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F/H TANK FARMS WASTE COMPLIANCE PLAN FOR TRANSFERS TO THE EFFLUENT TREATMENT FACILITY

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1 BACKGROUND AND WASTE GENERATOR RESPONSIBILITIES

The Tank Farms receive waste from a number of sources. The waste is produced as the result of the separation of useful products from spent nuclear fuel and targets. To prevent corrosion of the carbon steel waste tanks, the waste is neutralized with sodium hydroxide and/or sodium nitrite in the Liquid Waste Generators processes before it is sent to the Tank Farms. Neutralizing the waste produces a mixture of insoluble sludge suspended in a salt solution. Any insoluble species in the waste settle to the bottom of the tank, forming a layer of sludge at the bottom, with a layer of supernate above it.

To reduce the cost of storage and improve the safety of storage, the supernate is evaporated to reduce its volume and mobility. The overheads from the evaporators are condensed and sent to a mercury collection tank where mercury is collected. After passing through the mercury collection tank, the overheads may be treated by passing them through a cesium removal column to remove residual Cs-137. This step is omitted for overheads that have been sufficiently decontaminated by the evaporator. Once all treatment steps in the evaporator system are completed, the overheads are sent to ETF for further decontamination and eventual release to the environment.

The ETF basins are provided to temporarily hold non-routine waste streams containing high levels of radioactivity resulting from process upsets at HLW facilities and Separations facilities. Storm zones are diverted when the tank farms are conducting liquid waste transfer, or when a zone's water monitor is out of service or initiates a false alarm due to administrative or precautionary reasons.

The ETF WAC designates the waste generators as responsible for:[1,2]

- developing, implementing and maintaining a waste certification program in accordance with the respective facility's approved Waste Certification Plan;
- their waste throughout its full life cycle;
- all cost incurred as a result of a noncompliance;
- allocation of adequate funding and resources to support the waste certification process;
- characterizing waste with sufficient accuracy per WAC 4.02 to permit proper segregation, treatment, storage, and disposal;
- identifying the Organization of the waste generator's (this should include the appropriate Engineering, Operations, Generator Certification Official lines of structure.

Attachment 1 contains the Organization charts for Concentration, Storage and Transfer (CST) and High Level Waste Engineering.

2 PROCESS DESCRIPTION

The purpose of the evaporator systems is to reduce the amount of liquid volume of high-level radioactive waste resulting from the nuclear processing. The boiling action in the evaporators causes the liquid to separate from the waste. The separation of the liquid from the waste reduces the waste volume to about 25% to 30% of the original volume.

Note: The description below is a generic description of the operation of the 242-H, 242-16H, 242-16F and 242-25H evaporators.

The waste in the evaporators is boiled using steam and separated into vapor and concentrated liquid. The concentrate is lifted out of the evaporator and gravity-drains down to a concentrate receipt tank. The overheads are cooled in the condenser. The overheads then enter the mercury removal tank where mercury in the overheads settles to the bottom of the tank for removal. The overheads tank is sampled for gamma activity. If the gamma activity is low, the overheads are directed to the Effluent Treatment Facility (ETF). Operating experience with the existing waste evaporators shows that the decontamination factor (DF, defined as the concentration of activity in the pot divided by the concentration of activity in the condensate) is approximately 10^4 to 10^5.[3,4] The 242-25H evaporator will provide a DF in the range of 10^6 to 10^8.[5] Overheads that do not sample within limits are returned to the feed tank and recycled back to the evaporator to further remove contaminants. Figure 1 presents a basic evaporator flow diagram.

The principal evaporator overheads components are summarized below.

Condenser – The condenser removes the heat from the overheads to condense them.

Mercury Removal Tank – The purpose of the mercury removal tank is to allow mercury from the overheads to settle, whereupon it is removed through a manually operated drain valve at the bottom of the tank.

Cesium Removal Column – The cesium removal column acts as an ion exchanger to remove cesium from the overheads.

Overheads Tanks – The overheads tanks collect and hold the condensed vapor until sample. It allows continuous operation of the evaporator by collecting vapor in one tank while the other tank is being sampled.

Overheads Sampler – The overheads sampler takes a sample to determine if the overheads meet the ETF limits. If the levels are higher than the ETF limits, then the overheads are sent to the feed tank to be reprocessed.

The Tank Farms receive incoming waste from a number of sources. Eventually, the waste is fed to the evaporators. The waste sources include, but are not limited to the following:[6]

- F-Canyon (Separations, including outside facilities)
- H-Canyon (Separations, including outside facilities)
- RBOF/RRF

- ETF
- Reactor Areas
- SRTC
- Analytical Laboratory Facilities
- Other Site Facilities
- Waste generated from decommissioning of tanks or other facilities

The Tank Farms receive the following recycle streams from within the HLW System:

- Spent decontamination solutions from the Tank Farm Maintenance Facility (299-H)
- Spent Wash Water from Sludge Processing
- Recycle from DWPF
- Highly contaminated cooling water or storm water
- Other internally generated streams

3 ETF WASTE ACCEPTANCE CRITERIA

3.1 Physical/Chemical

3.1.1 Volatile Organic Material

The organics in high-level waste are primarily the soluble residue of tri-butyl phosphate and n-paraffin used in the solvent extraction process in the canyons. These are relatively heavy organics, both of which have boiling points higher than water. Organics resulting from ion exchange resins (digested and undigested) were also received from the canyons. Only a small amount of ion exchange resins will be transferred to the Tank Farms due to the limited processing plans of the canyon facilities. Smaller quantities of organic constituents from RBOF and DWPF are also received in the Tank Farms. The Tank Farms contains more inorganic resins than organic resins, but inorganic resins (e.g., zeolite) do not decompose and form flammable constituents. Therefore, inorganic resins do not have a flammability concern from thermal, chemical or radiolytic decomposition.[7] Another source of organic material is from the defoaming agents used in the evaporators. The organic constituents that are present in the defoaming agents are not expected to contribute significantly to the composite lower flammability level due to the limited quantities and the significant dilution from the tank farm supernatant.[7]

The Table below summarizes the most current waste tank data for organics (O/A vol.% – organic over aqueous). Currently, the organic content of incoming waste streams into the Tank Farm waste tanks is limited to <0.5 vol.% O/A.[12] This limit was established to ensure the vapor space in the waste tanks is non-flammable.

Table 1 – Waste Tank Organic Content Sample Data[8]

Waste Tank	O/A vol.%
26	0.032
33	0.12
38	0.03
43	0.004
46	0.007

The Tank Farm Authorization Basis (AB) requires a minimum separation between the evaporator feed pump suction location and the supernate waste liquid in the evaporator feed tank with organics.[9] Therefore; the concentration of organics (if any) in the evaporator overheads should not produce (at equilibrium) vapors in the flammable or explosive range during normal operations at ETF. Samples from the 242-16F, 242-16H and 242-25H evaporator overheads submitted for analysis in the SRTC Lab were analyzed for a few specific organic compounds.[10] Table 2 below summarizes the organic compound results.

Table 2 – Organic Compounds

Species	ETF WAC Limit (mg/l)	242-16H Evaporator Overheads (mg/l)	242-16F Evaporator Overheads (mg/l)	242-25H Evaporator Overheads (mg/l)
Butanol	-	0.16	0.021	<0.01
Phenol	50	<0.1	<0.1	<0.1
TBP	50	<0.1	<0.1	<0.1
DBP	-	<10	<10	<10
benzene	3	<0.025	<0.0019	<0.001
n-paraffin	-	<0.1	<1	1.5
trimethylamine	-	<20	<20	-
dimethylamine	-	<10	<10	-
methylamine	-	<10	<10	-

Note: The sample data corresponds to the samples pulled on:

December 1999 – 242-16H evaporator

September 2000 – 242-16F evaporator (data Report is not final)

November 2000 – 242-25H evaporator (data Report is not final)

The phenol, benzene, and the TBP concentrations are within the ETF WAC limits.

3.1.2 Toxic Gases, Vapors and Fumes

Currently ammonia is received in the Tank Farms from the Separations facilities. Ammonium nitrate collects on the vessel vent filters in the Separations canyons. When these filters are flushed, the canyons make the flush solutions strongly alkaline by the addition of sodium hydroxide prior to transfer. Due to the high hydroxide concentration (~1.1 M) essentially all of the ammonium nitrate exists as ammonia. Therefore, most of the ammonia evolves and evaporates into the pump tank and waste tank vapor space. The DWPF is presently processing sludge only (no salt). Recycle from DWPF containing trace concentrations of ammonia is received in H-Tank Farm.

