FEB 7 1992

MEMORANDUM FOR: Paul H. Lohaus, Chief
LLWB/LLWM/NMSS

THRU: Joseph Kane, Acting Section Leader
LLWB/LLWM/NMSS

AND: James E. Kennedy, Section Leader
LLWB/LLWM/NMSS

FROM: Surry Inspection Accompaniment Team
LLWB/LLWM/NMSS

SUBJECT: TRIP REPORT ON ACCOMPANYING VISIT OF DECEMBER 17, 1991, DURING R-II INSPECTION AT SURRY

Enclosed (Enclosure 1) are the relevant items of note from the recent visit (December 17, 1991) to Surry during a Region II inspection being conducted under MC83750 - Occupational Radiation Exposure. The accompaniment team consisted of three (3) division members from headquarters whose overall objective was to gain familiarity with the facility design and activities at the new radwaste facility at the Surry nuclear plant. R. Shewmaker was also completing followup on operational information regarding the experience to date with the bitumen solidification system by U.S. Ecology that is under an interim approval for WM-102.

As a result of the visit, a better understanding of the Distribution Control System (DCS) for the facility was obtained and a better understanding of how the DCS is used to implement the Process Control Program (PCP) associated with the U.S Ecology topical report on solidification with high-strength asphalt was obtained. Future visits can be made with the focus being on the details of the parameters during the production of the end products of solidified waste.

If there are any questions please contact one of the team members.

ORIGINAL SIGNED BY
Robert E. Shewmaker
LLWB/LLWM/NMSS

ORIGINAL SIGNED BY
John Lentz
LLWB/LLWM/NMSS

ORIGINAL SIGNED BY
Richard Turtil
LLWB/LLWM/NMSS

Enclosure:
Information Items from Surry
with Attachments A-F

Distribution: Central File WM 102 NMSS r/f RBangart PLohaus JTravis
JAustin JSurmeier MTokar JKennedy JLentz RTurtil LLWM t/f LLWB r/f

PDR YES X
PDR NO ___ Category: Proprietary ___ or CF Only ___ ___
ACNW YES X NO

SUBJECT ABSTRACT: TRIP REPORT ON ACCOMPANYING VISIT OF DECEMBER 17, 1991 DURING RII INSPECTION AT SURRY

OFC :LLWB	:LLWB	:LLWB	:LLWB	:LLWM
NAME:RShewmaker/jj	:JLentz	:RTurtil	:JKane	:JKennedy
DATE: 2/3/92	: 2/3/92	: 2/3/92	: 2/5/92	: 2/ /92

RS/P.LOHAUS/1/2 OFFICIAL RECORD COPY

WM-102
NH14 1/1

9202140198 920207
PDR WASTE
WM-102 PDR

INFORMATION ITEMS
FROM SURRY

1. The facility is designed for storage capability of one year for all types of output wastes: LSA Boxes, HICs, Cement Solidified Liners, and Bitumen Filled Drums.

   The actual storage capability for certain types of waste may, however, extend beyond one year if "normal" waste volumes are generated.

2. Process design quantities are: liquids - 15,000 gpd;
   laundry wastes - 9,395 gpd;
   spent resin (bead) - 800 ft ^{3}/yr. High Activity
   1920 ft ^{3}/yr. Low Activity
   oily wastes - 4200 gpy
   DAW compactable - 50,000 ft ^{3}
   non-compactable - 6,000 ft ^{3}
   (See Attachment A)

3. The plant operates with 3-man shifts with a 5-shift rotation.

4. Virginia Power Company (VPCo) has processed 750,000 gallons of liquid with the systems in the rad waste facility since mid-August of 1991.

5. There have been 48-55 gallon drums processed with bitumen and all are Class A wastes with the highest radiation of 62 mR/hr. for a surface value and less than 35 mR/hr. at 1 meter. VPCo is awaiting radionuclides survey results from SAIC to prepare to send out the first shipment for burial.

6. They are using raw bitumen from 2nd batch of input bitumen with the shipments to the 6000 gal. storage tank being sent by truck from New Jersey.

7. The VPCo. Radwaste Superintendent indicated and left the impression there was significant chemical characterization of the waste prior to pretreatment. A copy of Radwaste Operating Procedure (ROP) 1.24, Rev.2, 10/24/91 indicates the following items are monitored: pH, chromates, Na, B, conductivity & oil. (See Attachments B & C for listing of operating procedures and ROP 1.24.)

8. For boric acid concentrate they are operating at a 38 % waste loading and getting 275 gallons of waste processed per 55 gallon drum. This -2 % off the 40 % allowed by Interim PCP gives them operating margins. If they could go to 50 % they could process 400-450 gallons per drum. They have done test runs of simulated waste concentrates at 60 % loading also.

9. Evaporator bottoms are ranging from pH of 8-10 and are being combined to keep pH in the 9.0-9.5 range as per boric acid interim approval. VPCo does not want to have to adjust pH downward with H_2SO_4 additions unless absolutely necessary. Using 25 % solution of NaOH to adjust pH upward.

Enclosure 1

10. VPCo experience with the antifoaming installation they have has been very good.

11. The dry active waste (DAW) that VPCo normally generates has a density, as collected, of 4 pcf; they separate into combustibles for incineration and the remainding non-combustables go to the SEG incinerator. VPCo uses a 700 psi compactor with repeated ram strokes and the process yields a compacted waste density of 58.9 pcf. Super-compaction gets only 60-61 pcf.

12. An explanation was provided on how high activity in sumps, drums and traps was significantly reduced by processing the residual materials through the radwaste processing system via the concentrates.

13. An explanation was provided on a combination of wastes used to fill a 90 ft^3 HIC. The process started with 30 ft^3 of 2×10^{-5} μci/cc waste to produce a HIC filled at 450 R/hr. (mostly Co).

14. Distributed Control System (DCS) for the control of the processes within the radwaste facility were provided by Foxboro and appears to be an excellent control system. System diagrams can be screened on video monitors as well as printed in color. Data is stored electronically and can be recovered at any time for a specific time and plant status of various subsystems or components in the facility (see Attachments D and E for actual monitor screen printouts).

15. The facility has 18 months storage capacity for DAW storage which amounts to 4200 ft^3 (after compaction and separation of incinerables). Extra storage could be provided via a Butler type building quickly put in place.

16. Waste resins are produced at 1200-1500 ft^3/yr. with a storage capacity of 1500 ft^3 in HICs and 2925 ft^3 in tankage (2-2½ yrs). HICs used are 90 ft^3.

17. Storage capacity for drums per design was 600 (3 layers each of 200) but will probably be able to handle 693 total with partial 4th layer. VPCo anticipates producing 200-250 drums/yr. for normal operation.

