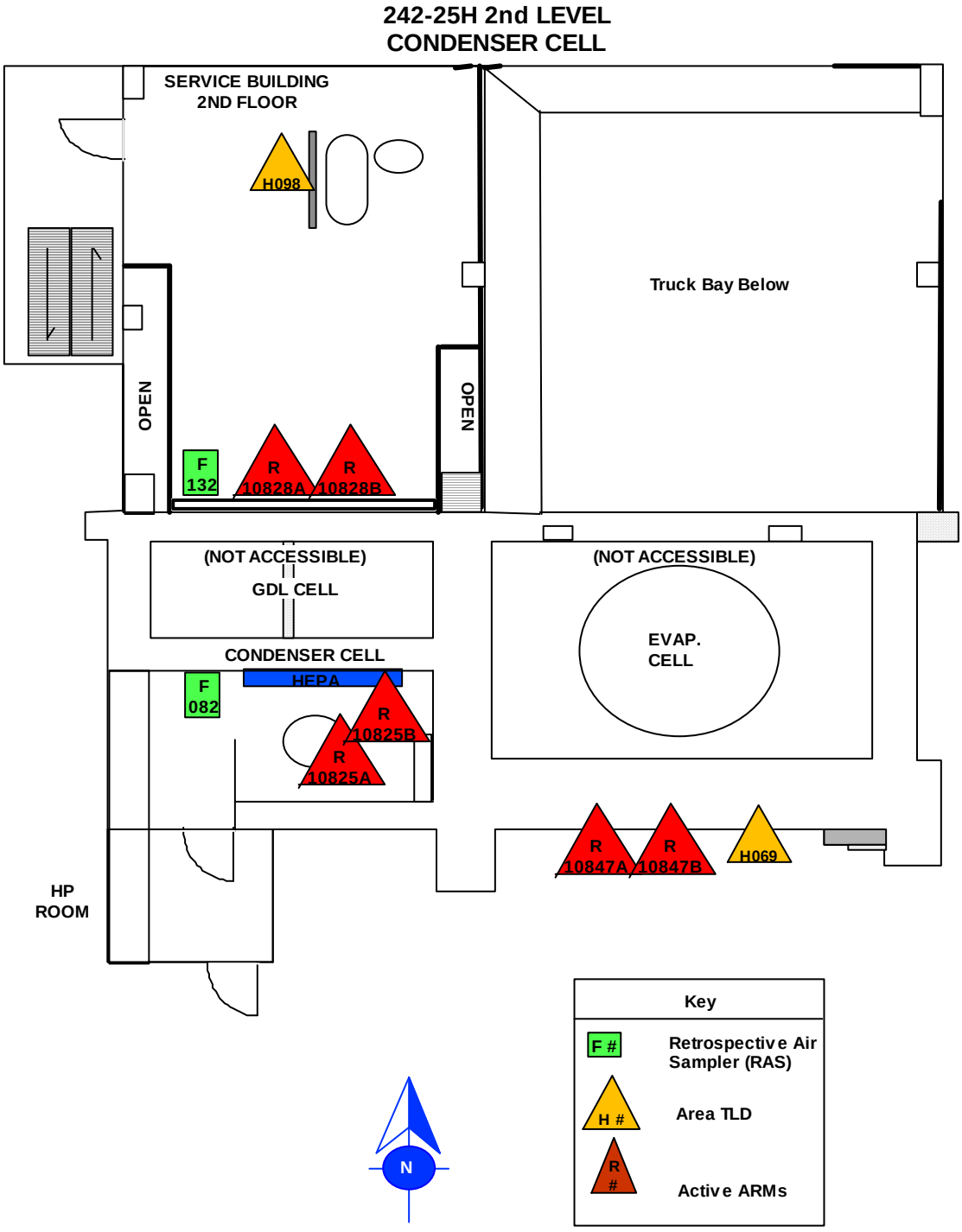
9.6 242-25H 1st LEVEL



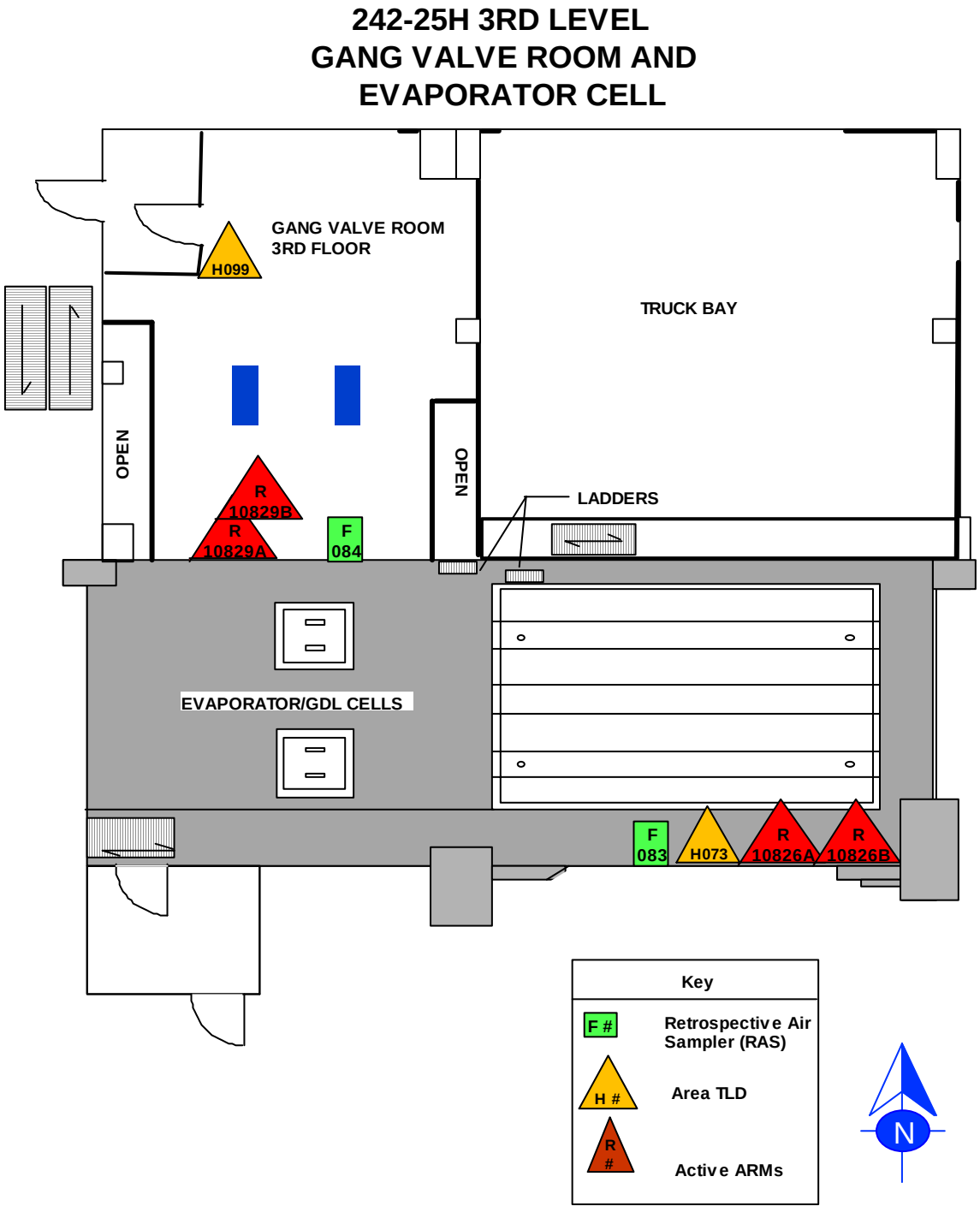
9.7 242-25H 1st LEVEL PVS AND MCC



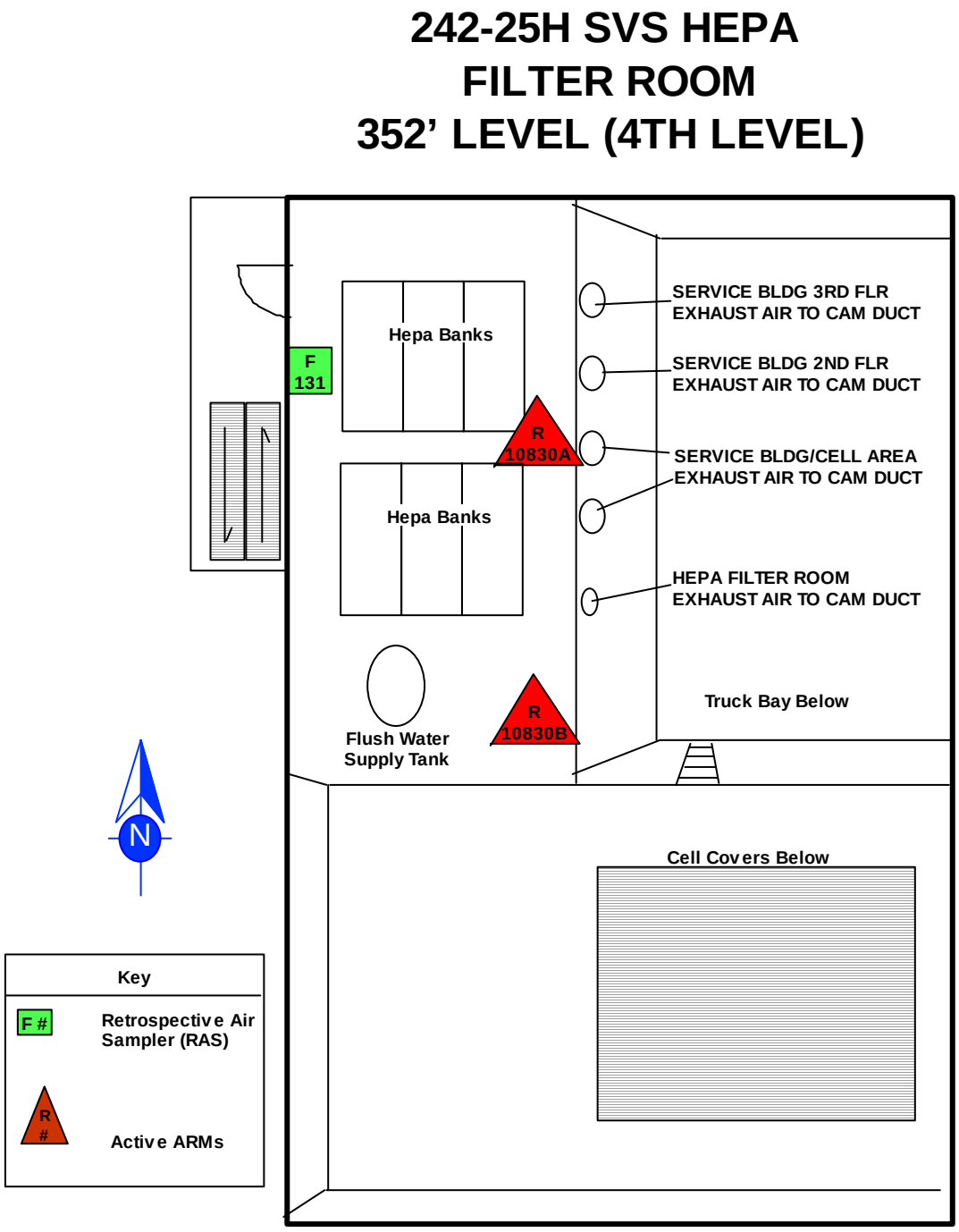
9.8 242-25H 2nd Level Condenser