The Tank Farm WAC limits the amount of ammonia to less than 0.127 wt% (1650 mg/l) to maintain the equilibrium vapor phase ammonia concentration to less than or equal to 15% of the Lower Explosive Limit (LEL).[11] The final ammonia supernate concentration will be less than the incoming waste streams due to the dilution factor added by the waste tank contents.

In 1976 the canyons changed their processing flowsheet to reduce the amount of ammonia generated by destroying hydrazine and sulfamate with nitrite. This change resulted in a 94% reduction in the ammonia sent to the tank farms.[7]

Table 3 –Evaporator Overheads Ammonium Sample Results

Evaporator	NH_4^+, (mg/l)
242-16H	27
242-16F	33
242-25H	<10

Note: The sample data corresponds to the samples pulled on:

December 1999 – 242-16H evaporator

September 2000 – 242-16F evaporator (data Report is not final)

November 2000 – 242-25H evaporator (data Report is not final)

Samples of the 242-16F, 242-16H and 242-25H evaporator overheads sent to the SRTC Lab for analysis have been analyzed for the ammonium ion (NH_4^+).[10] Quarterly sample analysis results for ammonium are included in Table 3.

3.1.3 Listed Waste

No RCRA hazardous 'listed' waste is allowed to be transferred into the Tank Farm waste tanks.[12] Therefore, no hazardous 'listed' waste will be transferred to ETF as part of the evaporator overheads.

3.1.4 Chemical Contaminants

The waste stored in the High-Level Waste tanks in F Area and H Area is a complex mixture of insoluble and soluble chemical compounds that were generated from chemically processing nuclear materials at the Savannah River Site. The waste is hazardous due to the presence of hydroxide, nitrite and various soluble and insoluble chemical compounds of toxic metals (i.e., lead, silver, cadmium, selenium). The principal chemicals present in the evaporator overheads are the chemicals present in the high-level waste liquid waste (supernate) evaporated. The major chemicals are the corrosion inhibitors needed to prevent corrosion of the carbon steel waste tanks and equipment. These major species include hydroxide, nitrite, and nitrate. No other chemicals are added to the waste tanks besides the aforementioned inhibitors, chemicals received in the incoming waste streams, and small quantities of defoaming agents used in the evaporators. The incoming waste streams are evaluated before receipt into the Tank Farms and the concentration of any chemicals is limited per the Tank Farm WAC.[12]

Table 4 below summarizes the most recent chemical contaminants results for the 242-16F, 242-16H and 242-25H overheads samples sent to the SRTC Lab for analysis.[10]

Table 4 – Chemical Contaminants

Species	ETF WAC limit (mg/l)	242-16H Evaporator (mg/l)	242-16F Evaporator (mg/l)	242-25H Evaporator (mg/l)
Ammonium	150	27	33	<10
Cl	5	1	<0.2	<2
Ag	1	<0.002	<0.006	<0.006
As	1	<0.0009	0.00205	0.00185
B	6	<0.058	<0.005	<0.005
Ba	2	<0.002	<0.002	<0.002
Be	5	<2E-04	<0.001	<0.001
Ca	22.9	<0.01	0.038	<0.018
Cd	0.6	<0.001	<0.003	<0.003
Cr	5	<0.023	<0.007	<0.007
Cu	2	<0.003	<0.002	<0.002
Hg	2	1.09	0.0154	0.0902
K	1000	0.78	<0.135	<0.135
Mg	13	0.061	0.004	<0.001
Mn	31	<0.001	<0.001	<0.001
Mo	0.48	<0.004	<0.004	-
Na	600	12.7	0.911	0.049
Ni	2	<0.003	<0.007	<0.007

Note: The sample data corresponds to the samples pulled on:

December 1999 – 242-16H evaporator

September 2000 – 242-16F evaporator (data Report is not final)

November 2000 – 242-25H evaporator (data Report is not final)

Since June 2001 high levels of mercury have been found in the 3H evaporator overheads system. The Hg concentration in the overheads ranged from 1.04 to 5.95 mg/l (average of 3.31 mg/l). A deviation to the ETF WAC was submitted for continued operation of the evaporator and determination of the optimal operating parameters for the evaporator. (Refer to Deviation Request No. SWMD-RFD-2001-0064). A Problem Identification Report was issued to ensure samples are analyzed in a timely manner (2001-PIR-05-0060).

Table 4 – Chemical Contaminants (Continuation)

Species	ETF WAC limit (mg/l)	242-16H Evaporator (mg/l)	242-16F Evaporator (mg/l)	242-25H Evaporator (mg/l)
Pb	2	<0.018	<0.028	<0.028
Phenol	50	<0.1	<0.1	<0.1
Sb	40	<0.0005	<0.066	<0.066
Se	1	0.0242	0.0011	0.00545
Si	5	3.60	0.399	0.174
Sn	2	<0.005	<0.005	-
TBP	50	<0.1	<0.1	<0.1
Zn	40	<0.002	<0.003	0.003
Nitrate	1600	<1	<1	<10
Nitrite	300	<1	<1	<10
Sulfate	40	0.7	<0.5	<5
Aluminate	100	<30	<0.002	<0.002
Carbonate	200	<30	<0.002	<0.002
Fluoride	100	<0.2	0.5	<2
Phosphate	100	<1	<1	<10
Oxalate	100	<1	<1	<10
Chloride	5	1	<0.2	<2
Other Limits				
TOC	100	5	9.59	3.113
TSS	40	ND	0.003	ND
particle size	40 MESH (350 micron)	-	<3	ND
benzene	3	<0.025	0.0019	<0.001
EDTA	3	-	<20	<20
methanol	2	-	<0.001	<0.01
isopropanol	50	-	<0.001	<0.01
other volatiles	20	Refer to Table 2	<0.001	<1
pH	1-12.5	8.00	9.729	6.304

Notes to Table 4:

1. "-" Represents that a value was not reported and no sample data is available.
2. The table was updated with the most recent sample data available.[10] Samples of the 242-16H evaporator will continue to be analyzed per the schedule in Section 3.6 after successful completion of the evaporator pot cleaning efforts.

The only current source of phenol is tetraphenylborate (TPB). The Tank Farm WAC and the Tank Farm SAR prohibits transfers of liquid waste into the waste tanks containing TPB unless an evaluation is performed. Therefore, the ETF limit could not be exceeded.

3.2 Radioactive Inventory

Since tritium is evaporated in the HLW evaporators all the tritium present in the supernate during evaporation will be transferred to the ETF in the overheads. Actual overheads and supernate data shows concentration of tritium in the range of 10^5 dpm/ml. Refer to Table 5 below. Therefore, it is expected that the tritium limit could be exceeded. A deviation request for tritium is included as part of this WCP.

Table 5 - Tritium sample Data:

	dpm/ml
242-F Overheads	49.9
242-16F Overheads	2.95E5
F catch tank	1.48E4, 1.42E4
26F	3.63E5
33F	4.70E3
46F	3.29E5
47F	6.83E4
242-16H Overheads	3.49E3
29H	4.67E4
30H	4.4E5
32H	5.33E5
35H	7.31E5
36H	1.29E5

The most recent evaporator overheads sample data shows a tritium activity of 1810 dpm/ml for the 242-16H evaporator, 1.26E5 dpm/ml for the 242-16F evaporator, and 6.93E5 dpm/ml for the 242-25H evaporator.[10]

Evaporator overheads data (PHA) is included in Attachments 1, 2, and 3.[13] The data represents the daily maximum overheads activity. The 242-25H evaporator activity can also be verified in the mercury removal tank. Historically, evaporator overheads samples were taken where the Cs-137 exceeded the ETF WAC limit for a single batch transfer. Since the ETF Cs-137 limit could be exceeded for a single batch transfer, a compliance strategy and a deviation request is submitted as part of this WCP.

Table 6 - Evaporator Overheads Iodine –129 Sample Data:[14]

Evaporator	dpm/ml
242-16F	<0.0339
242-16H	<2.46E-03
242-25H	0.163

The concentration of I-129 in supernate for some Tanks is summarized in Table 7 below.[15] Overheads sample data shows the limit has not been exceeded.

