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of Energy*

Processing Results of 1,800 Gallons of Mercury and Radioactively Contaminated Mixed Waste Rinse Solution

B. P. Thlesen

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Published January 1993

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EG&G Idaho, Inc.
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ABSTRACT

The mercury-contaminated rinse solution (INEL waste ID# 123; File 8 waste) was successfully treated at the Idaho National Engineering Laboratory (INEL). This waste was generated during the decontamination of the Heat Transfer Reactor Experiment 3 (HTRE-3) reactor shield tank. Approximately 1,800 gal of waste was generated and was placed into 33 drums. Each drum contained precipitated sludge material ranging from 1–10 in. in depth, with the average depth of about 2.5 in. The pH of each drum varied from 3–11. The bulk liquid waste had a mercury level of 7.0 mg/l, which exceeded the Resource Conservation and Recovery Act (RCRA) limit of 0.2 mg/l. The average liquid bulk radioactivity was about 2.1 pCi/ml, while the average sludge contamination was about 13,800 pCi/g. Treatment of the waste required separation of the liquid from the sludge, filtration, pH adjustment, and ion exchange. The first process was the decanting and filtration of the liquid from the sludge. The sludge in the 33 drums was then combined into 4 drums and will be solidified. The pH of the liquid portion was adjusted and then processed by ion exchange in the Portable Water Treatment Unit (PWTU) located at the Test Area North (TAN) at the INEL. In order to remove the mercury, additional ion exchange columns containing 1.0 ft³ of Purolite S-920 resin was installed into the PWTU system. Because of difficulties in processing, three trials were required to reduce the mercury levels to below the RCRA limit. In the first trial, insufficient filtration of the waste allowed solid particulate produced during pH adjustment to enter into the ion exchange columns and ultimately the waste storage tank. In the second trial, the waste was filtered down to 0.1 μ to remove all solid mercury compounds. However, before filtration could take place, a solid mercury complex dissolved and mercury levels exceeded the RCRA limit after filtration. In the third trial, the waste was filtered through 0.3- μ filters and then passed through the S-920 resin to remove the dissolved mercury. The resulting solution had mercury levels at 0.0186 mg/l and radioactivity of 0.282 pCi/ml. This solution was disposed of at the TAN warm waste pond, TAN782, TSF-10.

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Processing Results of 1,800 Gallons of Mercury and Radioactively Contaminated Mixed Waste Rinse Solution

1. INTRODUCTION

1.1 Scope

This report addresses the processing of 1,800 gal of mercury-contaminated mixed waste (also referred to as File 8 waste) at the Idaho National Engineering Laboratory (INEL). The objective is to detail the methods by which the waste (INEL waste ID# 123) was processed and describe final waste forms and ultimate disposal of each waste form. Included in this report are details of processing problems and recommendations for future processing of similar wastes.

1.2 Background

The Test Area North (TAN) mercury-contaminated rinse solution was produced from the decontamination of the Heat Transfer Reactor Experiment 3 (HTRE-3) reactor shield tank. This reactor was designed as part of the airplane engine program. Shielding for the reactor was provided by an approximately 1,500-gal shield tank filled with mercury. This reactor since has been put on display at the Experimental Breeder Reactor I (EBR-I) museum.

Prior to the HTRE-3 reactor being sent to EBR-I for display, the residual mercury was removed by rinsing the shield tank with 30 wt% nitric acid solution. After rinsing the shield tank, the following processes were to be performed on the solution. The solution was to be transferred to a mixing tank, and the pH of the solution increased to about 10 by adding 50 wt% sodium hydroxide. Sodium sulfide was then to be added to convert the mercury to an insoluble mercury sulfide. Aluminum sulfate was then to be added to act as a flocculating agent. The solution was then to be neutralized to a pH of 7 and filtered through a 5- μ filter.

Originally, it was anticipated that the resulting waste would pass Resource and Conservation Recovery Act (RCRA) limits and then disposed of as a nonhazardous, nonradioactive waste. However, the solution did not pass RCRA limits and the waste was placed into 33 polyethylene, 55-gal drums. The 33 drums of waste were then placed into the Mixed Waste Storage Facility (MWSF) at the INEL. Information from the waste characterization report and results from analyses performed on the waste indicate that the above procedures were not all performed, resulting in each waste drum having different metal concentrations and pH.

2. WASTE TREATMENT

The TAN mercury-contaminated rinse solution was treated as part of a treatability demonstration of mixed wastes at the INEL. Several similar mixed wastes have been identified at the INEL for potential treatment by ion exchange. The processing of the 1,800 gal of TAN mercury-contaminated rinse solution waste was to evaluate the treatability of this and similar wastes on a large scale by ion exchange and the requirements of a treatment system for future processing.