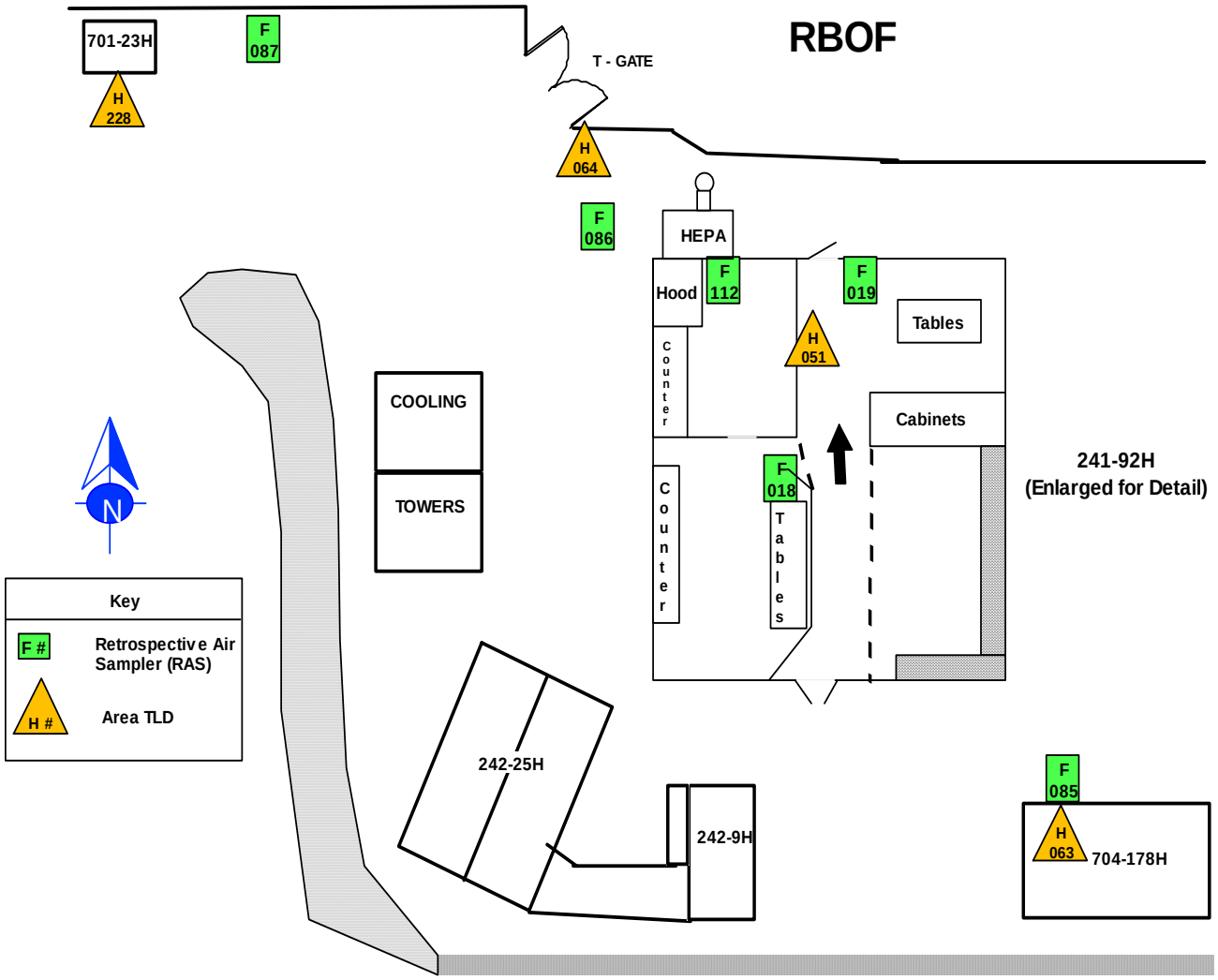
9.9 242-25H 3rd Level GVH and Cell



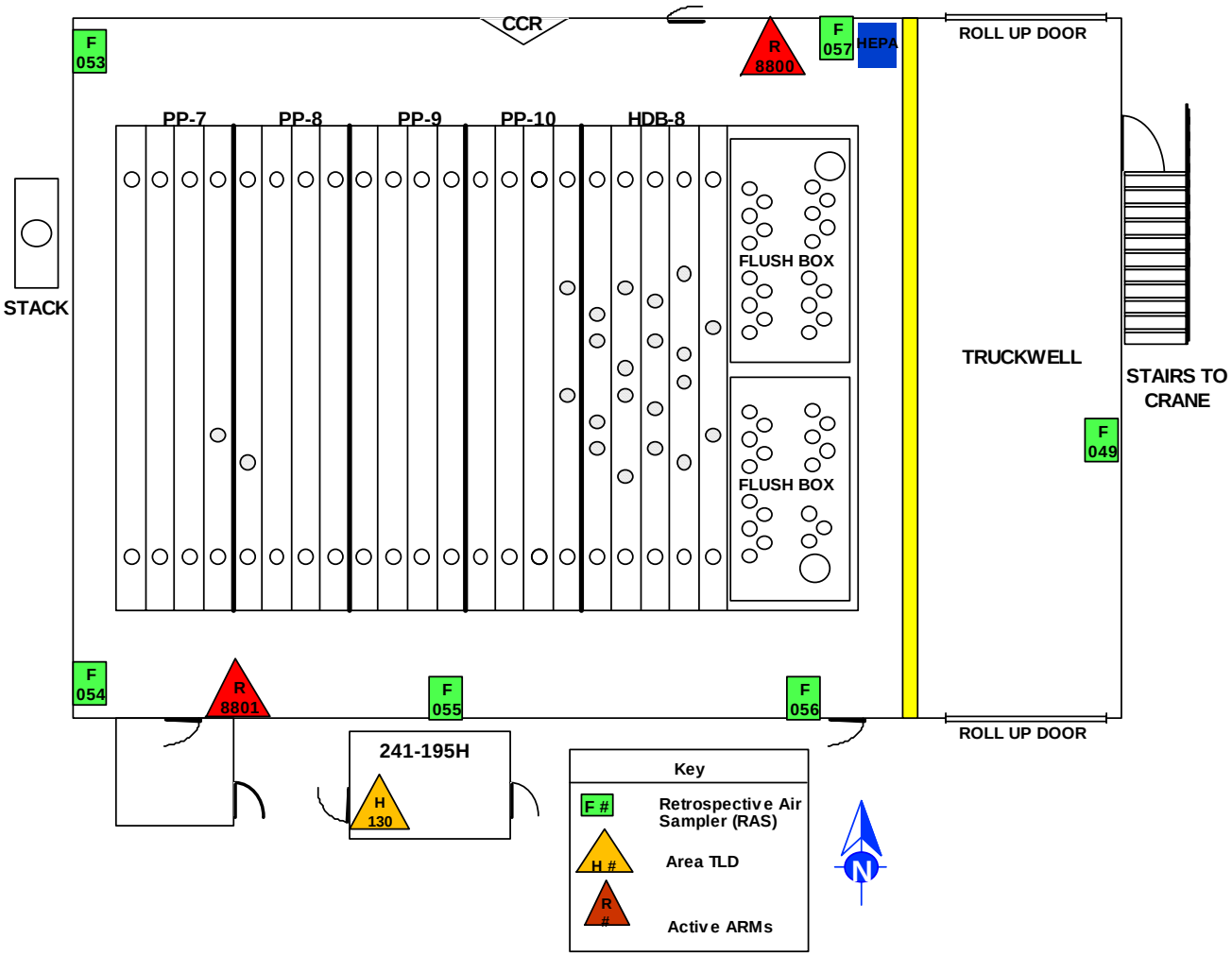
9.10 242-25H 4th Level HEPA



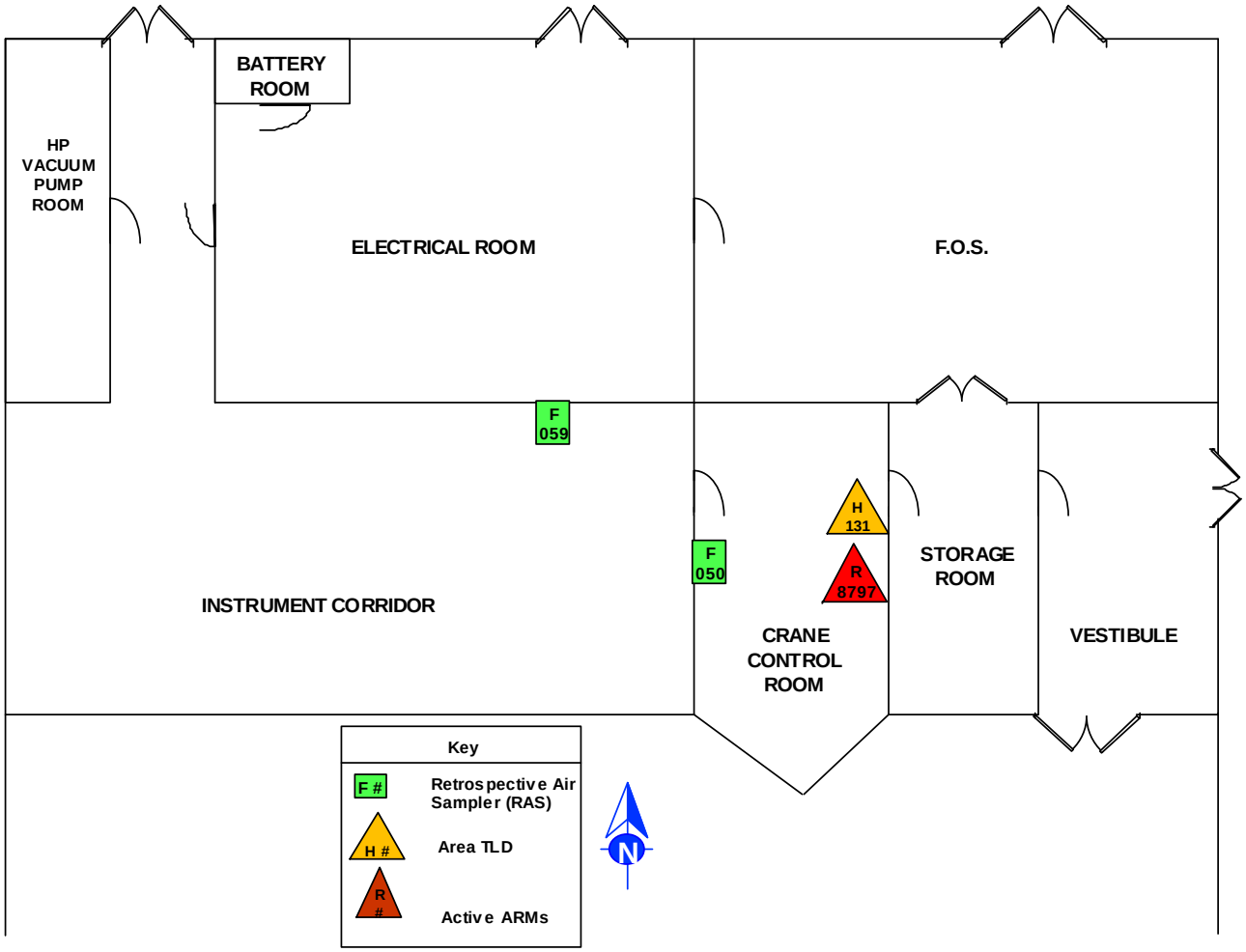
9.11 241-92H


RBOF
701-23H
H 228
F 087
T - GATE
H 064
F 086
HEPA
Hood
F 112
F 019
Tables
H 051
Counter
Cabinets
241-92H
(Enlarged for Detail)
F 018
Tables
Counter
COOLING
TOWERS
N
Key
F #
Retrospective Air Sampler (RAS)
H #
Area TLD
242-25H
242-9H
F 085
H 063
704-178H