Table 7 – Iodine-129 in HLW Supernate

Waste Tank	I-129 (dpm/ml)
11	2E2
32	2E2
12	6E2
15	6E2
30	6E2
9, 10	4

Table 8 below summarizes the most recent overheads sample data.[10]

Table 8 – Radioactive Contaminants

Radionuclides	ETF Limit (dpm/ml)	242-16H Evaporator (dpm/ml)	242-16F Evaporator (dpm/ml)	242-25H Evaporator (dpm/ml)
H-3	1.2E5	1810	6.5E4	3.71E5
Cs-137	1.2E3	178	371	571
Gross Alpha	1.0E2	<7.70	<1.31	<6.94
Gross Beta/Gamma	2.5E3	1080	430	1960
C-14*	2.5E3	0.558	0.558	-
Ni-59	2.5E3	<16.8	<16.8	-
Ni-63***	2.5E3	-	-	-
Co-60	1.3E1	<0.195	<0.0522	<0.0534
Se-79**	5.0E1	0.164	0.164	0.164
Sr-90	1.8E2	<74.5	<64.8	<7.04
Y-90	1.8E2	<74.5	<57.5	<55
Nb-94	6.3E1	<12.1	<0.0434	<0.0493
Tc-99	2.5E3	<9.08	<9.08	-
Ru-106	7.9E2	<148	<2.29	<2.84
Rh-106	7.9E2	26	<2.29	<2.84
Sn-126	7.0E2	<20.9	<0.522	<0.646
Sb-125	2.5E2	<38.5	<1.17	<1.46
I-129	1.0E0	<2.46E-3	<0.0339	0.163
Cs-134	2.5E3	<13.1	0.603	1.15
Eu-154	2.5E1	<16.0	<0.141	<0.152
Np-237	1.3E-1	<21.3	<0.0532	<0.00939
Pu-241**	1E2	0.217	<4.63	<8.92
RCG	1.2E-2	<4.466E-3	<3.75E-3	<0.01

RCG = (0.0145[Co-60] + 0.0078[Ru-106] + 0.013[Sb-125] + 0.022[Cs-137] + 0.061[Eu-154] + 0.0705[Sn-126])/2200

Notes to Table 8:

1. *Based on supernate sample data adjusted by DF of 10^4 (references 16, 17, 18, 19).
2. ** Based on process knowledge (fission yield data).
3. ***Activation product (not a fission product).
4. "-" Represents a value was not reported.

The sample data corresponds to the samples pulled on:

December 1999 – 242-16H evaporator

September 2000 – 242-16F evaporator (data Report is not final)

November 2000 – 242-25H evaporator (data Report is not final)

The analysis results reported in Tables 4 and 8 are documented in reference.[10] Most of the species were below their limit of detection for the analysis method.

No sample data is available for Ni-63. Nickel-63 is an activation product that is expected to be present in HLW in very small quantities (below detection limits). Therefore, it will be exempted from any characterization.

3.3 ETF Basins

The discussion that follows is credited to reference 20.

Water that is diverted to the ETF basins could contain a wide variety of radionuclides. Historically, waste tank supernate has been the most likely source because that was the only material routinely moved around the tank farm (e.g., feeding the evaporators). Now that waste removal and processing operations are becoming more common, the range of likely compositions is widening. The curie content of a real contaminated diversion could vary widely, and the actual radionuclide distribution will have to be determined after the event. In ETF's first 5.5 years operating history, only one real diversion occurred, although ETF's original design basis anticipated a frequency of about one per year. Regardless of the frequency, when the water is contaminated, it can be sent to the ETF treatment plant, the water can be sent to the tank farms, or alternative treatment could be provided (e.g., Chem-Nuclear treated the 1989 diversion).

In the basins' influents, slight amounts of activity and chemicals can be absorbed on dirt particles, and the larger suspended particles typically settle out in the large basins. Periodically the basins are emptied and any accumulated sediment is removed. Table 9 below summarizes sample result of the ETF basins' sediments. These results are an initial representation of the concentration of contaminants that could reach the ETF basins when a diversion occurs. As indicated in the previous paragraph, the actual concentration of contaminants will have to be determined after a real diversion occurs.

Table 9 – ETF's Retention Basins' Sediment Data[20]

	F-Area Retention Basin	H-Area Retention Basin	
Sample date	03/93	05/31/91	03/93
As*	-	-	<0.20
Ba*	-	-	1.074
Cd*	-	-	<0.10
Cr*	-	-	<0.05
Pb*	-	-	<0.50
Hg*	-	-	<0.0121
Se*	-	-	<0.10
Ag*	-	-	<0.05
Co-60♦	ND	ND	ND
Cs-137♦	ND	1.11	1.8
Am-241♦	ND	ND	ND
Others♦	ND	0.016 (Cs-134)	ND

*Units are in mg/l.

♦Units are nCi/g

Currently the Tank Farms divert the storm zones when transfers are conducted, when a zone's water monitor is out of service or initiates a false alarm. The storm water systems are sampled daily. If the storm water monitor is on the credible transfer path of a transfer, it is sample every six hours. Likewise, if the monitor is out of service it is also sampled every six hours.[21] In addition, procedures require notification to ETF and WPT when there is a diversion of the Storm Water System from the Creek to the Basin. In the event of a real diversion (e.g., emergency during a liquid waste transfer), the F/H Tank Farms in conjunction with ETF will determine what actions are to be performed for the safe management of the waste and future processing. In the event high levels of lead and/or copper are found in the basins (during ETF's annual sampling of the basins), the Tank Farms will support the ETF in determining the source of the contamination. This could include sampling of the storm water system.

3.4 Catch Tank Transfers into ETF

H-Area catch tank was designed to collect waste leaked into HDB-1 and the concrete encasements, which contain transfer pipes, from waste tanks 9-16.[9] The catch tank mostly consists of rainwater which has soaked through the concrete encasements. The catch tank has a capacity of 11,700 gallons and is enclosed in a cell.[9] There is no overflow line on the catch tank, and in the event that the catch tank volume capacity is exceeded, the liquid will begin to back up in the concrete encasements which drain to the tank.[9] In order to prevent the catch tank from overflowing into the concrete encasements, the catch tank contents are transferred to ETF. Table 10 summarizes the most recent sample results of the catch tank contents.

F-Area catch tank was designed to collect waste leaked into FDB-1 and certain line encasements.[9] The contents of F-Area catch tank are sent to Tank 26; therefore, this WCP is not applicable to F-Area catch tank. However, in the future, if F-Area catch tank contents are to be sent to ETF this WCP must be revised.

Table 10 - H-Area Catch Tank Inventory

Species	ETF WAC Limit (dpm/mL)	Sample Data 9/25/00	Sample Data 1/23/01
Alpha	100	<25	<1
Beta-gamma	2500	92	167
Cs-137	1200	189	204
pH	1-12.5	8.5	8.7

3.5 Criticality

Waste received in the Tank Farms shall be inherently safe with respect to criticality for any concentration and mass in the uncontrolled geometry of the waste tanks. The concentration of fissile material in high level waste supernate is limited by solubility. The concentration of fissile material in the evaporator overheads is assessed or monitored by the ETF total alpha activity limit. The 100 dpm/ml alpha limit represents a very small amount of fissile material. The two main isotopes in HLW considered for criticality purposes are Pu-239 and U-235. If the alpha activity limit is assumed to be Pu-239, the concentration of Pu-239 in the supernate will have to be ~8 mg/l (5 times higher than the Pu solubility limit in supernate). Assuming all alpha is U-235, the U-235 concentration in supernate will be ~2E5 mg/l (at least 10^3 times greater than the U solubility limit in supernate). Therefore, it is incredible that fissile material in the overheads will approach concentrations that could cause a criticality event.

3.6 Administrative Controls

3.6.1 Compliance Plan

The method to ensure compliance with the ETF WAC is through historical supernate sample data, fission yield data, and sampling of the evaporator overheads. The evaporator overheads transferred to the ETF are the result of the evaporation of the supernate contained in the high level waste tanks. Therefore, available supernate data can be used to demonstrate that after evaporation, the transferred overheads will meet the ETF WAC limits. Any changes in influents into the Tank Farms will be evaluated per the Tank Farm WAC, and impacts in processing (evaporation) will be assessed. Any impacts to the characterizations of the overheads will require revision of this WCP (including Deviations) and approval by ETF. Evaporator overheads samples will be analyzed according to the schedule below. Sample analysis results are included in this WCP, and will be provided to ETF in a separate technical report. A tracking system will be developed to ensure samples are analyzed per the schedule in Table 11.