Prior to treatment of the 1,800 gal, treatability studies were performed on samples of the waste at the Test Reactor Area (TRA) radiochemistry lab located at the INEL.^a After completion of the treatability studies, treatment facility and treatment process options were evaluated and a processing scheme was developed. The following sections detail the processing of the 1,800 gal of mixed waste designated ID# 123. Processing of this waste required three processing trials denoted as Trials 1, 2, and 3.

2.1 Treatability Studies

Treatability studies were performed on samples of the waste to evaluate treatment options and recommend a treatment plan. The results of the treatability studies are detailed in footnote a. A summary of the treatability study is provided here.

2.1.1 Sampling and Analysis Results

In 1992, six of the 33 drums were sampled to perform treatability studies. The samples indicated that the waste had both a liquid phase and a solid sludge phase. It appeared from the sampled drums that sludge filled about 2–3 in. of the bottom of the drum. The sludge was a very fine particulate. The liquid was separated from the solids by using a 0.45- μ filter, and both the liquid filtrate and the solids were analyzed for metals and radioactivity.

Some of the results of the analysis are shown in Tables 1–3. Table 1 shows the concentrations of mercury and lead in the filtrate and the solid portion of the waste. A more complete metals analysis was obtained and is detailed in footnote a, but only mercury and lead were above the RCRA limits of 0.2 mg/l and 5.0 mg/l, respectively. Table 2 shows the total activity of the filtrate and Table 3 shows the total activity of the solid portion of the waste.

The filtrate has a wide range of results for lead and mercury. Most of the mercury values are over the RCRA limit, ranging from 0.133 to 4.68 mg/l with an average of 1.156 mg/l. Only one lead value is over the RCRA limit, ranging from 0.622 to 8.10 mg/l with an average of 3.03 mg/l. The lead and mercury values for the sample from Drum 702 are not considered valid because the values shown are outside the instrument detection limits and are not included in this discussion. The total activity of the filtrate is very low, ranging from 2.2 to 74 pCi/ml with an

a. D. R. Haefner, *Treatability Study of Aqueous, Land Disposal Restricted Mixed Wastes*, EGG-WM-10496, December 1992.

Table 1. Mercury and lead concentrations of the liquid and solid portions of the sampled waste.

Drum number	Filtrate		Solids	
	Mercury content (mg/l)	Lead content (mg/l)	Mercury content (mg/l)	Lead content (mg/l)
568	0.326 ± 0.010	0.622 ± 0.019	54.5 ± 0.5	101.3 ± 0.8
572	0.133 ± 0.005	0.674 ± 0.012	2.98 ± 0.03	189.4 ± 1.6
635	4.68 ± 0.09	2.88 ± 0.04	9.37 ± 0.04	651.4 ± 1.8
697	0.340 ± 0.012	8.10 ± 0.15	138 ± 10	135.0 ± 0.8
702	19,880 ± 650	1,120 ± 20	80 ± 7	66.9 ± 1.0
703	0.301 ± 0.010	2.87 ± 0.04	46.9 ± 0.3	154.0 ± 1.0

Table 2. Gross alpha and beta radioactive contamination of the liquid portion in the sampled waste.

Drum number	Dissolved solids (mg/ml)	Filtrate gross α (pCi/ml)	Filtrate gross β (pCi/ml)
568	223.4	2.4 ± 1.4 E-1	7.4 ± 1.2 E+1
572	16.6	2.8 ± 1.0 E-2	6.5 ± 1.1 E-1
635	3.9	1.0 ± 0.2 E-1	2.2 ± 0.4 E+0
697	264.4	0.6 ± 1.6 E-1	3.7 ± 0.7 E+0
702	3.2	4.2 ± 0.7 E-1	4.4 ± 0.7 E+1
703	89.6	2.3 ± 0.7 E-1	2.7 ± 0.5 E+0

Table 3. Gross alpha and beta radioactive contamination of the filterable solid portion in the sampled waste.

Drum number	Filterable solids		Solids gross α (pCi/g)	Solids gross β (pCi/g)
	$\geq 0.45\mu\text{m}$ (mg/ml)	$0.1-0.45\mu\text{m}$ (mg/ml)		
568	935.6	9.7	$3.6 \pm 0.9 \text{ E}+1$	$2.0 \pm 0.3 \text{ E}+4$
572	612.5	0.1	$8 \pm 3 \text{ E}+1$	$1.05 \pm 0.17 \text{ E}+3$
635	782.1	0.0	$-1.3 \pm 0.6 \text{ E}+1$	$4.9 \pm 0.8 \text{ E}+3$
697	277.3	2.6	$-1.0 \pm 0.2 \text{ E}+3$	$4.0 \pm 0.6 \text{ E}+4$
702	4.0	0.2	$3.6 \pm 0.9 \text{ E}+3$	$1.0 \pm 0.3 \text{ E}+4$
703	419.6	2.2	$-2.9 \pm 0.8 \text{ E}+1$	$7.1 \pm 1.1 \text{ E}+3$

average of 21 pCi/ml. The total activity of the sludge is much higher, ranging from 1,050 to 40,000 pCi/g with an average of 13,800 pCi/g.