18. Facility features to overcome problems experienced with other bitumen processing systems are as follows:

    - Hot flush water system with Volume=150 % of normal process system Q;
    - Viewing ports with hot flush wiper spray/flow;
    - All systems are installed for drainage as plumbing with smooth bends, no 90° elbows etc;
    - Effort made at every opportunity to remove oils including the use of a high quality Japanese unit, and the Japanese puff filter bags on laundry drain system;
    - Every pump, valve, pipe, heat exchanger, evaporator, etc. located and considered for maintenance operations;
    - All cubicles and compartments labeled and diagrammed outside with isometric to help preplan entry;
    - Cubicle and equipment layout done to minimize piping runs;

- Special pumps purchased in Japan (Konsui) to facilitate fast maintenance for seals & bearings. Maintenance by one man, minimum tools and alignment controlled the pump design;
- System design to keep process flow continuous -i.e., redundant resin waste circulating pumps sized for 50 % normal flow;
- All hand operated valves, etc., located for access without ladders or other special arrangements;
- Gauges, valves, etc., outside cubicles for ALARA considerations;
- Compaction - solution isn't more force, but repeated ram cycles based on Japanese study and tests.

19. The advantages of the bitumen process from an operational shutdown and startup view was emphasized when compared to other solidification systems like cement, polymers, etc. It is basically either heat input or heat loss to put the system in the flow or stop mode. Flow is achieved after heating. The process also leaves open the concept of recovery by being able to reheat.

20. Radwaste Superintendent was unaware that requirements for the transition from interim to final approval for boric acid need the next action by USE. They (VPCo) are anxious for bitumen criteria to move ahead on the resins. They hope to achieve Volume Reduction (VR) 2.5-2.8.

21. VPCo is concerned about non-approval status on resin waste streams and NRC's insistence for minimizing strength losses vs. the absolute value of strength (post-environmental tests).

22. It was noted by the VPCo representative that they have been looking at alternatives that might have to be used due to the repeated downtime at the SEG incinerator that VPCo ships DAW to. Apparently SEG operated the unit outside (hot) its operating parameters which has led to premature failures of the incinerator internals. Some utilities, have apparently been turned away as a result.

Attachment A

Design Conditions

STORAGE CAPABILITY FOR 1 YR.

Wastes		North Anna	Surry
• Liquid Waste			
Quantity	(gal/Day)	15,000	15,000
Specific Activity	(µCi/cc)	2.2 E-3	2.5 E-2
Boron Content	(ppm)	300	300
• Laundry Waste			
Quantity	(gal/Day)	5,000	9,395
Specific Activity	(µCi/cc)	1.9 E-5	5.0 E-5
• Spent Resin Quantity			
High Active Resin	(cf/Year)	800	800
Low Active Bead Resin	(cf/Year)	1,920	1,920
Low Active Powdex Resin	(cf/Year)	3,350	—
• Oily Waste			
Quantity	(gal/Year)	4,760	4,211
• COMPACTABLE DAW			
Quantity	(cf/Year)	50,000	50,000
• NON-COMPACTABLE DAW			
Quantity	(cf/Year)	6,000	6,000

Attachment B Rec'd 12/17/91

December 17, 1991

RADWASTE OPERATING PROCEDURES

	No.	Title	Rev	Eff Date
	ROP-1.00	LIQUID/LAUNDRY WASTE SYSTEM		
OM	1.01	Liquid Waste Evaporator Startup to Hot Standby	3	8-23-91
OM	1.02	Liquid Waste Evaporator Hot Standby to RUN	2	8-23-91
OM	1.03	Processing Liquid Waste By Demineralization Using DCS	2	11-22-91
VP	1.04	Releasing Liquid Waste Monitor Tank 1-RLW-TK-4A or B using DCS	1	8-22-91
VP	1.05	Releasing Liquid Waste Monitor Tank 1-RLW-TK-4A using LWP	1	8-22-91
VP	1.06	Releasing Liquid Waste Monitor Tank 1-RLW-TK-4B using LWP	1	8-22-91
OM	1.07	Processing Laundry Drains using Liquid Waste Panel	1	9-24-91
VP	1.08	Releasing Laundry Drain Monitor Tank 1-RLW-TK-11A using LWP	1	8-22-91
VP	1.09	Releasing Laundry Drain Monitor Tank 1-RLW-TK-11B using LWP	1	8-22-91
VP	1.10	Releasing Laundry Drain Monitor Tank 1-RLW-TK-11A or B using DCS	1	8-22-91
OM	1.11	Replacement of Laundry Drain Prefilter Bag	0	7-19-91
OM	1.12	Removing Laundry Drain Filter from Service	1	12-13-91
OM	1.13	Placing Laundry Drain Filter in Service	0	7-19-91
OM	1.14	Filling Acid Tank	1	8-31-91
OM	1.15	Filling Caustic Tank	1	8-31-91
OM	1.16	Resin Removal from Liquid Waste Distillate Demineralizer 1-RLW-IX-2	0	8-23-91
OM	1.17	Resin Addition to Liquid Waste Distillate Demineralizer 1-RLW-IX-2	0	8-23-91
OM	1.18	Processing Liquid Waste Using a Temporary Ion Exchanger System	0	
OM	1.19	Terminating Liquid Waste Temporary Ion Exchanger System Usage	0	
OM	1.20	Adding Media to Liquid Waste Filter 1-RLW-FL-1	0	9-11-91
OM	1.21	Resin Removal from Liquid Waste Filter 1-RLW-FL-1	1	12-17-91
OM	1.22	Adding Media to Liquid Waste Oil Filter 1-RLW-FL-4	0	9-16-91
OM	1.23	Resin Removal from Liquid Waste Oil Filter	0	9-13-91
OM	1.24	Pretreatment of Liquid Waste Collection and Surge Tanks	2	10-24-91
OM	1.25	Processing Liquid Waste By Demineralization Using Liquid Waste Panel	0	8-23-91
OM	1.26	Liquid Waste Evaporator RUN to Hot Standby	1	8-23-91
OM	1.27	Liquid Waste Evaporator Hot Standby to Shutdown	0	8-23-91
OM	1.28	Adding Resin to Liquid Waste Demineralizer 1-RLW-IX-1A	0	8-09-91
OM	1.29	Adding Resin to Liquid Waste Demineralizer 1-RLW-IX-1B	0	8-09-91
OM	1.30	Adding Resin to Liquid Waste Demineralizer 1-RLW-IX-1C	0	8-09-91
OM	1.31	Adding Resin to Liquid Waste Demineralizer 1-RLW-IX-1D	0	8-09-91
OM	1.32	Adding Resin to Liquid Waste Demineralizer 1-RLW-IX-1E	0	8-09-91
OM	1.33	Resin Removal from Liquid Waste Demineralizer 1-RLW-IX-1A	0	8-09-91
OM	1.34	Resin Removal from Liquid Waste Demineralizer 1-RLW-IX-1B	0	8-09-91