Table 11 - Sample and Analysis Schedule for the Evaporator Overheads

Batch		Monthly		Quarterly		Annually	
Species	Lab	Species	Lab	Species	Lab	Species**	Lab
Cs-137	PHA	Total α	ETF	Total α	ETF	Species from Attachments 1 and 2 of WAC 4.02.	SRTC
		Total β/γ	ETF	Total β/γ	ETF		
		Tritium	ETF	Tritium	ETF		
		NH3+	ETF	Sr-90	SRTC		
		Al*	ETF	Cs-137	SRTC		
		Cr	ETF	I-129	SRTC		
		Cu	ETF	TOC	SRTC		
		Fe*	ETF				
		Hg	ETF				
		Pb	ETF				
		Si	ETF				
		Zn	ETF				
		TSS	ETF				
		Conductivity*	ETF				
		Oil & Grease*	ETF				
		pH	ETF				

* Species not required per ETF WAC. Analyses will be done per ETF request.

** Except Ni-63 and Rh-106. These species do not exist in the waste due to their short half-life or very small quantities.

Notes:

1. The Quarterly and Annual sample results will be provided to ETF within three month of the sample(s) being taken for those samples sent to the SRTC lab for analysis. The monthly sample results will be documented and provided to ETF within a week after the analysis results are received from the ETF lab.

3.6.2 Deviations to the ETF WAC

The following species could exceed the ETF WAC limit during normal processing (evaporation) of high-level waste supernate: tritium, and cesium-137. A Request/Approval for Deviation OSR form (OSR 29-41) will be submitted to the ETF requesting allowance for transfers of overheads that might exceed these species limits. Proper justification for the deviations will be included in the deviation request form.

Tritium:

There is no technology available for the removal of tritium. Tritium evaporates and will be sent to ETF in the evaporator overheads. CST will continue to monitor the tritium output from the overheads via sampling of the overheads, waste tank contents, the data that ETF provides from the F&H Lift Stations, or ETF's Waste Water Collection Tanks 1&2, and ETF's Treated Water Tanks 1,2, and 3. CST will use this data in conjunction with ETF facility management's direction to control the output of tritium to ETF. This control will occur by several methods, which include:

1. Limiting the operation of the evaporator system(s) that are contributing to the high tritium situation. Currently the highest tritium concentration is 7.31E5 dpm/ml. Therefore, the overheads will be limited to 7.31E5 dpm/ml.
2. Coordinate the release of tritium via the evaporator overheads with the ETF facility direction (run the evaporator in campaigns to allow time for the natural dilution process of the ETF receipt system to occur).
3. Coordinate the release of tritium via the evaporator overheads with NMMD division's operating schedule to control the tritium release levels to or below the ETF limit.
4. Request ETF to alter their operating schedule to accommodate more tritium releases (curies/day) per week.
5. A combination of 1-4.

This permanent deviation is covered under SWMD-RFD-99-046.

Cs-137:

The Cs-137 limit could be exceeded for a single batch transfer during normal evaporator operation. Overheads that are outside the ETF limits must be sent to the evaporator feed tank. This results in operational constraints and cost. The activity of the evaporator overheads is usually high after a shutdown. This usually results from an increased in specific gravity and low vapor velocities. This translates into a lower efficiency of the demister pad and higher activities in the overheads. Transfer data from 1997 through 2001 shows that the daily average Cs-137 activity in the overheads is less than 2,000 dpm/ml even though the batch limit of 2,000 dpm/ml can be exceeded. For example, the activity of the 242-25H evaporator feed is high enough that a minimum DF of 1E7 is required to meet the ETF limit. Samples of the evaporator overheads will be taken and analyzed for Cs-137. CST will trend the evaporator overheads PHA data.

3.6.3 Documentation

Procedures are used to sample the evaporator overheads and to transfer the overheads to ETF. Samples from the evaporator overheads will be analyzed, and the results will be provided to ETF in a separate technical report.

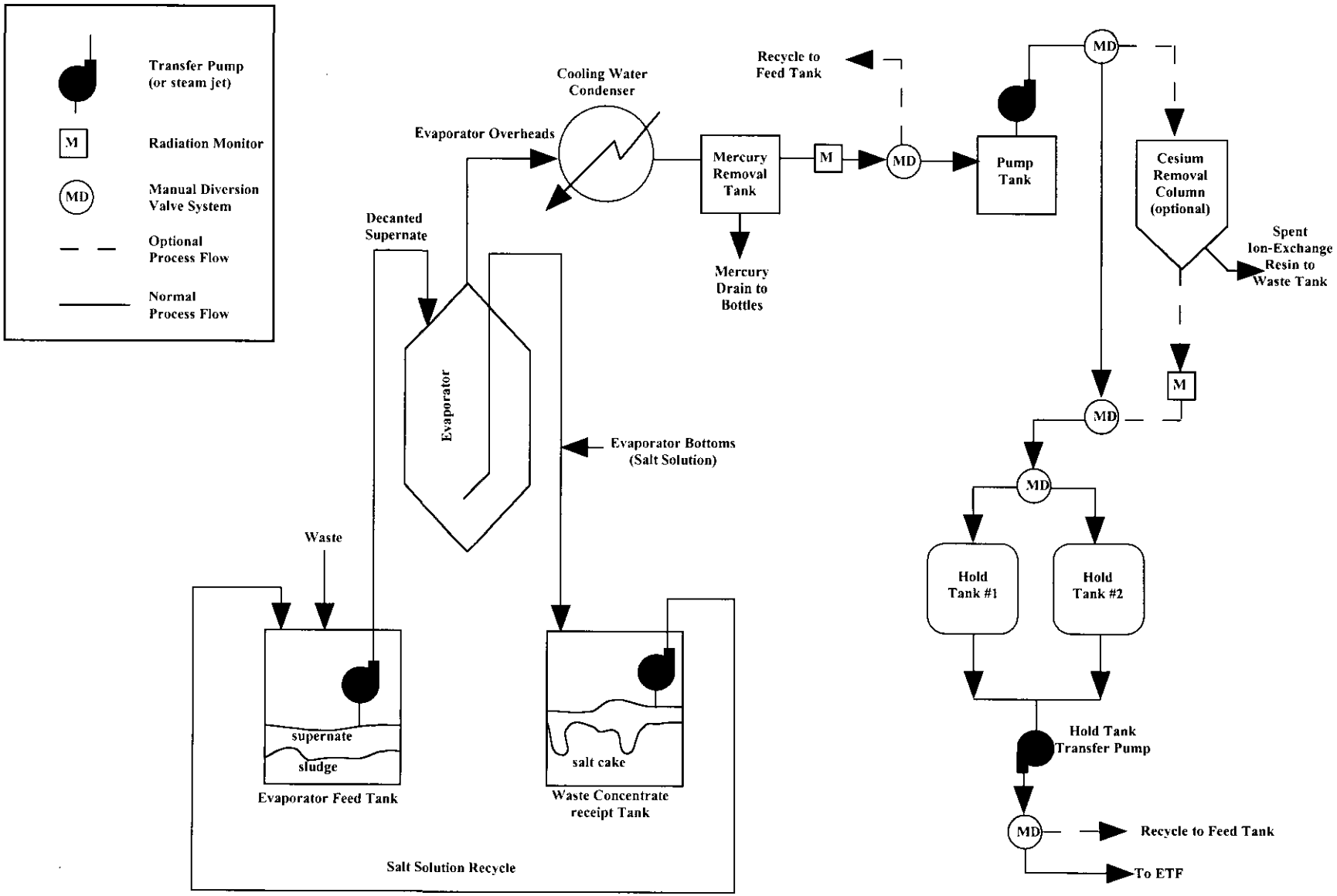
3.6.4 Waste Characterization Non-Compliance

ETF will be notified of any non-compliance with this WCP and the ETF WAC. The NCR and SIRIM procedures are to be invoked as appropriate. The Tank Farm WAC requires the Liquid Waste Generators to characterize the waste sufficiently for CST to demonstrate that the Tank Farms' ability to meet various criteria imposed by the downstream processing facilities will not be impaired. CST will participate in any corrective actions resulting from a non-compliance.