The original waste was thought to have been treated in a large mixing tank, then placed into the waste drums. However, the results from the six samples indicate that each waste container is different and has its own characteristics. All the samples have very high concentrations of sodium, reading beyond the capability of the analytical instrument, indicating that the sodium sulfide was probably added. Also, some of the samples have high concentrations of aluminum while others have almost no aluminum, indicating that some of the containers may of had aluminum sulfate added. The pH of the samples ranged from less than 3 to greater than 10. It can be concluded that the waste probably had chemical additions after being placed into the drums.

2.1.2 Treatability Results and Conclusions

The treatment processes tested on a lab scale basis are detailed in footnote b. Ion exchange experiments were run in a glass column, 1.5 cm in diameter and 20–25 cm tall. The following conclusions and recommendations for large scale processing of the waste were made:

- Results of the treatability study indicate that the waste can be treated to remove the hazardous heavy metals of mercury and lead by use of an ion selective resin. Two selective ion resins were recommended:
 - GT-73 produced by Rhom and Hass.
 - S-920 produced by Purolite.

b. D. R. Haefner, *Treatability Study of Aqueous, Land Disposal Restricted Mixed Wastes*, EGG-WM-10496, December 1992.

The first resin, GT-73, proved to be slightly more effective with mercury and lead removal than the S-920.

- Heavy metal removal was most efficient at acidic conditions, pH 4–6, but also was effective under caustic conditions, pH 8–10. A pH drop of about two points occurred during processing of the waste.
- Heavy metal removal was effective at a flow rate of 10–12 bed volumes per hour.
- The GT-73 resin passed the RCRA toxicity characterization leaching procedure (TCLP) metals testing after treatment of the waste. The S-920 was not TCLP tested.
- The sludge failed for TCLP lead, but passed all other TCLP metals. This indicates that the filters will probably become a mixed waste.

The recommended procedure to process the waste is outlined below:

1. Neutralize the waste solution to a pH of 10.
2. Filter the solution through a 0.45- μ filter.
3. Process the solution through a resin column at a flow rate of 10–12 bed volumes per hour.

2.2 Treatment Facility Options

In order to treat the waste, a system capable of neutralization, filtration, and ion exchange had to be located. Also, because the waste is considered a mixed hazardous waste, the system to process the waste must be permitted to treat the waste's specific hazards under RCRA and State regulations. It was determined that the Portable Water Treatment Unit (PWTU) located at the INEL would be capable of processing the waste.

2.2.1 Portable Water Treatment Unit

The PWTU was originally designed to treat well water contaminated with low levels of radioactive isotopes and trichloroethylene at the INEL. The PWTU contains a filtering system, activated carbon beds, resin columns for radioactive isotope removal, and pH adjustment system as shown in the drawings in Appendix A.

All processing of the waste could not take place at the PWTU. The activity of the waste was too high to meet the requirements of the PWTU safety analysis report (SAR). However, the liquid portion could be processed at the PWTU if the liquid was separated from the sludge. It was determined by EG&G Idaho, Inc., that the separation of the liquid from the solid and the repackaging of the liquid into separate waste drums was not hazardous waste treatment and could be performed at any facility with capabilities of handling the waste. The TAN Hot Shop was evaluated as being the best facility to separate the liquid from the solid portion of the waste. Factors included in the evaluation were the TAN Hot Shop SAR encompassed the waste's

characteristics, the Hot Shop has trained personnel, and the PWTU is located about 500 yd from the TAN Hot Shop.

In order to use the PWTU, modifications to the system were required. The existing columns in the PWTU contained C-100H resin from Purolite. This resin is not capable of removing heavy metals to required concentrations below the RCRA limit. To remove the heavy metals from the waste, ion exchange columns packed with GT-73 and S-920 were installed. Also, a means to adjust the pH of the liquid prior to ion exchange had to be developed.

2.2.2 Treatment Flow Diagram

Figure 1 shows the flow diagram for the treatment of the waste. The waste was first removed from the MWSF and brought to the TAN Hot Shop, a trip of about 45 mi. The liquid waste was then separated from the sludge. The sludge was combined into four drums and sent back to the MWSF for future treatment. The liquid portion was pumped into clean 55-gal drums and taken to the PWTU storage area. At the PWTU the waste had the pH adjusted to 7–8. The waste was then processed in the PWTU and discharged to two polyethylene storage tanks. Upon verification of the treatment by sampling and analysis, the waste would be discharged to the warm waste pond at TAN.

2.3 Sludge Separation, pH Adjustment, and Ion Exchange, Trial 1

The processing of the waste entailed sludge separation at the TAN Hot Shop and pH adjustment and ion exchange at the PWTU. In this section the details of processing the waste are given.