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VP = SRF Virginia Power SNSOC Approval

December 17, 1991

RADWASTE OPERATING PROCEDURES

	No.	Title	Rev	Eff Date
OM	1.35	Resin Removal from Liquid Waste Demineralizer 1-RLW-IX-1C	0	8-09-91
OM	1.36	Resin Removal from Liquid Waste Demineralizer 1-RLW-IX-1D	0	8-09-91
OM	1.37	Resin Removal from Liquid Waste Demineralizer 1-RLW-IX-1E	0	8-09-91
OM	1.38	Transfer of Waste from LWMT to RPG Makeup Tank	1	8-31-91
OM	1.39	Operation of the Sludge Transfer Pump	1	8-16-91
OM	1.40	Sampling the Liquid Waste Evaporator	1	10-22-91
OM	1.41	Adding Acid to LWCT or LWST	0	7-26-91
OM	1.42	Adding Caustic to LWCT or LWST	2	11-22-91
OM	1.43	Filling Resin Measuring Tank Using Hopper	1	8-23-91
OM	1.44	Securing from Liquid Waste Demineralizer Processing	0	8-23-91
OM	1.45	Transferring LWCT/LWST and Sampling SPI Oil/SS Remover	1	10-09-91
OM	1.46	Sampling the LW Demineralizer and LW Filter	2	10-24-91
OM	1.47	Operation of the Evaporator Bottoms Tank	2	10-19-91
OM	1.48	Operation of the Oil Drain Tank	0	9-09-91
OM	1.49	Transferring Liquid Waste Monitor Tank to Liquid Waste Surge Tank	2	11-22-91
OM	1.50	Transferring Laundry Drain Monitor Tank to Liquid Waste Collection/Surge Tank	1	12-13-91
OM	1.51	Removing/Installing LW Evaporator Recirc Sample Line pH Probe	1	12-17-91
OM	1.52	Laundry Drain Oil Filter Operations	1	12-13-91
OM	1.53	Liquid Waste Ion Exchanger Media Unpacking	0	12-13-91
OM	1.54	Adding Antifoam to Liquid Waste Evaporator	0	11-08-91
	ROP-2.00	**BITUMEN SOLIDIFICATION SYSTEM**		
VP	2.01	Startup the Volume Reduction and Solidification System	0	10-24-91
OM	2.02	Volume Reduction and Solidification System Shutdown	1	9-20-91
VP	2.03	Waste Transfer and Pretreatment	2	12-10-91
VP	2.04	Drum Preparation and Loading	1	12-10-91
VP	2.05	Drum Fill	0	10-24-91
VP	2.06	Drum Package and Store	0	10-24-91
OM	2.07	Switch Waste Batch Tanks	0	8-30-91
OM	2.08	Maintain Heat	1	11-22-91
VP	2.09	Bitumen Storage Tank Fill	0	10-24-91
OM	2.10	Primary Heating Fluid System Operation	2	9-11-91
OM	2.11	Secondary Heating Fluid System Operation	2	9-19-91
OM	2.12	Solvent Cleaning and Recovery	0	
OM	2.13	VRSS Auxiliary System Operation	1	8-30-91

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RADWASTE OPERATING PROCEDURES

	No.	Title	Rev	Eff Date
OM	2.14	VRSS Acid Addition	1	8-31-91
OM	2.15	VRSS Caustics Addition	2	12-17-91
OM	2.16	Waste Batch Tank Sampling	1	8-31-91
VP	2.17	Calibrating Bitumen Metering Pump	0	10-24-91
VP	2.18	Calibrating Evaporator Feed Pump	0	10-24-91
OM	2.19	Replacement of Waste Batch Tank Decant Filter Bag	0	8-16-91
OM	2.20	Unclogging Evaporator Feed Pump Discharge Line	0	11-08-91
	ROP-3.00	**SPENT RESIN HANDLING SYSTEM**		
OM	3.01	Transferring Resin from Large Truck Bay to 1-RWR-TK-1C	0	7-19-91
OM	3.02	Transferring Resin from Large Truck Bay to 1-RWR-TK-1D	0	7-19-91
OM	3.03	Transferring Resin from Spent Resin Collection Tank 1-RWR-TK-1A to HIC	0	7-15-91
OM	3.04	Transferring Resin from Spent Resin Collection Tank 1-RWR-TK-1B to HIC	0	7-15-91
OM	3.05	Transferring Resin from Spent Resin Collection Tank 1-RWR-TK-1C to HIC	0	7-15-91
OM	3.06	Transferring Resin from Spent Resin Collection Tank 1-RWR-TK-1D to HIC	0	7-15-91
OM	3.07	Transferring Resin from Spent Resin Collection Tank C to RMT	0	7-15-91
OM	3.08	Transferring Resin from Spent Resin Collection Tank D to RMT	0	7-15-91
OM	3.09	Decant Spent Resin Collection Tank 1-RWR-TK-1A using 1-RWR-P-1A	0	7-15-91
OM	3.10	Decant Spent Resin Collection Tank 1-RWR-TK-1A using 1-RWR-P-1B	0	7-15-91
OM	3.11	Decant Spent Resin Collection Tank 1-RWR-TK-1B using 1-RWR-P-1A	0	7-15-91
OM	3.12	Decant Spent Resin Collection Tank 1-RWR-TK-1B using 1-RWR-P-1B	0	7-15-91
OM	3.13	Decant Spent Resin Collection Tank 1-RWR-TK-1C using 1-RWR-P-1A	0	7-15-91
OM	3.14	Decant Spent Resin Collection Tank 1-RWR-TK-1C using 1-RWR-P-1B	0	7-15-91
OM	3.15	Decant Spent Resin Collection Tank 1-RWR-TK-1D using 1-RWR-P-1A	0	7-15-91
OM	3.16	Decant Spent Resin Collection Tank 1-RWR-TK-1D using 1-RWR-P-1B	0	7-15-91
OM	3.17	Resin Transfer to HIC	0	
OM	3.18	Transferring Dry Resin from MRTS to Storage Containers	0	12-17-91
OM	3.19	Receiving and Dewatering of Resin Slurry to MRTS	0	
OM	3.20	Transferring Resin from MRTS to SRCT 1-RWR-TK-1C OR 1-RWR-TK-1D	0	
OM	3.21	Replacement of SRCT Decant Filter Bag	0	8-16-91
OM	3.22	Spent Resin Collection Tank A Recirculation and Transfer to Another SRCT	0	
OM	3.23	Spent Resin Collection Tank B Recirculation and Transfer to Another SRCT	0	
OM	3.24	Spent Resin Collection Tank C Recirculation and Transfer to Another SRCT	0	
OM	3.25	Spent Resin Collection Tank D Recirculation and Transfer to Another SRCT	0	