4 ATTACHMENTS

Figure 1

BASIC EVAPORATOR FLOW DIAGRAM



Attachment 1 – Organization Charts

W8000 - HLWM CHIEF ENGINEER (96285)

Parent: W0000 - HLWM DIVISION

Switch to Financial View

275 Total Personnel Assigned on Administrative Org Tree for W8000

W8000	**8** HLWM CHIEF ENGINEER	**96285** LEX, THOMAS J.
⊞ W8100	**74** WD ENGINEERING DIRECTOR	**96284** KERLEY, WILLIAM D.
⊞ W8200	**29** REGULATORY PROGRAMS	**96278** DEWES, JOHN N.
⊟ W8300	**17 CST ENGINEERING**	**96275** MILLER, MARSHALL S.
⊞ W8310	**25** HTF & EAST HILL SYSTEM ENGIN.	**96274** ORTNER, TERRY L.
⊟ W8320	**12 CST ENGINEERING SUPPORT**	**96273** LEWIS, BRENDA L.
W8321	**10** WASTE CHARACTERIZATION	**91957** MARTIN, DAVID J.
W8330	**12** FACILITY ENGINEERING	**96272** TISLER, ANDREW J.
W8340	**16** WPT & EAST HILL TANK FARM ENG	**91953** THAXTON, GEORGE D. IV
W8350	**11** HTF WEST HILL ENGINEERING	**96241** BATES, WILLIAM F.
⊞ W8500	**32** WR PROJECTS	**96266** TIBREA, STEVEN L.
W8600	**12** ENGINEERING TESTING	**92570** BIELING, ARTHUR B.
W8700	**8** SALT DISPOSITION ENGINEERING	**94075** CARTER, JOE T.
W8800	**9** PROCESS ENGINEERING	**92175** EDWARDS, RICHARD E. JR

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Westinghouse Savannah River Company

Concentration, Storage, & Transfer (CST)

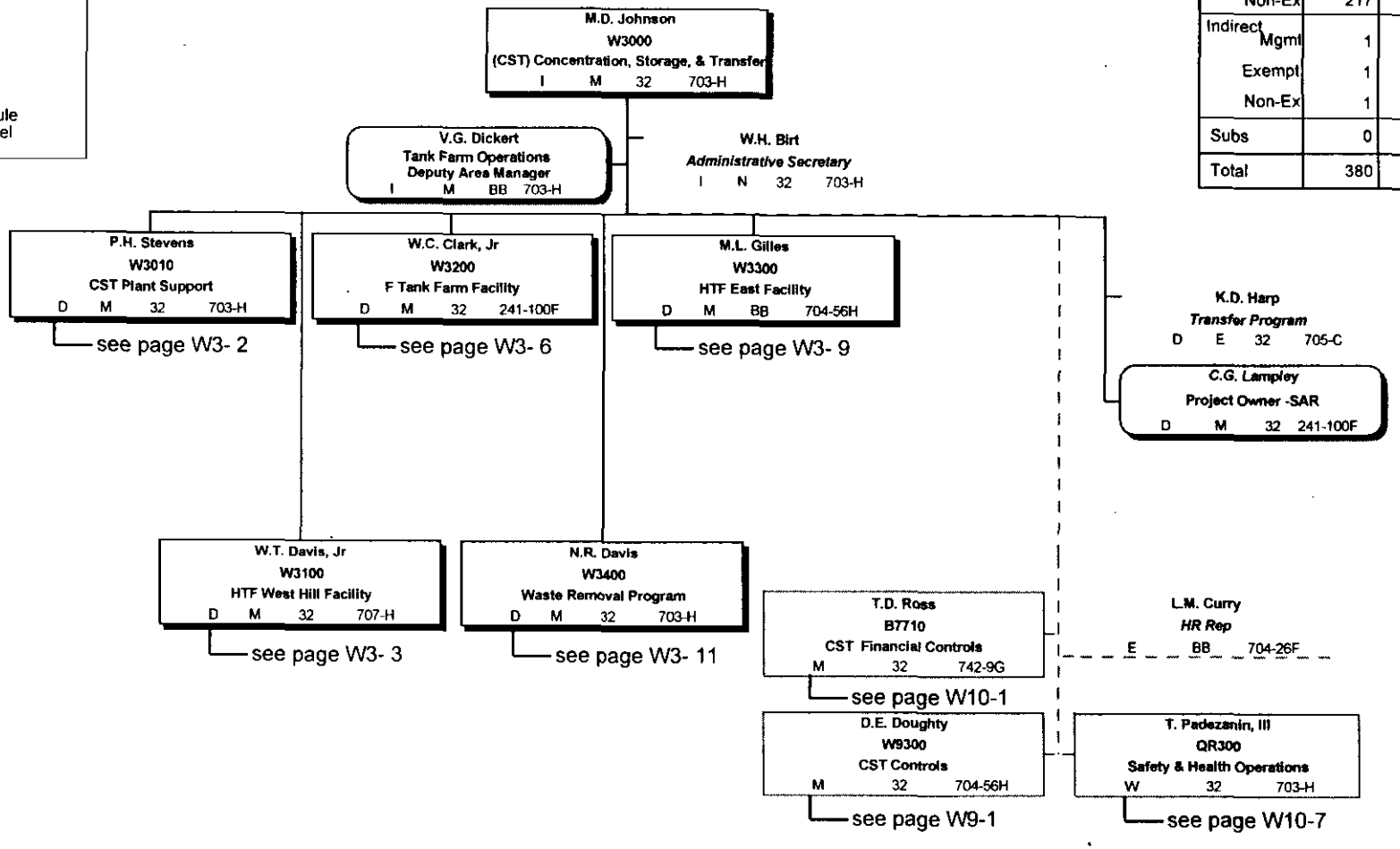
Concentration, Storage, & Transfer HLW Organization Charts

Key

Legend	
D/I:	D = Direct
	I = Indirect
Type:	M = Management (including FLM)
	E = Exempt
	O = Select Overtime Position (SOP)
	N = Non-Exempt
	L = LSE
	W = WAD
	S = Subcontractors
Shift:	AA & BB=9/80s
	32 = 4/10s
	W = Straight Days
	## = Specific Shift Schedule
ASL:	= Approved Staffing Level
CUR:	= Current Staffing Level

Name
Org Code
Title
D/I Type Shift Location

W3000	Cur	ASL
Direct Mgmt	80	80
Exempt	80	76
Non-Ex	217	219
Indirect Mgmt	1	1
Exempt	1	1
Non-Ex	1	1
Subs	0	0
Total	380	378



Original signed by:
M. D. Johnson *5/31/01*
Approved Date
Date: May 1, 2001

Westinghouse Savannah River Company

CST Plant Support

Concentration, Storage, & Transfer HLW Organization Charts

Key

Legend

D/I: D = Direct
I = Indirect
Type: M = Management
E = Exempt
O = Select Overtim
N = Non-Exempt
L = LSE
W = WAD
S = Subcontractor
Shift: AA & BB=9/80s
32 = 4/10s
W = Straight Days
= Specific Shift
ASL: = Approved Staffi
CUR: = Current Staffing

Name
Org Code
Title
D/I Type Shift Location

P.H. Stevens
W3010
CST Plant Support
D M 32 703-H

A.D. Steelman
Plant Services
D E 32 703-H

J. Lee D O 32
F.Y. Savoy D E 32

K. J. Collins
HLW Waste Certification Program
D E 32 703-H

R.J. Petras
Non-routine Waste & Waste Removal
D E 32 703-H

M.E. Roper
CST Waste Min Programs/ HLW Records/ HLW Chem Programs/ Alt GCO
D O 32 703-H