2.3.1 Sludge Separation at TAN

Sludge separation at TAN entailed the transporting of the waste to the TAN Hot Shop area, separation of the liquid from the solid sludge portion, and repackaging of the sludge for storage at the MWSF. The details for each stage of the sludge separation process are detailed below.

2.3.1.1 Transportation of the Waste to the TAN Hot Shop Area. Because the Hot Shop is not a permitted treatment, storage, and disposal (TSD) facility, the waste could only be at the Hot Shop for 10 days. It was estimated that the sludge separation process could be completed in three days, but to ensure the time limit was not exceeded, two staggered shipments were made from the MWSF. The first shipment of 16 drums was brought September 2, 1992. The second shipment of 17 drums was brought September 3, 1992. The drums were placed in a staging area at TAN.

2.3.1.2 Sludge Separation in the TAN Hot Shop. The liquid was separated from the sludge using the filter and pump assembly shown in Figure 2 and the procedures in Appendix B. The filtering system consisted of three series "L" Serfilco filter housings connected in series. Each filter housing accepts a 10-in., double-open-end filter. The first filter housing in the series had a 10- μ absolute rated filter installed. The second filter housing had a 1- μ absolute rated filter installed. The third filter housing had a 0.1- μ absolute rated filter installed. Pressure indicators

Figure 1. Process flow diagram for the treatment of TAN mercury-contaminated rinse solution.

Figure 2. Filter and pump assembly that was used to separate liquid from sludge.

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ITEMS 1 AND 7 TO BE LOCATED ON ITEM 11 APPROXIMATELY AS SHOWN MATCH DRILLED AS REQUIRED.

LABEL ITEM 10 APPROXIMATELY AS SHOWN WITH 1/8" HIGH CHARACTERS. LABEL EITHER 0.1 MICRON, 1 MICRON OR 10 MICRON DEPENDING ON COMPONENT.

PARTS LIST		
ITEM	QTY	DESCRIPTION
1	3	SERFILCO FILTER CHAMBER, SERIES "L" MODEL # PPL103/4-G4
2	1	FILTER CARTRIDGE, ALL WOUND DEPTH FILTER, PPL WITH PPL CORE, 10" HEIGHT, 10 MICRON
3	1	FILTER CARTRIDGE, ALL WOUND DEPTH FILTER, PPL WITH PPL CORE, 10" HEIGHT, 1 MICRON
4	1	FILTER CARTRIDGE, TRI-PLEATED POLYSULFONE MEMBRANE WITH PPL SUPPORT, 10" HEIGHT, 0.1 MICRON
5	3	PRESSURE GAUGE, 0-100 PSI
6	3	PRESSURE ISOLATION DIAPHRAGM
7	1	WILDEN DIAPHRAGM PUMP, 1/2" NPT(F) INLET AND OUTLET, 1/4" NPT(F) AIR INLET, MODEL # M1/PO/PU/PU/KU
8	1	MASTER PNEUMATIC 1/4" FRL, FILTER REGULATOR LUBRICATOR
9	1	WHITEY NEEDLE VALVE, 1/4"
10	3	PVC PLASTIC BALL VALVE, 1/2" NPT(F) INLET AND OUTLET
11	1	PLATE, 1/8" CARBON STEEL
12	AR	TUBING, 1/2" ID, REINFORCED TYGON
13	AR	TUBING, 1/2" ID, TYGON
14	5	POLYETHYLENE MALE PIPE ADAPTER, 1/2" NPT(M) X 1/2" TUBING
15	4	POLYETHYLENE MALE PIPE ADAPTER, 3/4" NPT(M) X 1/2" TUBING
16	2	PLASTIC PIPE MALE REDUCER, 3/4" NPT(M) X 1/2" NPT(M)
17	2	PLASTIC PIPE NIPPLE, 1/2" NPT(M)
18	1	PLASTIC PIPE TEE, 1/2" NPT(F)
19	9	HOSE CLAMPS

on each filter housing provided indication that the filters were working and when the filters became depleted. An air-driven, Wilden diaphragm pump was used to pump the liquid out of the drums and force it through the filters. The diaphragm pump is a positive displacement pump and does not require priming. To ensure that the pump would not overpressurize the filter housings, the supply air was maintained at 65 psig, which is less than the 100 psig pressure rating for the filter system.

Waste drums were brought from the staging area into the Hot Shop in sets of four bound to a pallet. The pH of each drum was obtained and recorded (see Table 4). The diaphragm pump was used to remove the liquid from the waste drums and pass it through the filtering system (see Figure 2). The flexible inlet line to the pump was connected to a 4-ft length of 5/8-in. stainless steel tubing. The tubing was slowly lowered into the waste drum until the sludge phase was reached. Operators could identify the sludge by observing the fluid flowing through the clear Tygon tubing. Once the liquid was decanted to within 1–2 in. of the sludge phase, the suction line was placed into the next container.