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RADWASTE OPERATING PROCEDURES

	No.	Title	Rev	Eff Date
	ROP-5.00	**INSTRUMENT AIR SYSTEM**		
OM	5.01	Operation of Instrument Air Dryers	1	8-09-91
	ROP-6.00	**SERVICE AIR SYSTEM**		
OM	6.01	Operation of the Service Air Compressors	0	7-15-91
	ROP-7.00	**DEMINERALIZED WATER SYSTEM**		
OM	7.01	Operation of Demineralized Water System	1	8-09-91
OM	7.02	Removal and Addition of Resins for the RPG IX	0	7-15-91
OM	7.03	Investigating Excess Usage of Demineralized Water	0	7-15-91
OM	7.04	Placing RPG Ion Exchangers in Service	1	9-24-91
OM	7.05	Reverse Osmosis Unit Operation	0	12-13-91
	ROP-8.00	**SEAL WATER SYSTEM**		
OM	8.01	Operation of Seal Water System	1	8-16-91
OM	8.02	Replacement of Seal Water Filter Bag	0	8-16-91
	ROP-9.00	**COOLING WATER SYSTEM**		
OM	9.01	Operation of Cooling Water System	2	9-09-91
	ROP-10.00	**HOT WATER FLUSHING SYSTEM**		
OM	10.01	Operation of Hot Flushing Water System	1	8-01-91
	ROP-11.00	**TANK VENT SYSTEM**		
OM	11.01	Operation of Tank Vent System	2	11-15-91
OM	11.02	Removing Tank Vent Filter from Service	0	7-15-91
OM	11.03	Placing Tank Vent Filter in Service	1	8-16-91
	ROP-12.00	**BUILDING DRAINS SYSTEM**		
OM	12.01	Operation of SRF Sump Pumps	1	8-09-91
	ROP-15.00	**CHILLED WATER SYSTEM**		
OM	15.01	Operation of Chilled Water System	1	8-09-91

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RADWASTE OPERATING PROCEDURES

	No.	Title	Rev	Eff Date
	ROP-16.00	**HOT WATER SYSTEM**		
OM	**16.01**	Operation of Hot Water Boilers	0	7-19-91
OM	**16.02**	Operation of Hot Water Circulation Pumps	1	11-15-91
	ROP-17.00	**HVAC SYSTEM**		
VP	**17.01**	Operation of RCA Ventilation System	1	11-05-91
OM	**17.02**	Operation of Non-RCA Ventilation System	2	12-13-91
	ROP-19.00	**DECONTAMINATION**		
OM	**19.01**	Liquid Abrasive Booth Operation	1	8-30-91
OM	**19.02**	Decon Booth Draining and Filter Change Out	0	8-31-91
	ROP-20.00	**DRY ACTIVE WASTE SYSTEM**		
OM	**20.01**	Startup the Shredder/Compactor	0	8-30-91
VP	**20.02**	Compacting and Packaging LSA Boxes	0	9-13-91
OM	**20.03**	Shredder/Compactor Shutdown	0	8-30-91
	ROP-22.00	**ELECTRICAL SYSTEM**		
OM	**22.01**	Racking Out 4160V Breaker	1	8-31-91
OM	**22.02**	Racking In 4160V Breaker	1	8-31-91
OM	**22.03**	Racking Out 480V Breaker	1	7-30-91
OM	**22.04**	Racking In 480V Breaker	1	7-30-91
OM	**22.05**	Normal Operation of Electrical System	1	8-31-91
OM	**22.06**	Placing UPS in Service	1	8-16-91
OM	**22.07**	Removing UPS from Service	1	8-16-91
	ROP-23.00	**RAD MATERIAL HANDLING**		
OM	**23.01**	Oil Solidification Bench Test	0	
OM	**23.02**	Oil Solidification	0	
OM	**23.03**	HIC Preparation and Closure	0	
	ROP-26.00	**MISCELLANEOUS**		
OM	**26.01**	Freeze Protection	2	12-19-91
OM	**26.02**	Sampling of Non-Radioactive Systems for Radioactivity	0	8-31-91

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December 17, 1991

RADWASTE ABNORMAL PROCEDURES

	No.	Title	Rev	Eff Date
OM	**RAP-1.01**	Evaporator Vapor Body Low Low Level	0	7-19-91
OM	**RAP-2.01**	Thin Film Evaporator Clogging	0	7-19-91
OM	**RAP-2.02**	Manual Flushing from Waste Process ERROR Signal	0	
OM	**RAP-13.01**	Loss of Domestic Water	0	9-24-91
OM	**RAP-22.01**	Loss of 1-REP-SS-1 Normal Feed	0	8-22-91
OM	**RAP-22.02**	Loss of 1-REP-SS-2 Normal Feed	0	8-22-91
OM	**RAP-22.03**	Returning to 1-REP-SS-1 Normal Feed	0	8-22-91
OM	**RAP-22.04**	Returning to 1-REP-SS-2 Normal Feed	0	8-22-91
OM	**RAP-26.01**	Personnel Injury	0	7-15-91
OM	**RAP-26.02**	Fire	0	7-15-91
OM	**RAP-26.03**	Personnel Accountability and Evacuation	0	8-31-91
OM	**RAP-26.04**	Restore SRF Systems After Station Emergency	0	8-31-91

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Attachment C Rec'd 12/17/91

JGC

RADWASTE OPERATING PROCEDURE

Title

PRETREATMENT OF LIQUID WASTE COLLECTION AND SURGE TANKS

Procedure Number	Revision Number	Effective Date
ROP-1.24	2	10-24-91

Revision Summary

Revised NOTES for modification of LW recirculation through LW Demineralizers. Added NOTE for non-applicable steps to be marked N/A.

FOR REFERENCE ONLY

NON-SAFETY RELATED

Approved by: [signature] 10-24-91
Date

PRETREATMENT OF LIQUID WASTE COLLECTION AND SURGE TANKS

1.0 PURPOSE

1.1 To skim oil, recirculate, sample, and prepare liquid waste in the Liquid Waste Collection (LWCT) and Surge Tanks (LWST) for processing.