J.A. Domer
Operations Compliance
D E 32 703-H

G.F. Hunsberger
Security Program Implementation
D E W 703-H

W.B. Renfro
Advisor - Special Programs
D E AA 703-H

R.F. Calta
SW POC
32 703-H

J.W. Naylor
CST Fire Protection Program
32 703-H

E.M. Foster
W3011
HTF Facility Support
D M 32 707-H

S.E. Ashley
Safety Coordinator/ ISMS/ JHA Coordinator
D O 32 707-H

R.A. Brown
Sampling
D O 32 707-H

N.M. Cotton
MTS/ Audits/ Assessments
D O 32 707-H

J.B. Crosby
Alt GCO/ Fire Protection
D O 32 707-H

P.N. Deason
CST Chemical Mgmt
D O 32 241-102H

E.G. Gojda, Jr
Alt GCO
D E 32 707-H

L.M. Rushen
CST Chemical Mgmt
D O 32 241-102H

J.J. Sanders, Jr
Alt GCO/ Hazard Waste Mgmt
D E 32 707-H

M.S. Shuford
ALARA Coord/ Source Control/ Frats
D E 32 707-H

W.R. Stewart
Lead GCO
D E 32 707-H

H.B. Vann
Issues Invest/ Resolution-SIRIM/ Critiques/ FOSC
D E 32 707-H

H.M. Frazier D N 32
S.C. Smith D N BB

R.R. Salmon
W3012
FTF Facility Support
D M 32 241-100F

A. Barnes
Alt. GCO/ Waste Verifier Supervisor
D E 32 241-102F

K.M. Baughman
Labeling/ PIZOC Coord/ CST Sampling/ Record Coord
D O 32 241-102F

D.L. Boring
FTF Contaminated Facility Rollback
D M 32 241-110F

L.P. Bradley
MTS/ Audits/ Assessments/ Issues Mgmt/ FEB Support
D E BB 241-102F

C.M. Cothran
RCO Implementation/ ALARA Coordinator
D E 32 241-102F

L.C. Dean
Waste Verifier
D N 32 241-28F

E.L. Dunbar
Alt GCO/ Haz Waste Mgmt
D E W 241-102F

M.I. Lenard
Alt GCO
D O 32 241-102F

J.R. McCracken
Admin/ Lessons Learned/ FOSC
D O 32 241-108F

P.J. Riley
Lead GCO/ Waste Forecast/ Waste Min
D E 32 241-102F

R.L. Staten
SIRIM/ Critiques
D E 32 241-108F

J.H. Tyler, Jr
Safety/ Fire Protection
D O 32 704-26F

S. Owens
W3012A
Day Support
D M 32 241-28F

R.A. Edmundson D N 32
V.S. Howard D N W

Vacant D N
W.N. Gross D N 23
C.E. Ransom, Sr D N 32

B.E. Long
W3013
HTF East Plant Support
D M 32 241-197H

T.K. Bragg
Sampling & Emergency Equipment Specialist
D O 32 241-153H

D.S. Crockett
Performance Indicators/ MTS
D E 32 241-153H

A.K. Doane
Alternate GCO
D E 32 241-197H

W. Hall, Jr
SIRIM Writer
D O 32 241-153H

D.E. Lott
Lead GCO/ Haz Waste Mgmt
D E 32 241-197H

R.E. Meador, III
Operations Lead
D O 32 241-197H

K.F. Neville
MTS & SCD-4 Coordination
D O 32 241-197H

W.E. Norris, Jr
Rad Containment / Special Equipment
D O 32 241-55H

F.A. Simonetti
ALARA/Decon and Large Equipment Lead
D O 32 241-197H

J.R. Walton
Chemical Procurement and Safety Lead
D O 32 241-153H

S.R. Willis
Fire Protection Specialist
D O 32 241-153H

J.H. Cooper
W3013A
Day FLM
D M 32 241-197H

B.G. Grant D N 32
F. Jones D N 32

W3010		
Direct	Cur	ASL
Mgmt	5	5
Exempt	42	42
Non-Ex	9	10
Indirect		
Mgmt	0	0
Exempt	0	0
Non-Ex	0	0
Subs	0	0
Total	56	57

Westinghouse Savannah River Company

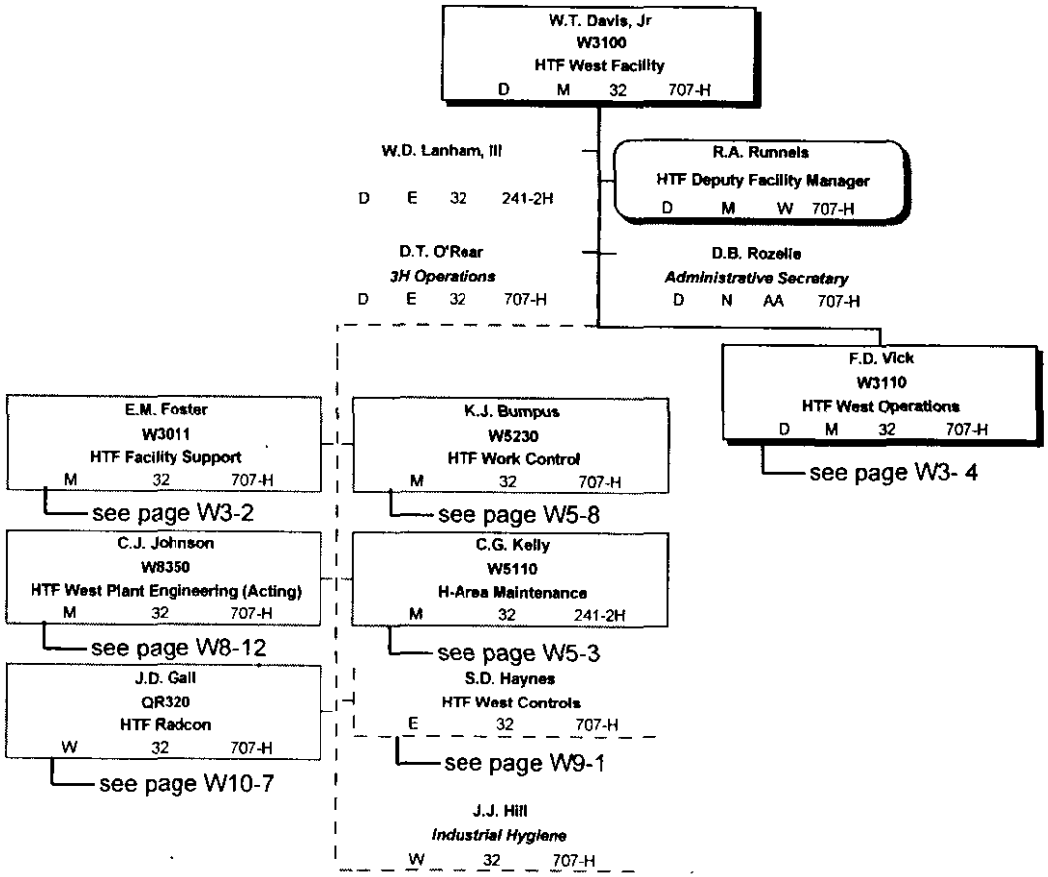
H-Tank Farm West Facility

Concentration, Storage, & Transfer HLW Organization Charts

Key

Legend	
D/I:	D = Direct
	I = Indirect
Type:	M = Management (including FLM)
	E = Exempt
	O = Select Overtime Position (SOP)
	N = Non-Exempt
	L = LSE
	W = WAD
	S = Subcontractors
Shift:	AA & BB=9/80s
	32 = 4/10s
	W = Straight Days
	## = Specific Shift Schedule
ASL:	= Approved Staffing Level
CUR:	= Current Staffing Level

Name
Org Code
Title
D/I Type Shift Location



W3100	Cur	ASL
Direct Mgmt	24	24
Exempt	12	10
Non-Ex	79	80
Indirect Mgmt	0	0
Exempt	0	0
Non-Ex	0	0
Subs	0	0
Total	115	114

Westinghouse Savannah River Company

F-Tank Farm Facility

Concentration, Storage, & Transfer
HLW Organization Charts

Key

Legend

D/I: D = Direct
I = Indirect
Type: M = Management (including FLM)
E = Exempt
O = Select Overtime Position (SOP)
N = Non-Exempt
L = LSE
W = WAD
S = Subcontractors
Shift: AA & BB=9/80s
32 = 4/10s
W = Straight Days
= Specific Shift Schedule
ASL: = Approved Staffing Level
CUR: = Current Staffing Level

Name
Org Code
Title
D/I Type Shift Location

W3200	Cur	ASL
Direct Mgmt	25	25
Exempt	8	8
Non-Ex	73	73
Indirect Mgmt	0	0
Exempt	0	0
Non-Ex	0	0
Subs	0	0
Total	106	106