Table 4 shows the drum numbers and information collected on each drum as it was processed. The liquid effluent from the filtering system ranged in colors from clear to brown. The pH of the effluent was also monitored for each drum (see Table 2). The filtered effluent was discharged into clean polyethylene drums. The drums were placed on a pallet and moved to the staging area at the TAN Hot Shop.

The filters were replaced three times. The first time the filters were replaced when the discharge tube became stained with the waste in Drum 667. There was no sign of solid particulate passing through the filters, indicating that the solution was discolored from dissolved ions. The next two filter change-outs were performed when pressure reading across the filters indicated they were depleted.

2.3.1.3 Sludge Accumulation. After the liquid portion was removed from a set of four drums on a pallet, the sludge from these four drums was then consolidated into a 55-gal steel drum with a polyethylene liner. The sludge solution in the waste drum was mixed by using a small stainless steel propeller on the end of a 3.5-ft-long shaft. A drill motor was used to drive the mixing shaft and propeller. The sludge was mixed with the 1–2 in. liquid layer that was left during the decanting stage to suspend the solid particulate. The mixed sludge solution was then pumped out of the drum using the assembly shown in Figure 2. Valve 1 was closed to prevent filling the filter housing with sludge and Valve 2 on the recycle line was opened. The end of the recycle line was placed into the sludge accumulation drum. The sludge accumulation drums were filled about two-thirds full. The extra space was left in the drums to provide room to add a solidification agent for future solidification of the sludge. Four sludge accumulation drums were used. Table 4 indicates which sludge from each drum went into each accumulation drum.

After the sludge accumulation drums sat overnight, an attempt was made to decant excess liquid from these drums. However, the operators were unable to distinguish the sludge phase from the liquid phase and no water was removed.

Table 4. Drums filtered at the TAN Hot Shop and treated at the PWTU.

Drum number	Sampled prior to treatment	pH	Sludge placed in drum number	Drum number	Sampled prior to treatment	pH	Sludge placed in drum number
564 ^a	No	9	4	626	No	10	3
565	No	9	3	627	No	10	3
568	Yes	11	1	630	No	10	3
569	No	8	1	635	Yes	7	1
570	No	9	1	636	No	9	1
571 ^a	No	9	4	637	No	9	1
572 ^a	Yes	8	4	638	No	7	1
575 ^a	No	9	4	666	No	10	2
576 ^a	No	11	4	667 ^{ab}	No	9	2
587	No	7	3	668	No	10	2
588 ^a	No	10	3	669	No	10	2
589	No	10	3	697	Yes	11	1
590 ^c	No	9	4	700	No	3	No sludge
609 ^a	No	9	3	701	No	3	3
610	No	7	3	702	Yes	3	No sludge
611	No	6	3	703	Yes	6	3
612 ^a	No	11	2				

- a. The solution in these drums had a brown color after filtering down to 0.1 μ . The remaining drums had a clear solution after filtering.
- b. Drum 667 had 8–10 in. of sludge. Most of the drums had 2–3 in. sludge.
- c. Drum 590 had 6–8 in. sludge. Sludge was very thick and damaged the pump. Water was mixed into the sludge as a thinner. The pump was replaced.

Most of the drums had 2–3 in. of sludge. However, Drum 667 had about 8–10 in. sludge and Drum 590 had 6–8 in. of sludge. Because not enough liquid was left in Drum 590, the sludge was too thick and damaged the pump. The damaged pump was removed and replaced with a new identical pump. About a gallon of water was added to Drum 590 and thoroughly mixed to suspend the sludge. The sludge was then pumped out of Drum 590 without further incident.

After all the sludge had been removed, the empty drums were left bound to the pallets and prepared for shipment to the Waste Experimental Reduction Facility (WERF) for compaction. After compaction, the waste containers will be disposed of at the radioactive waste burial grounds at the INEL.

2.3.2 Adjustment of pH at the PWTU

The pH adjustment of the wastewater was performed at the PWTU. After the liquid portion of the waste was transferred to clean 55-gal poly drums, the drums were bound four at a time to a pallet and transported to the PWTU with a forklift.

2.3.2.1 Adjustment of pH Requirement. The PWTU has a pH operating range of 6–9. The scoping studies indicated that the pH would drop 1–2 points in the ion exchange columns. Therefore, to stay above the pH limit of 6, the incoming waste had to be at a pH of 8. Although this conflicted with the optimal lead and mercury removal operating range for the resin of a pH of 4 or less, the scoping studies indicated that 7–8 was an acceptable pH for the incoming waste.

2.3.2.2 Adjustment of pH of the Liquid Waste. Once at the PWTU, the drums were opened one drum at a time. The pH of the waste in each drum was measured and compared to the pH measured during sludge separation. Also, a 150–200 ml sample of the waste in each drum was transferred to a 30-gal drum to produce a composite mixture of the waste. The composite mixture was sampled, and the sample was sent to Twin City Testing (TCT)^c for analysis. After the sample was obtained, acid or caustic was added to each drum as required to adjust the pH to 7–8.