2.0 REFERENCES

2.1 JGC P & IDs #D-00-1225-001, 002

2.2 JGC Logic Diagram D-20-1223-301

2.3 Commitment Number 1501 for LER 91-019-00

3.0 INITIAL CONDITIONS

FOR REFERENCE ONLY

____ 3.1 Seal Water (RSD) System is in service.

4.0 PRECAUTIONS AND LIMITATIONS

____ 4.1 IF Liquid Waste (LW) pH is less than 11, THEN pH adjustment shall NOT be required for processing with LW Demineralizers.

____ 4.2 IF Chromate concentration is greater than 25 ppm, THEN Station Main Control Room shall be notified. There may be a Component Cooling Water System leak in the Reactor Containment Building. (Reference 2.3)

5.0 INSTRUCTIONS

NOTE: IF LWCT or LWST level is less than 75 percent OR tank has been processed, THEN Subsection 5.1 should be marked N/A.

5.1 Removal of Oil by Skimming

____ 5.1.1 Verify LWCT or LWST tank level is greater than 75 percent.

____ 5.1.2 Verify Oil Drain Tank level is greater than 10 percent.

NOTE: Substep(s) NOT performed should be marked N/A.

5.1.3 Open the Oil Skim Valve for tank to be skimmed.

____ • For LWCT A, 1-RLW-234, LWCT A Oil Skim
____ • For LWCT B, 1-RLW-235, LWCT B Oil Skim
____ • For LWST A, 1-RLW-236, LWST A Oil Skim
____ • For LWST B, 1-RLW-237, LWST B Oil Skim

____ 5.1.4 Verify/Place ON/OFF Switch on 1-RLW-PNL-275, Oil Skimmer Pump Panel, in ON.

____ 5.1.5 Verify/Set Speed Control Dial on 1-RLW-PNL-275 is at 25 percent.

____ 5.1.6 Open AOV-RLW-114, Oil Skimmer Pump Discharge.

____ 5.1.7 Start 1-RLW-P-15, Oil Skimmer Pump, on LWP.

____ 5.1.8 Set Speed Control Dial on 1-RLW-PNL-275 at 85 percent.

____ 5.1.9 After three minutes of pump operation, open 1-RLW-239, Oil Skimmer Pump Grab Sample, and obtain a sample.

____ 5.1.10 IF there is no layer of oil on the sample surface, THEN enter N/A on Step 5.1.11 AND GO TO Step 5.1.12.

NOTE: The Oil Skimmer Pump automatically stops after 15 minutes of operation.

____ 5.1.11 Operate 1-RLW-P-15 for fifteen minute intervals, taking samples every ten minutes until no layer of oil is observed on sample surface.
IF oil is still observed after two 10 minute samples, THEN notify Chief Shift Operator (CSO).

____ 5.1.12 Stop 1-RLW-P-15.

____ 5.1.13 Close AOV-RLW-114.

NOTE: Substeps NOT performed should be marked N/A.

5.1.14 Close Oil Skim Valve for tank skimmed.

____ • For LWCT A, 1-RLW-234, LWCT A Oil Skim.
____ • For LWCT B, 1-RLW-235, LWCT B Oil Skim.
____ • For LWST A, 1-RLW-236, LWST A Oil Skim.
____ • For LWST B, 1-RLW-237, LWST B Oil Skim.

____ 5.1.15 Reset Speed Control Dial on 1-RLW-PNL-275 to 25 percent.

5.2 Recirculation of LWCT and LWST

NOTE: Substeps NOT performed should be marked N/A.

5.2.1 Determine tank to recirculate.

____ • LWCT A

____ • LWCT B

____ • LWST A

____ • LWST B

____ 5.2.2 Verify RCVNG CMP or STOP is displayed for tank to be recirculated.

____ 5.2.3 Select RECIRC for selected tank.

NOTE: Tank will recirculate for thirty minutes prior to receiving Sampling and Pretreatment display.

____ 5.2.4 Verify SAMPLE/PRT is displayed for selected tank.

NOTE:
- IF Liquid Waste, Caustic or Acid has NOT been added since last sample, THEN Subsection 5.3 should be marked N/A.
- IF Liquid Waste is being recirculated through the Demineralizer System, THEN Section 5.3 may be marked N/A.

5.3 Sampling and Pretreatment

____ 5.3.1 Have Chemistry sample the appropriate LWCT/LWST and analyze for pH.

NOTE:
- IF processing with LW Demineralizers and pH is less than 11, THEN Step 5.3.2 should be marked N/A.
- IF processing with LW Evaporator THEN Step 5.3.2 shall NOT be signed off until pH is between eight and ten.

____ 5.3.2 Verify pH is between eight and ten.
IF pH is less than eight, THEN add caustic in accordance with ROP-1.42, Adding Caustic to LWCT or LWST.
IF pH is greater than ten, THEN add acid in accordance with ROP-1.41, Adding Acid to LWCT or LWST.

____ 5.3.3 Notify Chemistry to complete chemical analysis for the appropriate LWCT/LWST.

NOTE: IF the LW Oil Filter is NOT available, THEN an oil sample is NOT required and may be marked N/A.

5.3.4 Record final:

____ • pH: ____________

____ • Sodium: ____________

____ • Boron Concentration: ____________

____ • Na - B ratio: ____________

____ • Conductivity: ____________

____ • Chromate: ____________

____ • Oil: ____________

____ 5.3.5 IF Chromate concentration is greater than 25 ppm, THEN Station Main Control Room shall be notified. (Reference 2.3)

Virginia Power Operator Notified: ______________________
Print Name/Date/Time

5.4 **Determination of Process Method**

NOTE:
- WHEN Sodium concentration is greater than 50 ppm, THEN rapid resin depletion will occur.
- WHEN Boron concentration is greater than 250 ppm, THEN the LW Evaporator may generate large volumes of Boric Acid Evaporator Bottoms with little radioactivity.
- WHEN Chromate concentration is greater than 50 ppm, THEN the LW Evaporator should NOT be used to prevent exceeding the maximum allowable Chromate concentration in solidified drums.
- WHEN Chromate concentration is greater than 20 ppm AND processing with the LW Evaporator, THEN the LW Oil Filter should be placed in service to prevent exceeding the maximum allowable Chromate concentration in solidified drums.
- WHEN Oil concentration is greater than 10 ppm, AND processing with the LW Evaporator, THEN the LW Oil Filter should be placed in service to main*ain LW Evaporator efficiency.
- WHEN Oil concentration is greater than 10 ppm, AND processing with the LW Demineralizers, THEN the LW Filter should be placed in service to prevent coating resin with oil.

NOTE: Substep NOT performed should be marked N/A.