W.C. Clark, Jr
W3200
F Tank Farm Facility
D M 32 241-100F

A.L. Heath
Administrative Secretary
D N 32 241-100F

S.W. Wilkerson
FTF Deputy Facility Manager
D M 32 704-71S

D.C. Sherburne
W3210
FTF Operations
D M 32 241-100F
see page W3- 7

R.R. Salmon
W3012
FTF Facility Support
M 32 241-100F
see page W3- 2

T.R. Jones
W5140
F Tank Farm Maintenance
M 32 241-100F
see page W5-5

S.R. Lamar
W5240
FTF Work Control
M 32 241-100F
see page W5-8

S.D. Folk
QR330
FTF Radcon
E 32 241-100F
see page W10- 7

A.J. Tisler
W8330
FTF Systems Engineering
M 11 241-100F
see page W8-10

D.C. Ballard
FTF Controls
E 32 704-26F
see page W9-1

Westinghouse Savannah River Company

H-Tank Farm East Facility

Concentration, Storage, & Transfer
HLW Organization Charts

Key

Legend	
D/I:	D = Direct
	I = Indirect
Type:	M = Management (including FLM)
	E = Exempt
	O = Select Overtime Position (SOP)
	N = Non-Exempt
	L = LSE
	W = WAD
	S = Subcontractors
Shift:	AA & BB=9/80s
	32 = 4/10s
	W = Straight Days
	## = Specific Shift Schedule
ASL:	= Approved Staffing Level
CUR:	= Current Staffing Level

Name
Org Code
Title
D/I Type Shift Location

W3300	Cur	ASL
Direct Mgmt	19	19
Exempt	9	9
Non-Ex	56	56
Indirect Mgmt	0	0
Exempt	0	0
Non-Ex	0	0
Subs	0	0
Total	84	84

M.L. Gilles
W3300
HTF East Facility
D M BB 704-56H

M.N. Borders
HTF East Facility Deputy
D M 32 704-56H

B.H. Herrington
Secretary
D N 32 704-56H

A.L. Whittenburg
W3310
HTF East Operations
D M 32 704-56H
see page W3- 10

B.E. Long
W3013
HTF East Facility Support
M 32 241-197H
see page W3- 2

G.D. Thaxton, IV
W8340
HTF East Plant Engineering
M 32 704-56H
see page W8-11

J.D. Gall
QR310
HTF East Radcon
W 32 707-H
see page W10-7

C.G. Kelly
W5110
H-Area Maintenance
M 32 241-2H
see page W5-3

K.J. Bumpus
W5230
HTF Work Control
M 32 707-H
see page W5-8

T.E. Pate
W9110
HTF East Controls
E 32 704-56H
see page W9-1

Westinghouse Savannah River Company

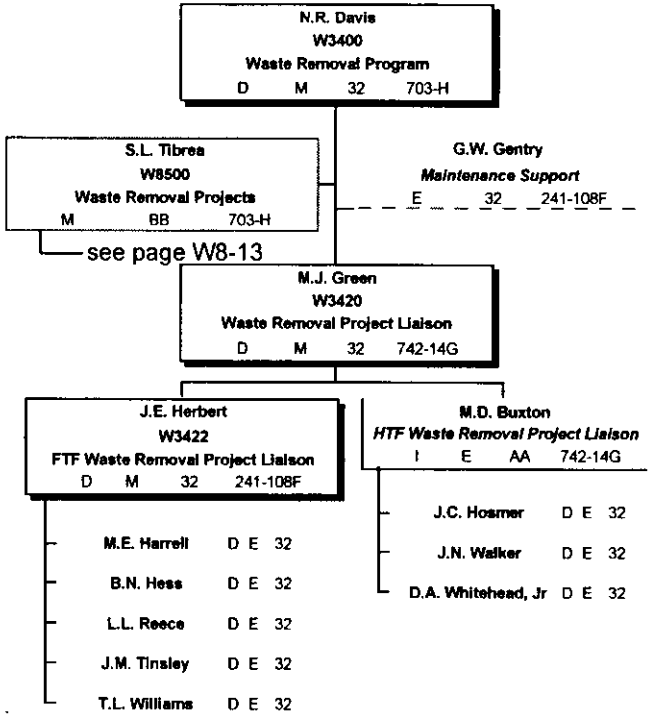
Key

Legend	Name Org Code Title D/I Type Shift Location

D/I: D = Direct
I = Indirect
Type: M = Management (including FLM)
E = Exempt
O = Select Overtime Position (SOP)
N = Non-Exempt
L = LSE
W = WAD
S = Subcontractors
Shift: AA & BB=9/80s
32 = 4/10s
W = Straight Days
= Specific Shift Schedule
ASL: = Approved Staffing Level
CUR: = Current Staffing Level