As can be seen in Table 2, two of the drums had a pH of 8, four of the drums had a pH of 7, and two of the drums had a pH of 6. No pH adjustment was made to these drums. Three of the drums had a pH of 3 and a 50% sodium hydroxide solution was added to these drums to raise the pH to 7–8. The remaining 22 drums had pHs of 9–11. Nitric acid was added to these drums to lower the pH to 7–8.

Originally, it was anticipated that as nitric acid was added, no precipitation would develop. However, as the acid was added, a precipitate did form. This precipitate was not analyzed because it was not thought to be mercury or lead because both of these compounds should have increased solubility in acid.

c. Twin City Testing (TCT), 1908 Innerbelt Business Center Drive, St. Louis, Missouri 63114-5700. TCT has been audited by EG&G Idaho and meets the requirements for an EPA Lab Program for quality assurance and quality control.

Sulfides were present in the waste, and there was a possibility of generating hydrogen sulfide when the acid was added to the waste. This is a hazardous and flammable gas. The acid was added slowly in 10-ml increments below the surface of the liquid. In this manner the reaction was not vigorous and if any hydrogen sulfide was produced, it remained in solution. There was no noticeable temperature increase in the waste because of the addition of the acid. No hydrogen sulfide was detected by odor during acid additions.

2.3.3 Filtering and Ion Exchange in the PWTU, Trial 1

The existing resin columns in the PWTU contain a general cation exchanger. This resin would not be effective at removing mercury to levels below the 0.2 mg/l RCRA limit. To ensure effective mercury and lead removal, heavy metal ion specific resins would have to be used.

The amount of resin required to treat the wastewater was about 0.2 ft³ of GT-73. However, with this amount, the flow rate could only be 0.23 gpm. Therefore, to decrease operating time, the flow rate was increased by using an excess of resin. Two resin columns were purchased, each with a 0.5 ft³ bed volume, giving a total bed volume of 1.0 ft³. Detailed resin column information is found in Appendix C. This bed volume permitted a flow rate of 1.2 gpm, which required three days to process the waste. Processing time could be further reduced by increasing the resin capacity, but at the expense of generating more radioactive waste.

Treatability results suggested the best resin to use was GT-73. However, it was no longer being manufactured and not available. About 7,000 g (0.28 ft³) was purchased from a lab supply company, but the remaining 0.72 ft³ of bed volume had to be filled with S-920. The GT-73 was placed at the bottom of the second column to act as a polishing resin because the scoping studies indicated it was the more effective resin. Once the columns were packed, they were installed into the system. The columns were installed into a bypass line around the activated carbon beds. The activated carbon beds were not usable while the columns were installed.

Once a drum of waste on a pallet had the pH adjusted to 7–8, the solution was pumped from the drum using a peristaltic pump. The solution was pumped from the drums at a rate of 1.2–1.4 gpm as measured on the two flow meters/totalizers in the process trailer. The waste was fed to the inlet of the PWTU shown in drawing number 177148 in Appendix A. The solution was filtered through 20- μ filters into the heavy metals ion exchange columns. Originally, the waste was fed through the general cationic ion exchange columns to remove the radioactive isotopes. However, the solution became very acidic in these columns. It was decided to bypass these columns and only go through the temporary heavy metal removal columns. After the waste was completely treated in the heavy metal columns, the waste was then processed through the general cation exchange resin to remove the radioactive isotopes. The treated waste was discharged to two tanks, each containing about 900 gal.

The pressure drop across the temporary heavy metal columns slowly increased during processing. When the inlet pressure reached about 40 psig, the system was shut down and the first column was dismantled. Precipitated material formed during pH adjustment was passing through the 20- μ filters and collecting in the ion exchange columns, causing the columns to restrict the flow. The resin in the first column was removed and replaced with fresh resin. The system continued operation until about five drums remained, at which time the columns again

became too plugged to continue operations. Both columns were then back flushed. After back flushing, the remaining drums of waste were treated.

The process initially passed the water through both the heavy metals resin and the radioactive ion exchange resin. However, the discharged solution was at a pH of less than 3. The radioactive removal columns were designed for a much higher flow rate, and it was decided that the slow 1.2 gpm flow rate was allowing too much ion exchange, resulting in the pH of the water being driven down. The radioactive columns were bypassed after about 300 gal was processed. With the waste going through the heavy metals column only, the pH stabilized at 7–8. The final waste was placed into two tanks. The first tank had the initial 300 gal of acidic water discharged to it, plus about 600 gal of water at pH 7–8. The final pH of this tank was less than 3. The solution was neutralized by adding 50 wt% sodium hydroxide. Mixing was provided by recycling the water at 140 gpm through a pump. The waste in the second tank was at a pH of 7. This wastewater was slightly turbid, indicating some solid particles probably had passed through the filters and resin columns.