5.4.1 Indicate processing method:

____ • LW Evaporator

OR

____ • LW Demineralizers

5.5 **Placing LWCT or LWST in Transfer or Transfer Standby**

____ 5.5.1 Select PRT CONF on DCS.

____ 5.5.2 Verify PRT CMPL is displayed on DCS.

____ 5.5.3 Select TRANSFER or XFR SB on DCS.

____ 5.5.4 Verify TRANSFER or XFR SB is displayed on DCS.

NOTE: Step(s) NOT performed should be marked N/A.

____ 5.5.5 IF processing using LW Demineralizers, THEN enter N/A on Step 5.5.6 through Subsection 5.8 AND GO TO ROP-1.03, Processing LW By Demineralization using DCS.

____ 5.5.6 IF LW Oil concentration is less than 10 ppm, AND Chromate concentration is less than 20 ppm, OR oil sample was NOT taken, THEN enter N/A Subsection 5.6.

5.6 **Place LW Oil Filter in Service**

____ 5.6.1 Verify Filter media is installed.

____ 5.6.2 Verify/Open 1-RLW-192, LW Transfer Pump Discharge to LW Oil Filter, and 1-RLW-170, LW Oil Filter to LW Evaporator.

____ 5.6.3 Verify/Open 1-RLW-538, LW Oil Filter inlet, and 1-RLW-539, LW Oil Filter Outlet.

____ 5.6.4 Verify/Close 1-RLW-42, LW Oil Filter Bypass.

____ 5.6.5 Enter N/A on Subsection 5.7.

5.7 **Bypassing LW Oil Filter**

____ 5.7.1 Verify/Close 1-RLW-192 and 1-RLW-170.

____ 5.7.2 Verify/Open 1-RLW-42.

5.8 **Selecting LW Evaporator Process**

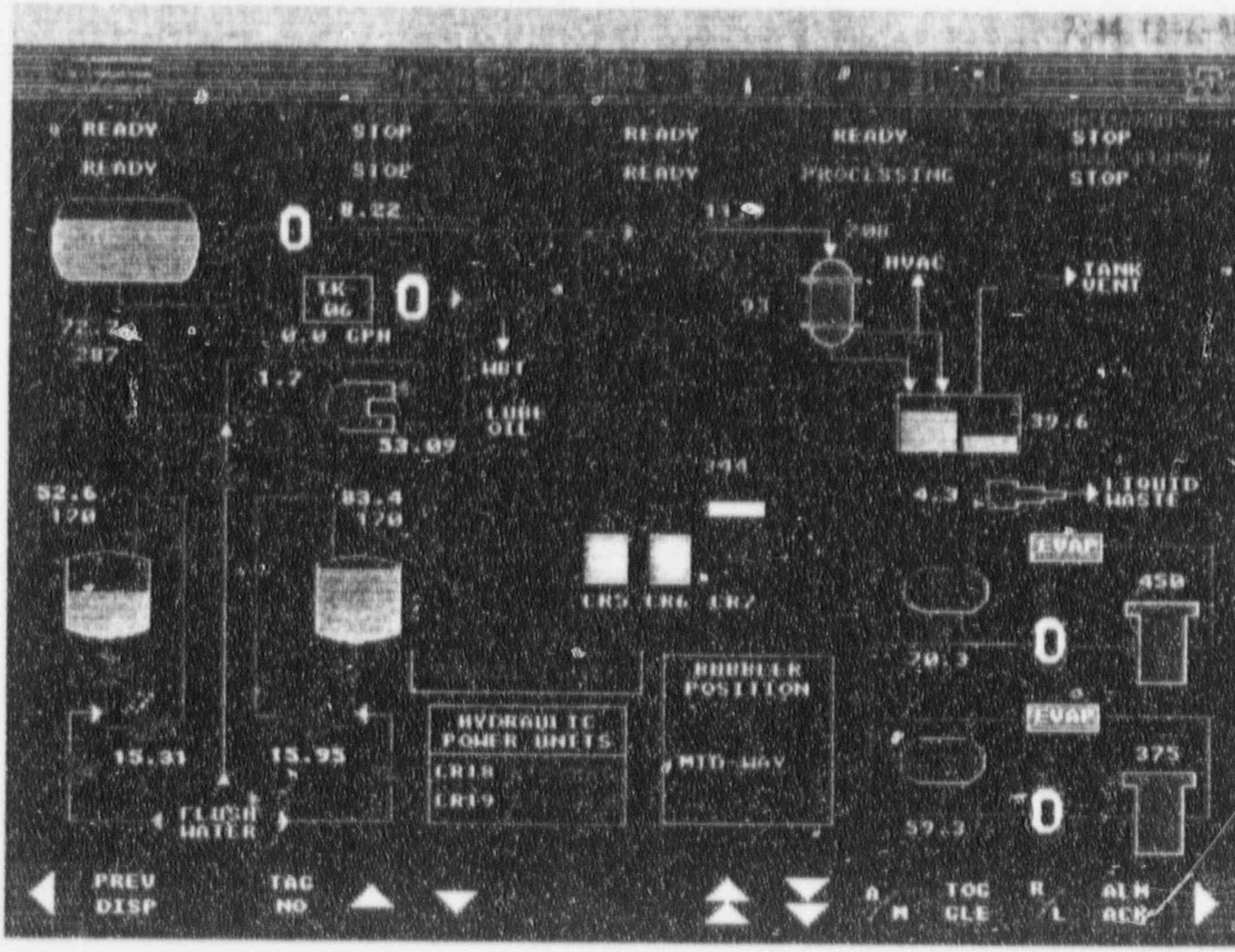
NOTE: Step(s) NOT perform should be marked N/A.

____ 5.8.1 IF LW Evaporator is in RUN, THEN GO TO ROP-1.45, Transferring LWCT/LWST and Sampling SPI Oil/SS Remover.

____ 5.8.2 IF LW Evaporator is shutdown, THEN GO TO ROP-1.01, LW Evaporator Startup to Hot Standby.

Completed by: ____________________
Print Name: ____________________
Date: ____________________