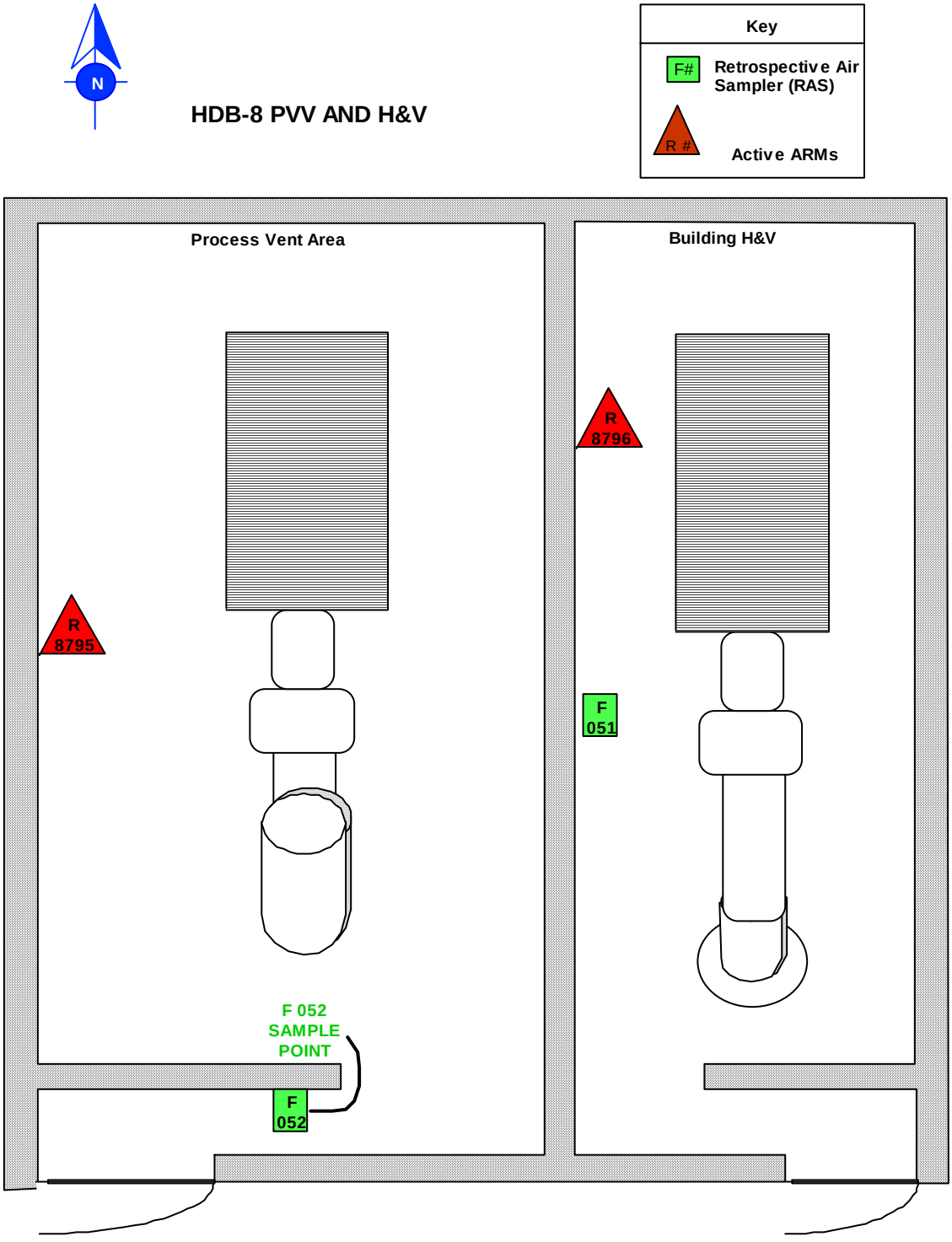
9.12 HDB-8 High Bay and Truck Well



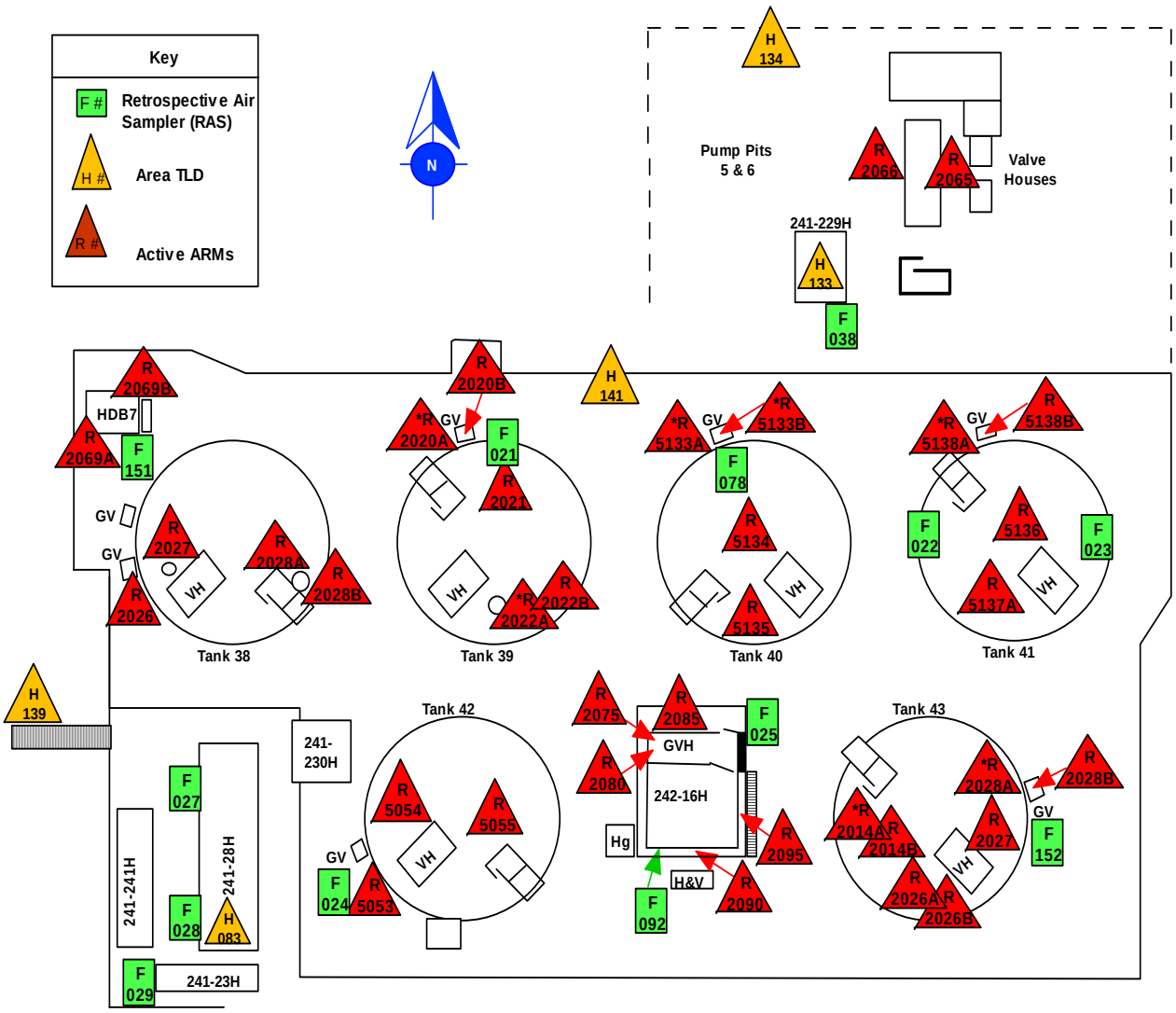
9.13 HDB-8 Crane Control Room and Instrument Corridor