The PWTU was reconfigured so wastewater would flow through the activated carbon beds and the three general cation, C-100H, exchange resin columns. The wastewater in the two tanks was then reprocessed in the PWTU at the system design flow rate of 8–10 gpm. The wastewater was processed through the activated carbon beds only to bypass the temporary heavy metal ion exchange columns and not to remove any organics. As the waste was processed through the C-100H ion exchange columns, the pH of the waste dropped to less than 3, and the in-line automatic pH adjustment unit could not increase the pH. The treated solution in the tanks was cloudy, indicating precipitation was in the tanks. The bulk solution in the tanks was at a pH of less than 3. The solution was neutralized in the tanks. A pump was connected to recycle the solution in the tanks at about 140 gpm. Solid sodium hydroxide was then slowly added to increase the pH. As the sodium hydroxide was added, a great deal of precipitate formed. The final pH of the solution was at 9. The precipitate was not analyzed, but was assumed to be aluminum or sodium, both of which may pass through the resin columns.

2.3.4 Sampling and Analysis Results of pH Adjustment and Ion Exchange, Trial 1

Samples of the treated wastewater were obtained for radioactive analysis at the Radiation Measurements Laboratory (RML) located at the INEL, and were analyzed for TCLP metals, TCLP pesticides, and TCLP herbicides at TCT. A sample was also sent to the Environmental Chemistry Unit (ECU) lab located at the INEL for total RCRA-regulated metals screen. Gamma-ray results are shown in Table 5 and detailed lab results are provided in Appendix D. TCLP test results from TCT are summarized in Table 6 and detailed lab results are provided in Appendix E. Table 6 also shows the results of TCLP metals testing from ECU. The results are divided into Tanks 1 and 2, because the waste was placed into two tanks after treatment.

As can be seen by the results in Table 5, the original waste had a total activity of 2.1 pCi/ml. This is from a sample of the consolidated liquid representing the bulk waste. After treatment, the total activity was reduced to 0.269 pCi/ml. The original waste contained only Co-60; however, after treatment the waste stream registered the presence of Cs-137. The Co-60 was reduced to 0.046 pCi/ml, but the Cs-137 increased 0.223 pCi/ml, accounting for the majority of the radioactivity in the final waste solution. The cesium probably was removed from the resin

Table 5. Radioactive contamination of consolidated sample of treated liquid waste.

Waste form	Activity by isotope (pCi/ml)		Total activity (pCi/ml)
Untreated consolidated liquid (180–200 ml collected from each waste drum after filtration)	Co-60	$2.10 \pm 0.03 \text{ E}+0$	$2.10 \pm 0.03 \text{ E}+0$
Treated liquid, Tank 1 ^a	Co-60	$5.2 \pm 0.5 \text{ E}-2$	$2.11 \pm 0.07 \text{ E}-1$
	Cs-137	$1.59 \pm 0.07 \text{ E}-1$	
Treated liquid, Tank 2 ^a	Co-60	$5.1 \pm 0.5 \text{ E}-2$	$2.82 \pm 0.08 \text{ E}-1$
	Cs-137	$2.31 \pm 0.08 \text{ E}-1$	
Treated liquid, Tanks 1 and 2	Co-60	$4.6 \pm 0.5 \text{ E}-2$	$2.69 \pm 0.08 \text{ E}-1$
	Cs-137	$2.23 \pm 0.08 \text{ E}-1$	

- a. The waste originally contained in 33 drums was discharged to two storage tanks from the PWTU.

columns in the PWTU. Cesium is an ion that is very difficult to remove by ion exchange. When the waste that contained a great deal of calcium and sodium ions was run through the ion exchange resin that had radioactive cesium already loaded on, the calcium and possibly some of the sodium replace the radioactive cesium on the active site of the resin, releasing the cesium to the wastewater solution.

The first metal results from ECU indicated that the mercury levels were reduced from 7.0 mg/l to an average of 1.39 mg/l, which is greater than the 0.2 mg/l RCRA limit. There was a large difference in values from Tank 1 at 1.9 mg/l to Tank 2 at 0.882 mg/l. Results from TCT arrived about a week later, and indicated that the mercury was barely above the RCRA limit in Tank 1 at 0.264 mg/l and well below the RCRA limit in Tank 2 at 0.0087 mg/l. There was a large discrepancy in values between the two labs' results.

The analysis methods of TCT and ECU were compared to evaluate why there was such a large discrepancy between the two labs' results. ECU was not following RCRA requirements for testing. It was acidifying the sample and then filtering, while TCT was filtering the sample and then doing the acid digestion. As a result, TCT was removing solid mercury compounds such as mercury oxide with the filtering, while ECU was putting the solid mercury into solution by acidification. This consistently produced higher metal results from ECU.