Attachment D Rec'd 12/17/91

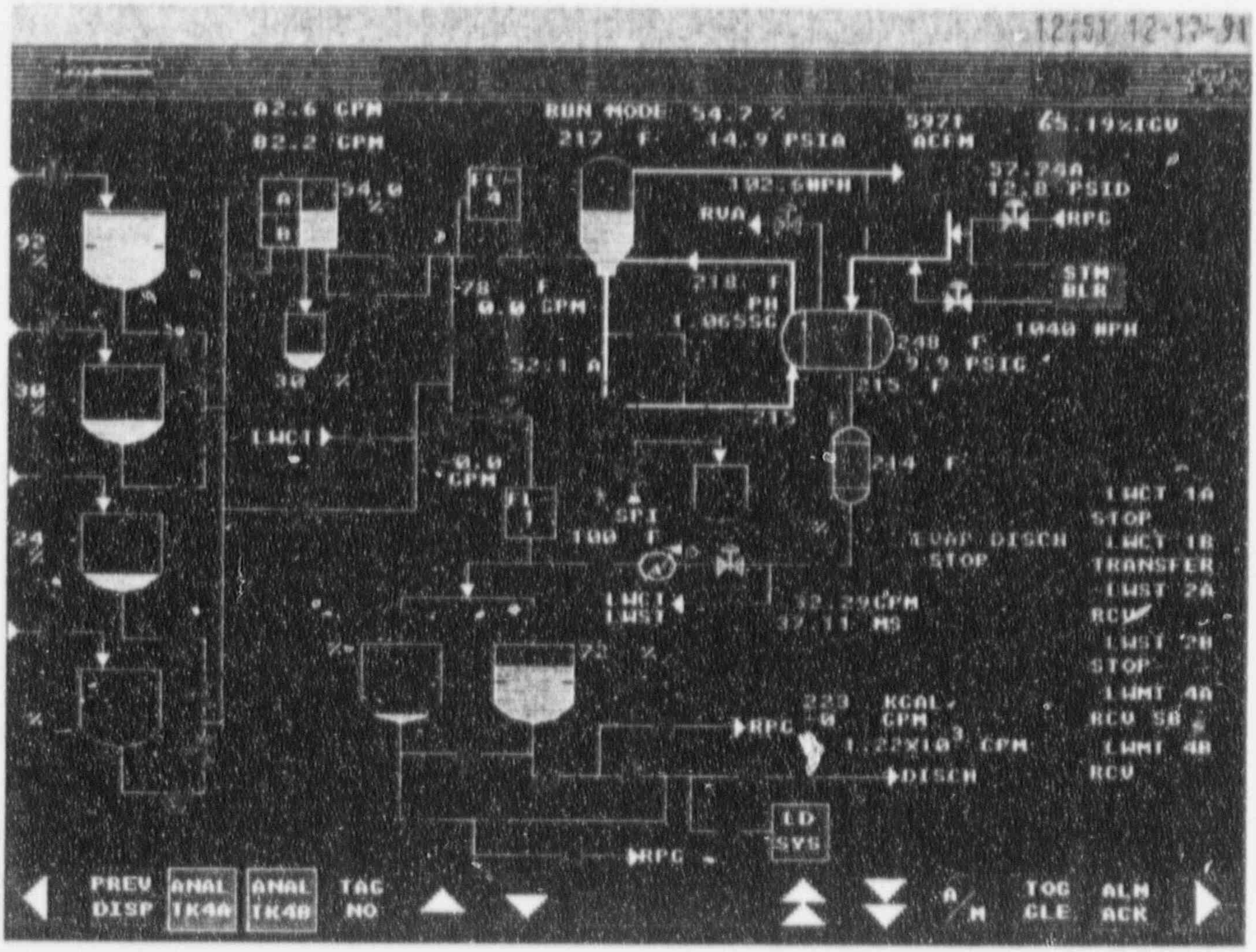


Proc. Rate .88 gpm / 53 gal Hour

WBT Level ↓ 4.2%/HR

Rec'd 12/17/91

Attachment E



Attachment F-12/17/91

SRF STATUS

Processed 550,000 gallons of $\sim 3x10^{-3}$ µci/ml water in 10 weeks of Hot Operation. With a Lower Level of Detection (LLD) which averages $\sim 2x10^{-8}$ µci/ml there has been no detectable activity measured after the Evaporator Process.

Bitumen Solidification has solidified Concentrated Evaporator Bottoms into 40 drums of 60/40 Bitumen/Waste mix.

Laundry filtration is achieving a decontamination factor of ~8.6. 15,000 gallons Laundry Water (NaOH Based Soap at Ph of 11.9) was processed in the HPD Evaporator to test anti-foaming capability. No adverse foaming was detected after the anti-foaming agent was injected into the Evaporator. Processing Laundry Water through Liquid Waste Evaporator.

NRF PURPOSE

TO PROVIDE PROVEN STATE-OF-THE-ART LIQUID AND SOLID RADWASTE PROCESSING CAPABILITY IN SUPPORT OF THE NUCLEAR POWER STATIONS.

IMPROVED RADWASTE PROCESSING CAN:

- REDUCE VOLUMES
- REDUCE EFFLUENT RELEASES
- REDUCE PERSONNEL EXPOSURE
- REDUCE COST THROUGH INCREASED EFFICIENCY

New Radwaste Facility

NRF MAJOR GOALS AND OBJECTIVES

1. On-site storage requirements for all waste types and forms shall be one(1) year.

2. Liquid-waste discharges shall not exceed
   0.1 Ci/year/site excluding tritium
   50% of NPDES limits

3. Low specific active shipped off-site shall not exceed 8,000 CF/reactor/year(16,000 CF/year/site)

4. There shall be no inadvertent radioactive gaseous releases from the NRF.

ADDITIONAL NRF GOALS AND OBJECTIVES

* NO FAILURE IN NRF SHALL EFFECT EXISTING POWER STATION OPERATION.

* NO WASTE TREATED AND/OR VOLUME REDUCED BY THE NRF SHALL EXCEED CLASS C CLASSIFICATION CRITERIA.

* THE FACILITY DESIGN SHALL BE BASED ON SOUND ALARA PRINCIPLES.

Design Conditions

Wastes		North Anna	Surry
• Liquid Waste			
Quantity	(gal/Day)	15,000	15,000
Specific Activity	(μCi/cc)	2.2 E-3	2.5 E-2
Boron Content	(ppm)	300	300
• Laundry Waste			
Quantity	(gal/Day)	5,000	9,395
Specific Activity	(μCi/cc)	1.9 E-5	5.0 E-5
• Spent Resin Quantity			
High Active Resin	(cf/Year)	800	800
Low Active Bead Resin	(cf/Year)	1,920	1,920
Low Active Powdex Resin	(cf/Year)	3,350	—
• Oily Waste			
Quantity	(gal/Year)	4,760	4,211
• COMPACTABLE DAW			
Quantity	(cf/Year)	50,000	50,000
• NON-COMPACTABLE DAW			
Quantity	(cf/Year)	6,000	6,000

NRF WASTE FORMS

- LSA BOXES
  - COMPACTED DAW
  - MISC. UNCOMPACTABLE WASTE & COMPONENTS
- HIC'S
  - DEWATERED LOW ACTIVITY RESIN
  - DEWATERED HIGH ACTIVITY RESIN (LESS THAN HIC LIMITS)
  - MISC. HOT DAW
- CEMENT SOLIDIFIED LINERS
  - HIGH ACTIVITY RESINS (GREATER THAN HIC LIMITS)
  - PRIMARY FILTERS
- BITUMEN DRUMS *
  - LOW ACTIVITY RESIN
  - EVAPORATOR CONCENTRATES
  - SLUDGES