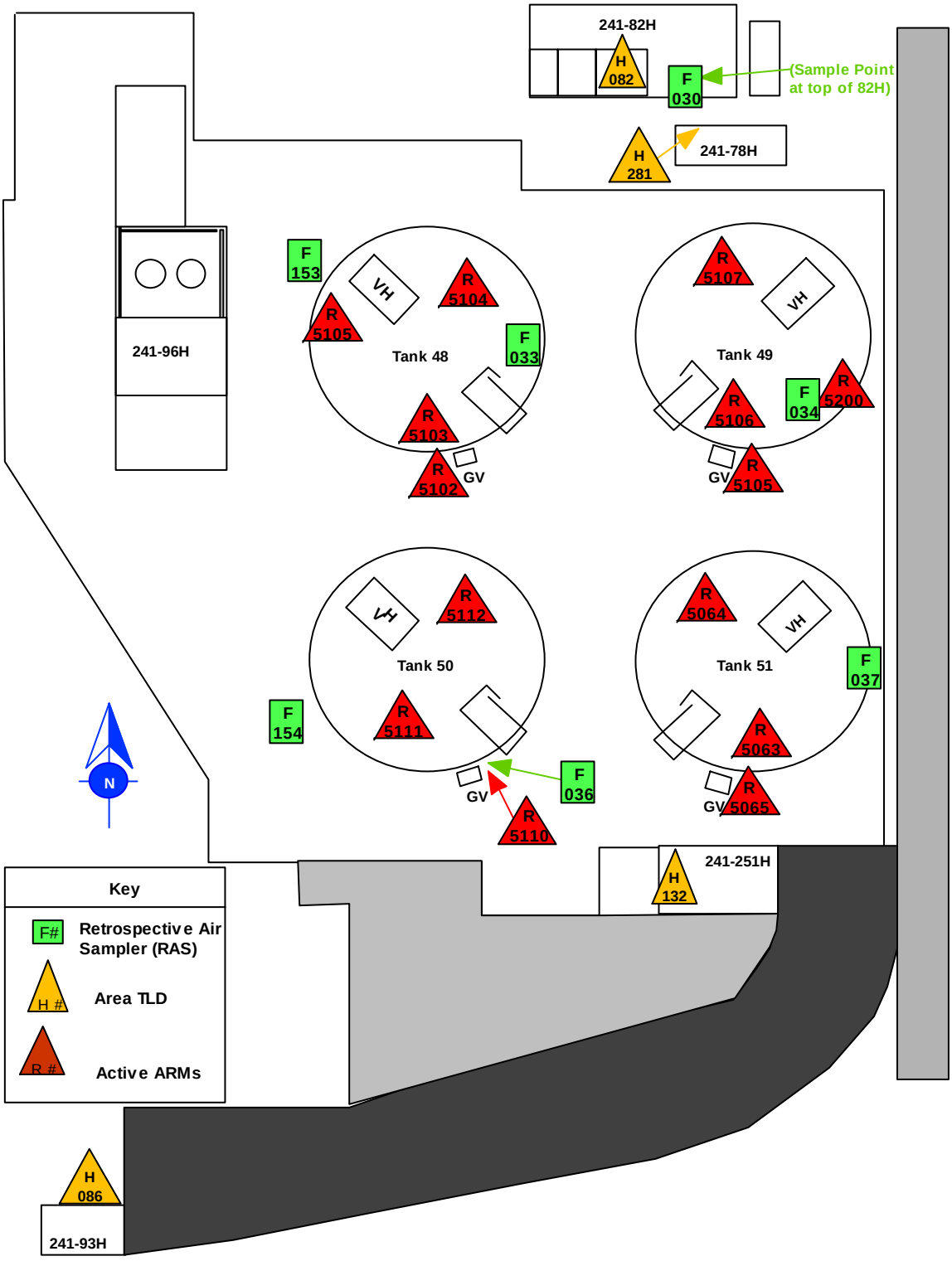
9.14 HDB-8 PVV and H&V



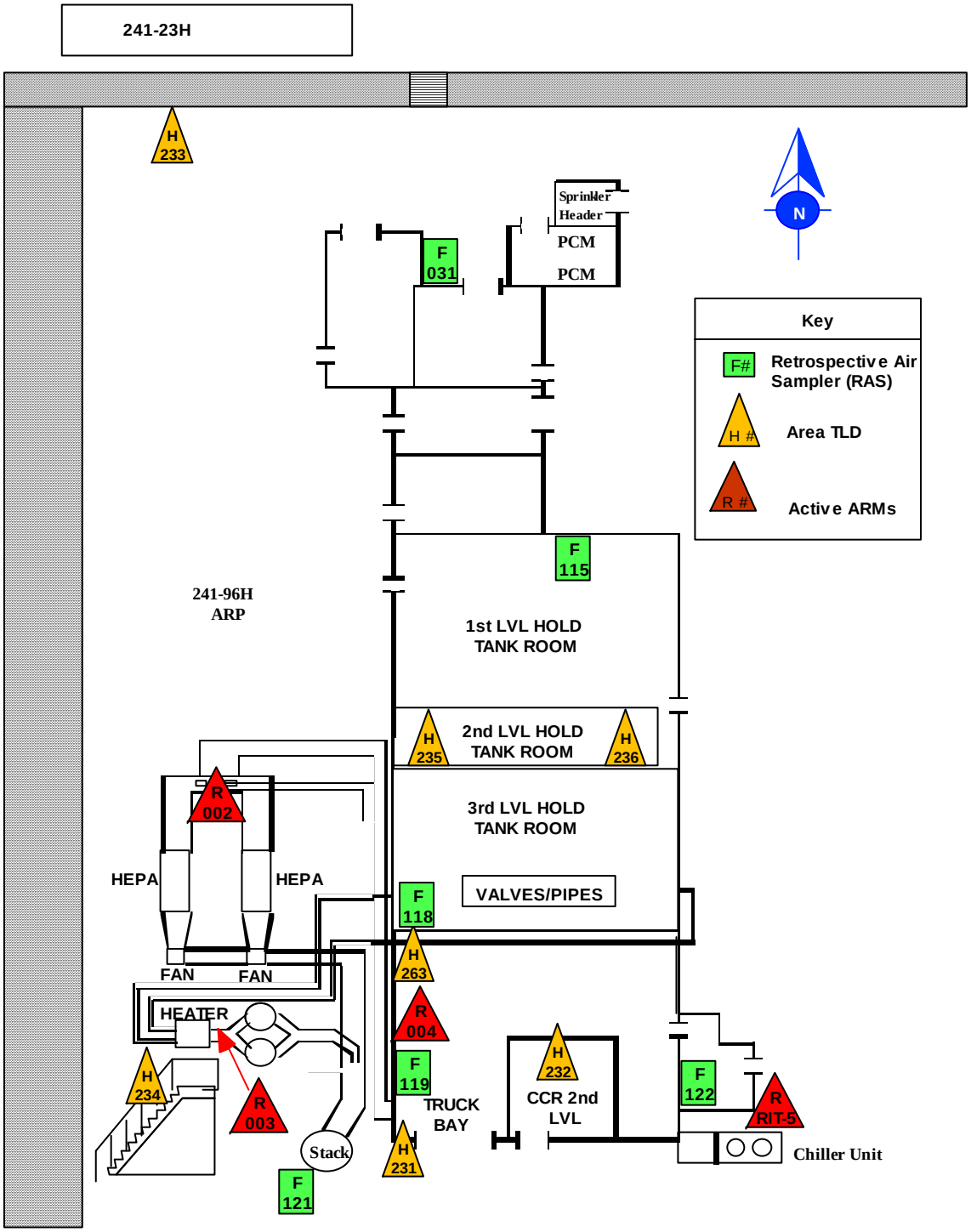
9.15 HTF East Hill Tank 38 – 43 and PP5&6