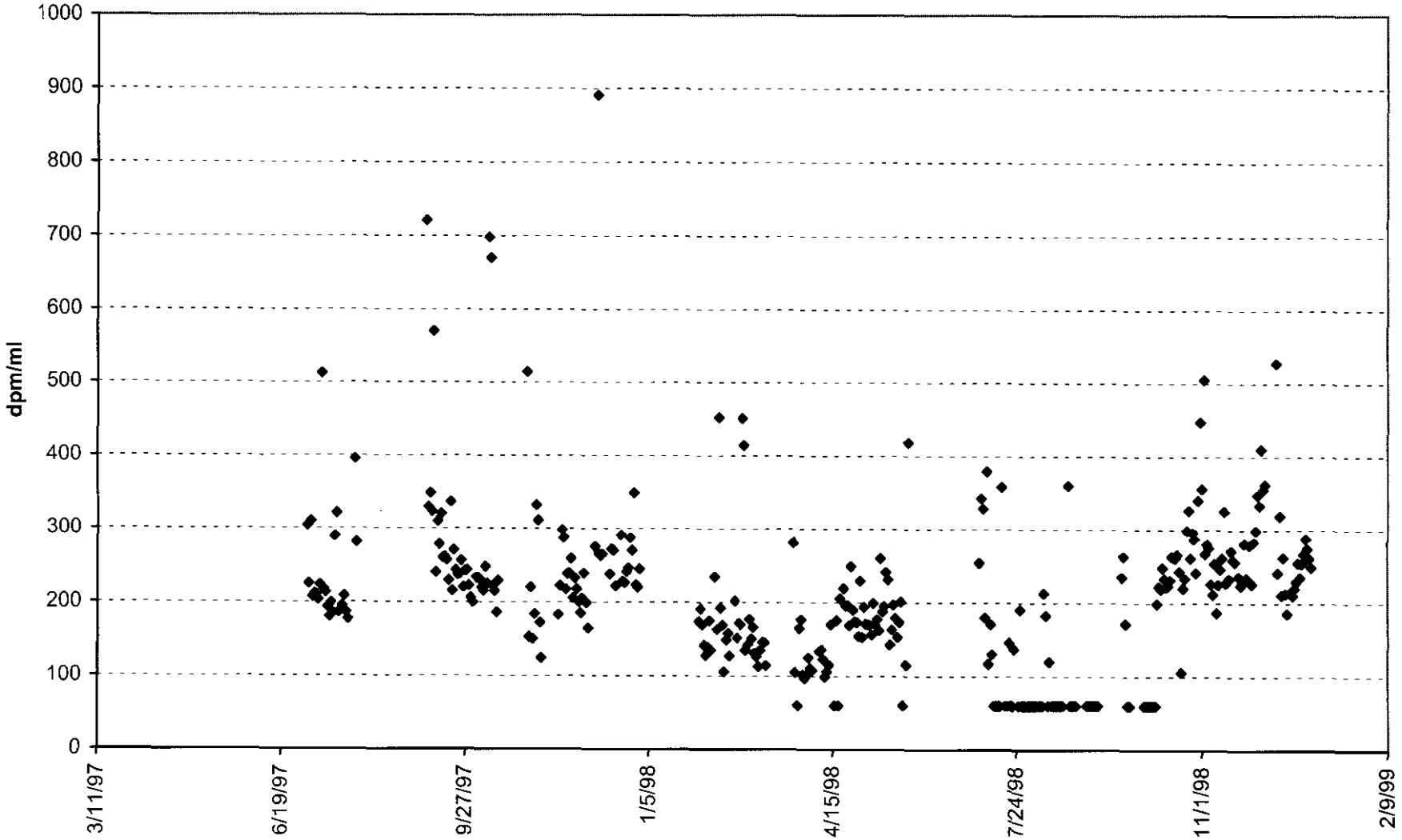
Waste Removal

Concentration, Storage, & Transfer HLW Organization Charts

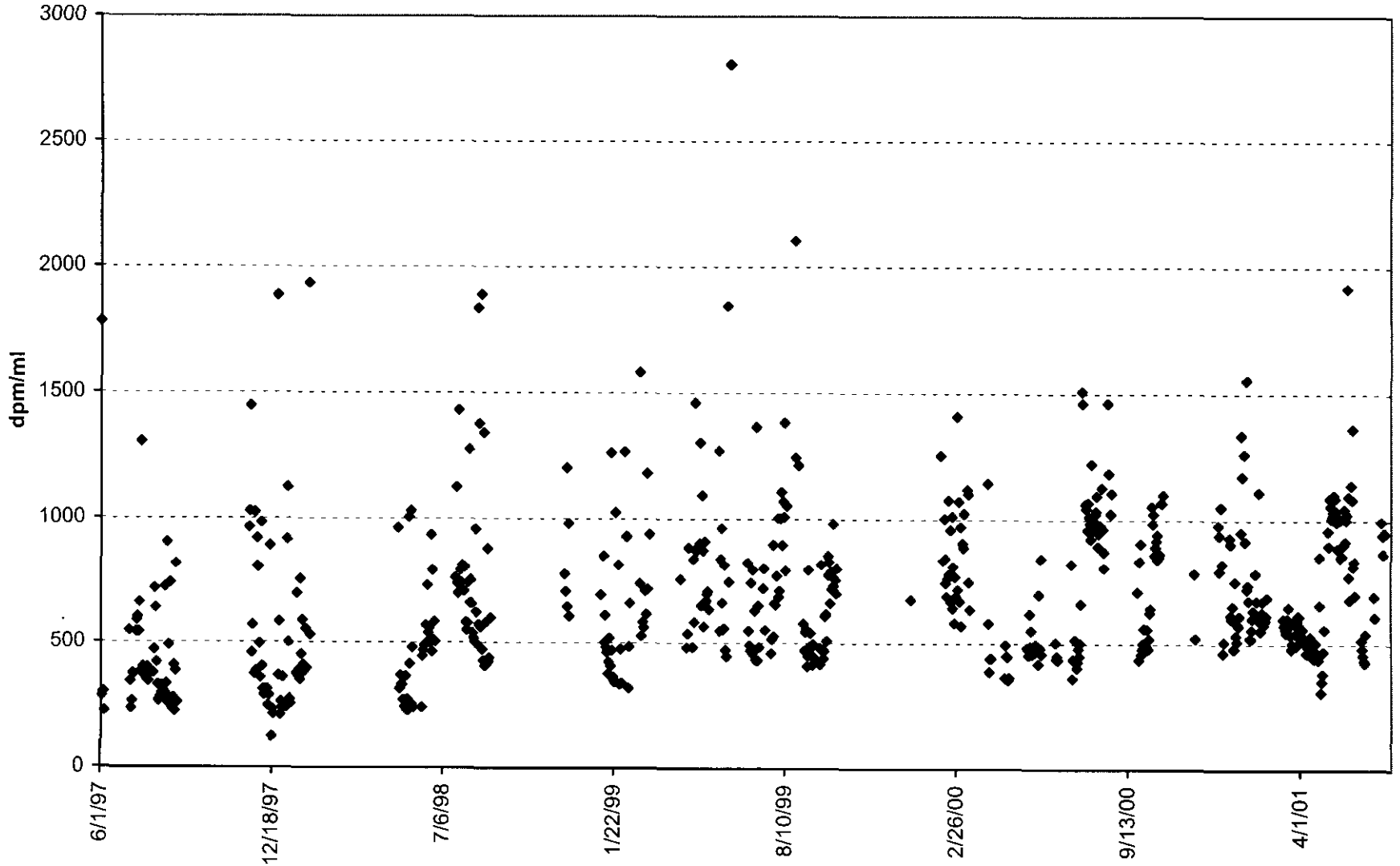


W3400		
	Cur	ASL
Direct Mgmt	2	2
Exempt	8	8
Non-Ex	0	0
Indirect Mgmt	0	0
Exempt	1	1
Non-Ex	0	0
Subs	0	0
Total	11	11

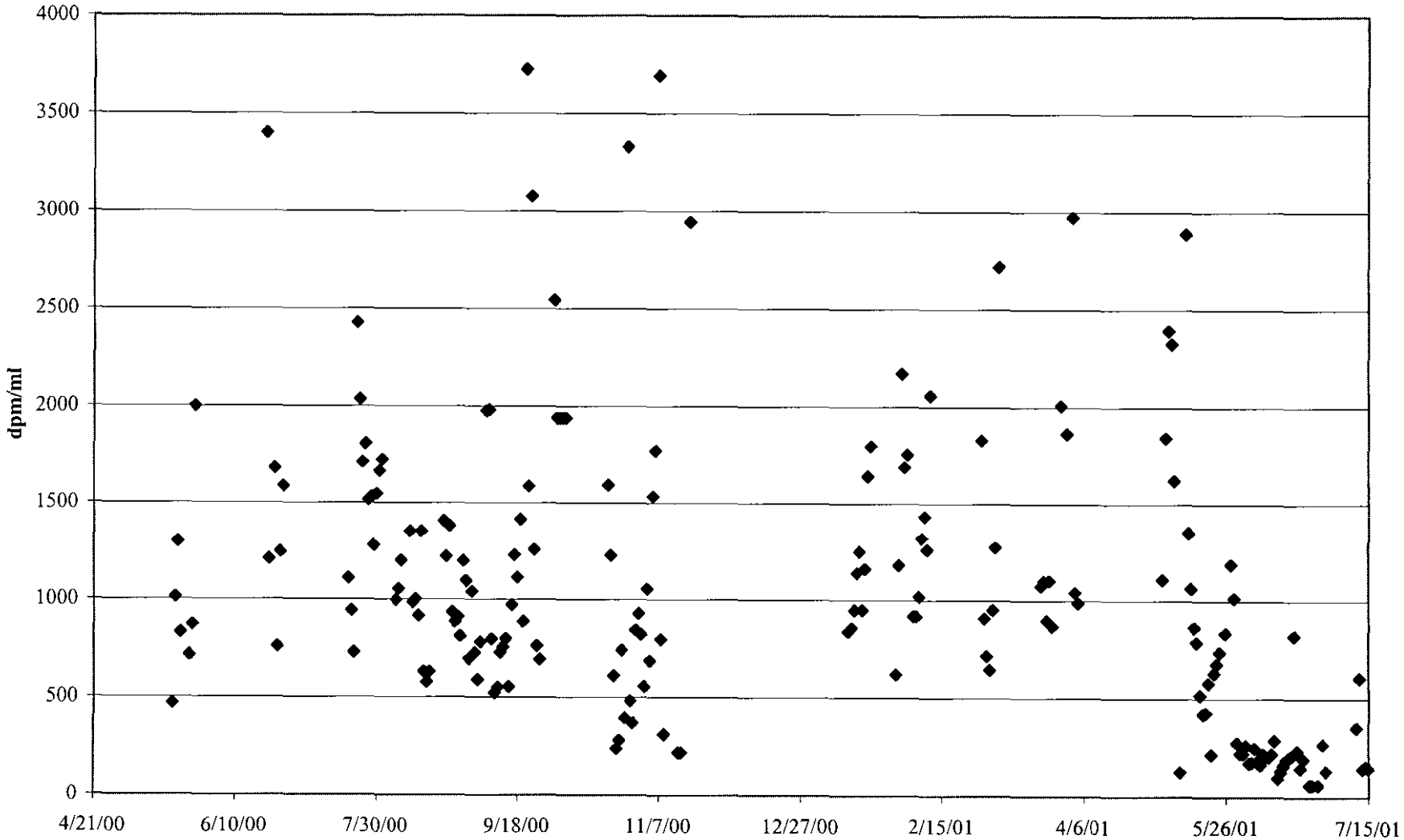
242-16H Evaporator Overheads Maximum Daily Transfer Activity
Attachment 2



242-16F Evaporator Overheads Maximum Daily Transfer Activity
Attachment 3



3H Overheads Activity (Daily Average)
Attachment 4



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21) SW9.1-SW(1H), (2H), (28H), 242-1H, -2H, -28H Storm Water System Manual