* APPROVED ATI TOPICAL EXPECTED
USE

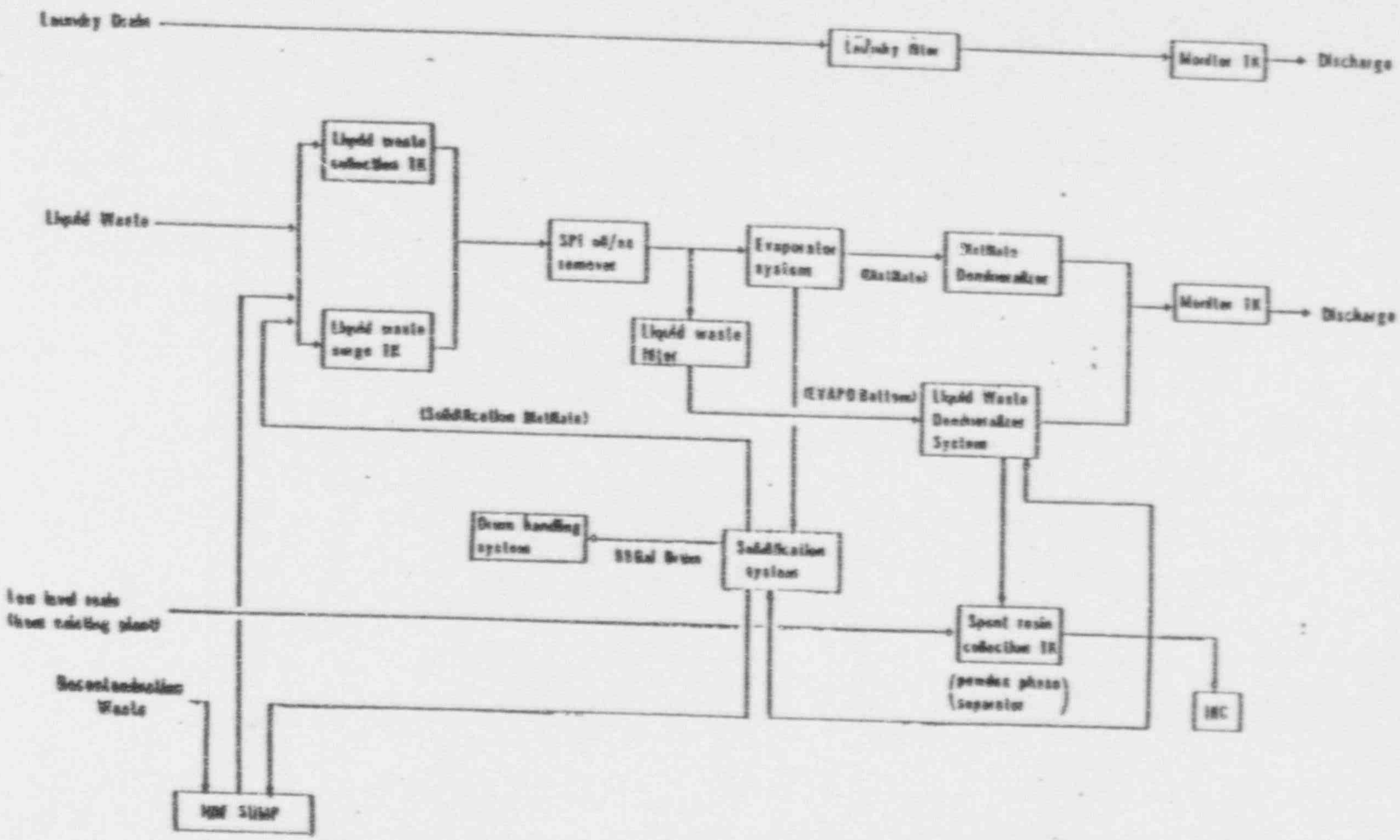
WASTE CLASSIFICATION

- FACILITY GOAL: NOTHING GREATER THAN CLASS C
- CLASSIFICATION SYSTEM UNCHANGED (RADMAN)

NEW RADWASTE FACILITY

- RADWASTE CONTROL ROOM
- LIQUID WASTE PROCESSING EQUIPMENT
  - 30 GPM EVAPORATOR
  - 60 GPM DEMINERALIZER
- LAUNDRY WASTE PROCESSING EQUIPMENT
  - FILTER
  - EVAPORATION OPTION
- HIGH PRESSURE SHREDDER/COMPACTOR
- ASPHALT SOLIDIFICATION SYSTEM
  - EVAPORATOR CONCENTRATES
  - SPENT RESINS
- CONTAMINATED OIL SOLIDIFICATION
- HIC FILLING AND DEWATERING
- DECONTAMINATION EQUIPMENT/AREA
- HOT MACHINE SHOP (CAPABLE OF RCP WORK)
- RADIOCHEMICAL LABORATORY

- STORAGE FOR 1 YEAR
  - DAW
  - SOLIDIFIED WASTE
  - HIC's
  - SPENT FILTERS
- ALL REQUIRED PROCESS AND BUILDING AUXILIARIES
- RADIATION MONITORING SYSTEM
- FIRE PROTECTION SYSTEM
- RCA ACCESS CONTROL



NRF WASTE DISPOSAL SYSTEM BLOCK FLOW

Liquid Waste Monitor Tanks => via => Evaporator System

$\frac{\text{INFLUENT - EFFLUENT}}{\text{INFLUENT}}$ X 100 = % D.F.

DATE	TANK	INFLUENT	EFFLUENT	% DF
10/12/91	"B" LWMT	2.00 E-3	0	100%
10/13/91	"B" LWMT	1.137 E-3	0	100%
10/14/91	"A" LWMT	8.3582 E-4	0	100%
10/14/91	"B" LWMT	2.00 E-3	0	100%

SRF PROCESS EFFICIENCY

- Evaporator concentrates to 12%
- 11/20/91 "A" LWCT was 230 ppm
- Ratio is $\frac{12\% \times 1748 \text{ ppm}/\%}{230 \text{ ppm}} = \frac{91}{1}$
- 4 Drums are generated per Waste Batch Tank of 1100 gallons
- $\frac{1100}{4}$ = 275 gallons of concentration per Drum of Product
- 275 gallons of Conc. x $\frac{91}{1}$ = 25,025 gallons of feed
- ~ 25,000 gallons of Process Water per Drum