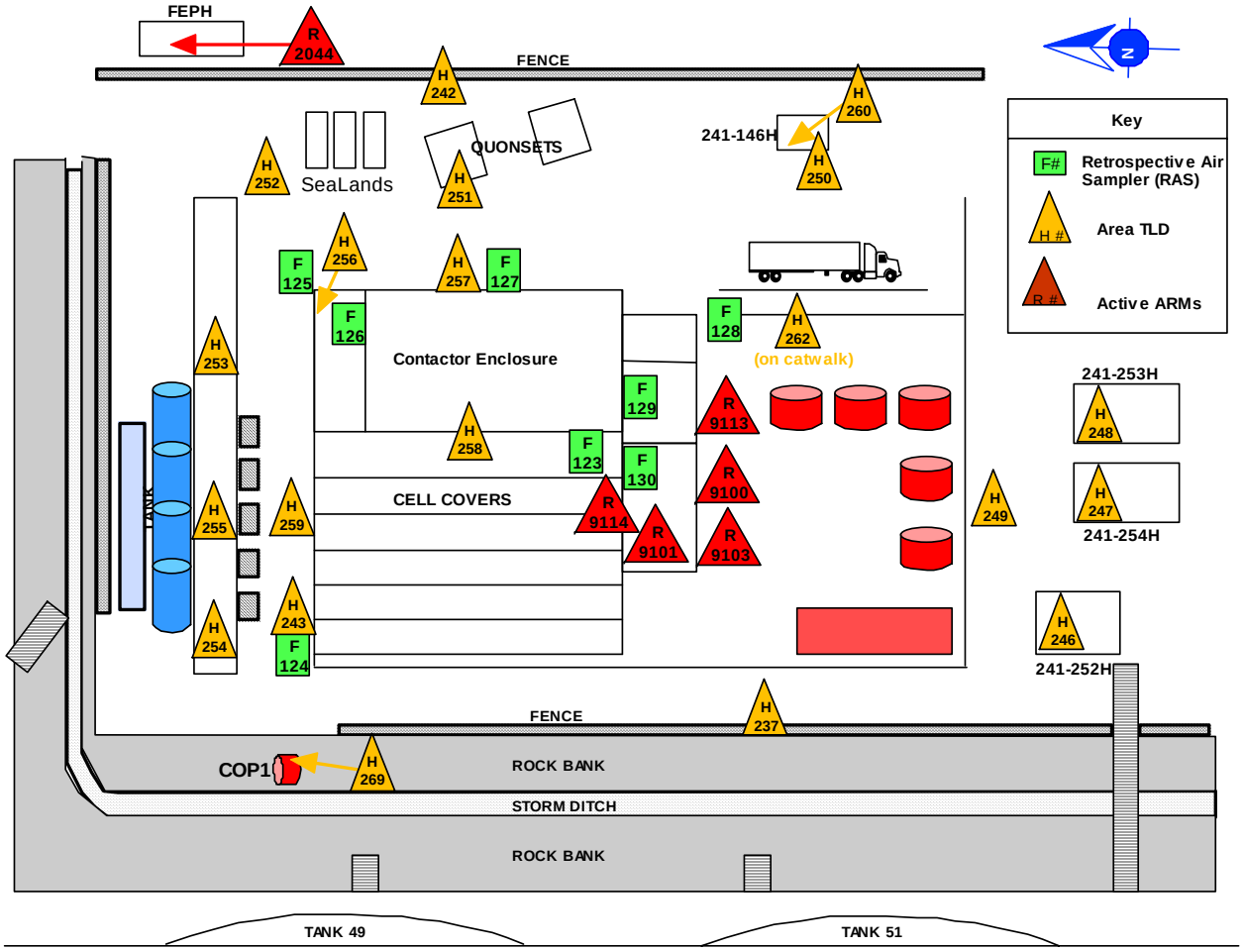
9.16 HTF East Hill Tank 48 – 51



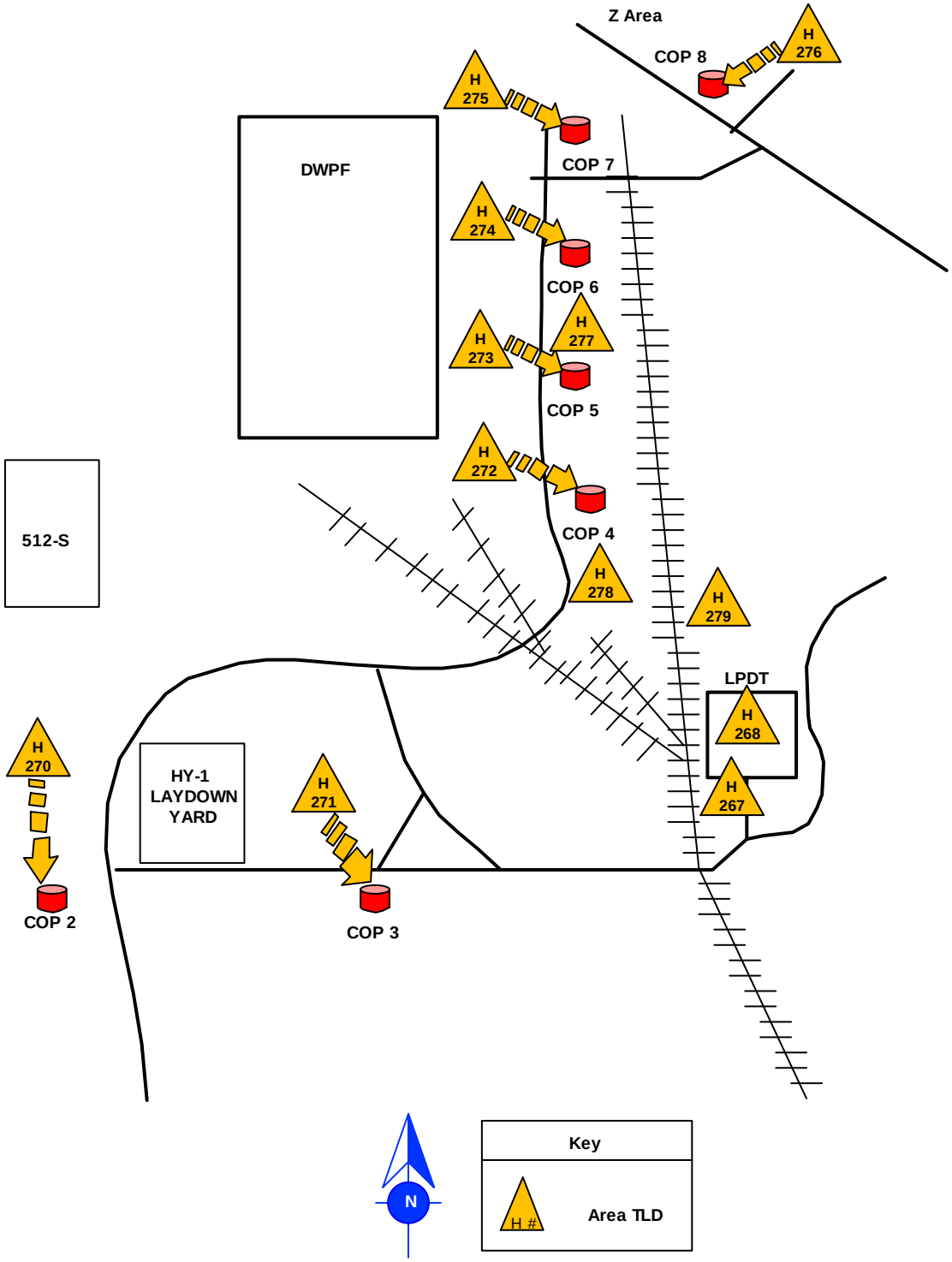
9.17 241-96H Actinide Removal Process (ARP)



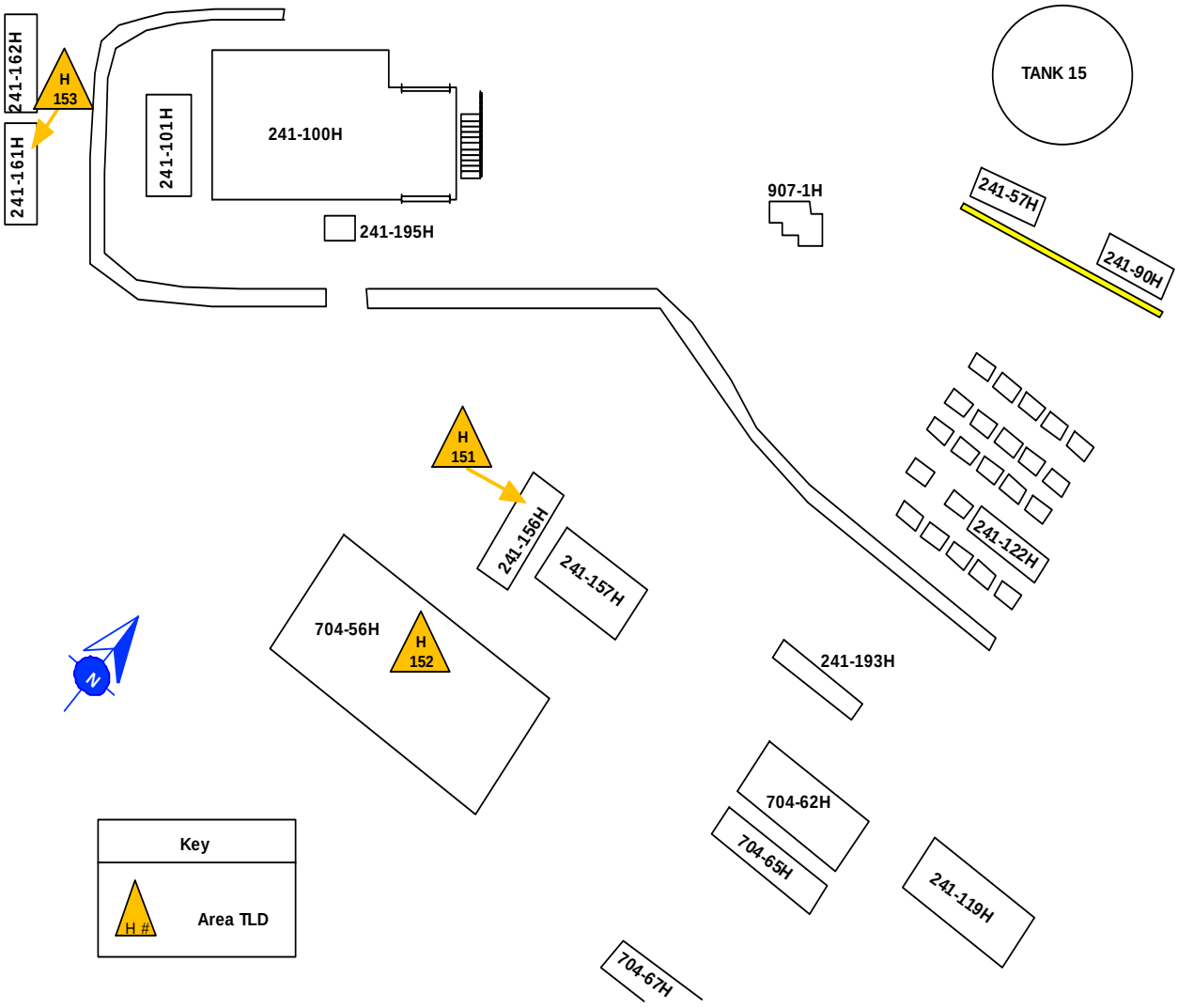
9.18 241-278H Modular Caustic Side Solvent Extraction Unit (MCU)



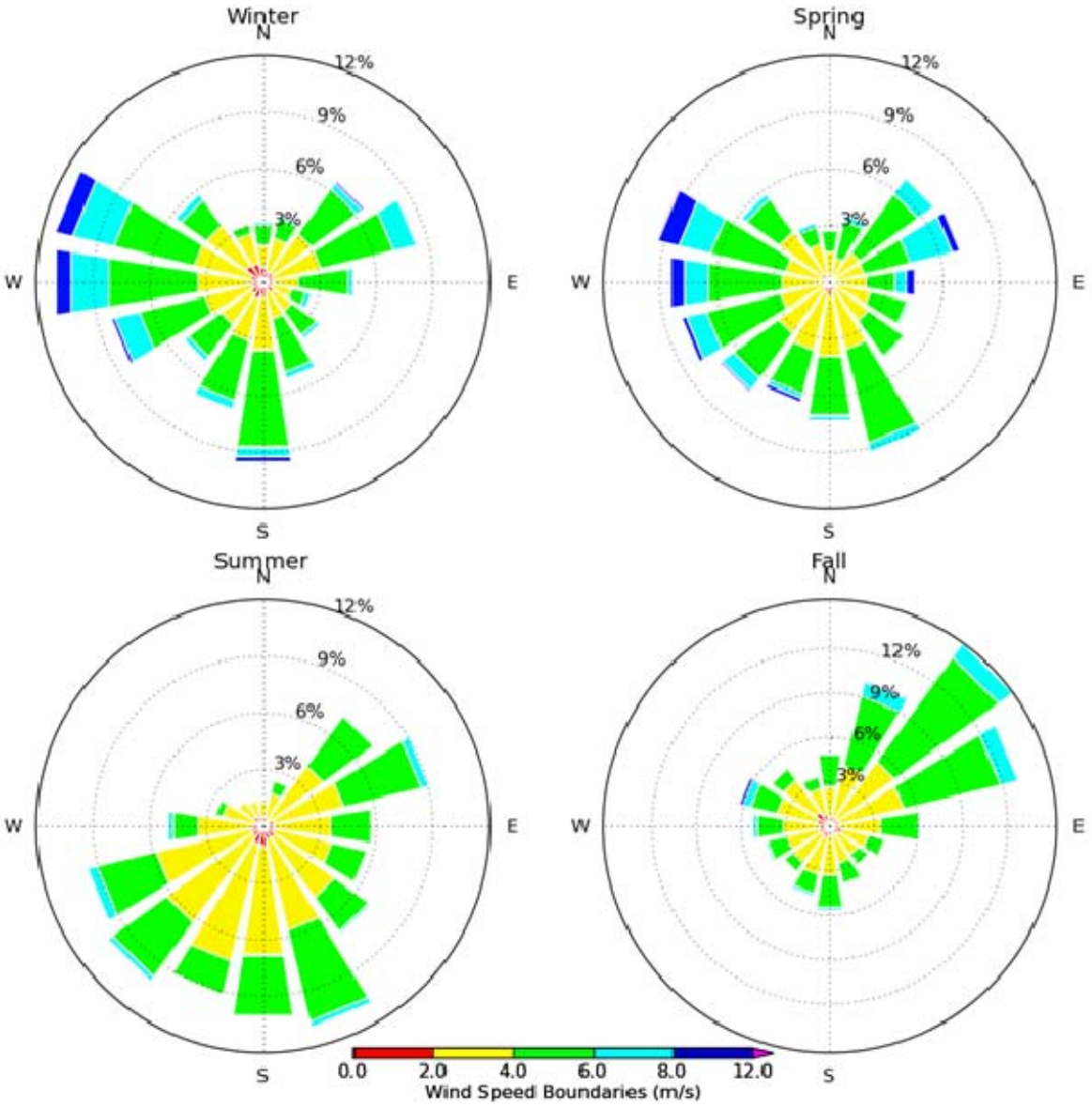
9.19 Clean Out Ports 2 – 8



9.20 Administrative Area



9.21 Seasonal Wind Rose Plots



10.0 References

10CFR835, *Occupational Radiation Protection*

WSRC 5Q, *Radiological Control Manual*

5Q1.2-132A, *Workplace Air Sampling and Monitoring*

5Q1.2-217, *Use of External Dosimetry*

5Q1.2-458, *Review of Sampling and Monitoring Systems*

WSRC-IM-2001-00025, *The Savannah River Site Workplace Air Monitoring Technical Basis Manual* (U)

SRR-RPE-2011-00012, *SRR Facilities 2011 Air Sampler and Monitoring Program Assessment*

ESH-HPT-95-0048, *Recommendation to Eliminate Constant Air Monitors in 241-96H (U)*

WSRC-TS-96-13, *Technical Safety Requirements, H-Tank Farm*

ESH-HPT-94-015, *Evaluation of Coverage Areas of Area Radiation Monitors in the SRS High Level Waste Tank Farms (U)*

WSRC-TR-95-0004, *VAMP Coverage Area for Personnel Protection (U)*, Rev. 0

SRR-LWE-2010-00237, *Area Radiation Monitor (ARM) Locations for Tank 13 Submersible Mixer Pump (SMP) Operation*, Rev. 2, 10/14/2011

LWO-RPE-2009-00024, *Justification for Removal or Redundant Area Radiation Monitors (U)*, Rev. 0, 8/4/2009

ESH-HPT-2000-00187, *Outdoor Air Sampling Technical Basis (U)*, 11/29/00

SRR-RPE-2011-00026, *Justification for Placement of Outdoor Facility Annual Review of Monitoring Systems (FARMS) Air Samplers*, Rev. 0, 10/26/2011

CBU-HDP-2003-00266, *2003 Review of Sampling and Monitoring Systems*

SRR-RPE-2014-00019, *LWO Low Level Neutron Exposure Assessment (U)*

SRR-RPE-2014-00018, *Tank Farms, Effluent Treatment Plant, & 299-H Maintenance Facility Personnel Monitoring and Beta-Gamma to Alpha Ratio Review (U)*

SRR-RPE-2014-00020, *Urine Bioassay Review for the Tank Farms, the 299-H Waste Management Maintenance Facility, and the Effluent Treatment Plant (ETP) (U)*

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*

ESH-HPT-95-0172 *HDB-8 Air Migration Study*

ESH-HPT-99-0066 *RHLWE Air Migration Study*

CBU-SHP-2005-0008 *241-92H Air Migration Study*

LWO-SHQ-2007-00027 *241-278H MCU Air Migration Study*

LWO-SHQ-2007-00028 *241-096H Air Migration Study*

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.