As can be seen by the results of TCLP metals in Table 6 Trial 1, mercury was not reduced to levels less than the RCRA limit of 0.2 mg/l. As a result, the liquid waste was reprocessed two more times resulting in the Trial 2 and 3 results. Trial 2 and 3 results will be discussed in detail in the following sections.

Table 6. Mercury and lead concentrations of untreated waste and treated waste after each trial.

Treatment	Mercury TCT/ECU ^a (mg/l)		Lead TCT/ECU ^a (mg/l)	
Untreated consolidated liquid (180 to 200 ml collected from each waste drum after filtration)	7.000 ^b		2.780 ^b	
	Tank 1 ^c	Tank 2 ^c	Tank 1 ^c	Tank 2 ^c
Treated liquid Trial 1 (filtered to 20 μ then passed through S-920, GT-73, and C-100H resins)	0.264/ 1.900	0.0087/ 0.882	0.022/ 0.150	0.104/ 0.240
Treated liquid Trial 2 (Filtered to 0.1 μ , no ion exchange)	0.864/ 1.380 ^d	1.788/ 1.380 ^d	No data collected	No data collected
Treated liquid Trial 3 (filtered to 0.3 μ then passed through S-920 resin)	0.0092/ 0.0156	0.0168/ 0.033	No data collected	No data collected

- a. TCT - Twin City Testing Corporation.
ECU - Environmental Chemistry Unit lab at the INEL.
- b. These are TCT lab results only; a sample of the untreated consolidated liquid was not sent to ECU for analysis.
- c. The waste originally contained in 33 drums was discharged to two storage tanks from the PWTU. The samples were labeled Storage Tank 1 or 2, but Tanks 1 and 2 are not necessarily the same storage tanks between processing trials.
- d. Sample sent to ECU lab was a mixture of approximately equal amounts from each tank.

Lead already started out below the RCRA limit of 5.0 mg/l, but concentrations were reduced by the treatment in the heavy metals ion exchange column. Results from ECU indicate that lead levels were reduced from 2.78 mg/l to an average of 0.195 mg/l. Results from TCT indicate that lead levels were reduced from 2.78 mg/l to an average of 0.063 mg/l. Again, the values from TCT and ECU were significantly different.

An evaluation was made to determine what may have caused the treatment to fail at reducing the mercury to RCRA limits, and what could be done to successfully process the waste. Three possibilities exist for the presence of the mercury in the treated wastewater. The first

possibility is that the precipitated material from the three acidic drums contained mercury oxides, and insufficient filtration then allowed the mercury compounds to be contained in the treated waste stream. The second possibility is that the precipitated material that lodged in the resin columns also plugged the active sites on the resin, making the resin ineffective. The third possibility is that the resin was not effective at removing the mercury ions. Of these three possibilities, it was believed that the first one was the most likely reason for the high mercury levels in the treated waste. To help evaluate which scenario occurred, the remaining liquid sample that was taken for ECU analysis was filtered with a $0.45\text{-}\mu$ filter and reanalyzed. The filtering of the sample lowered the mercury level to 0.025 mg/l , which is below the RCRA limit, indicating that solid particulate is responsible for the high mercury content.

2.4 Reprocessing by Filtration, Trial 2

2.4.1 Reprocessing by Filtration, Trial 2

After verification that filtering the sample was an effective treatment, a method to filter the wastewater was developed. The filtering unit shown in Figure 2 was installed in the PWTU. The last two filter housings were used and were plumbed to the system the same way the temporary ion exchange columns were installed. Also, $0.3\text{-}\mu$ filters were purchased and installed into the permanent filter housings in the PWTU. The two temporary filter housings were filled with $0.1\text{-}\mu$ filters. The end result was that the waste was filtered through $0.3\text{-}\mu$ filters, then into a $0.1\text{-}\mu$ filter, and finally into another $0.1\text{-}\mu$ filter. The activated carbon beds and the radioactive ion exchange columns were bypassed. The only treatment performed was filtration.

The waste was filtered through the system at a flow rate of about 6 gpm. There was about 1/2 to 1 in. of sludge at the bottom of the tanks. The sludge was not very compact and was easily suspended. The waste in both tanks was filtered down to a few inches above the sludge, so as not to stir up the sludge and require frequent filter changes during processing. After the liquid was removed from both tanks down to within a few inches of the sludge, the suction line was lowered into the sludge and the sludge was suspended. All the waste in both tanks was removed and the sludge material collected on the filters. The tanks were thoroughly rinsed with water and the rinse water was filtered. The filtered waste was discharged from the system to two polyethylene tanks. The $0.3\text{-}\mu$ filters required seven change-outs to process the liquid, resulting in use of 14 filters. The first $0.1\text{-}\mu$ filter in the series had to be changed out once. The second $0.1\text{-}\mu$ filter did not require any change-outs. Upon dismantling of the filter system after all the waste was filtered, a very fine black precipitate was observed on the last $0.1\text{-}\mu$ filter. The $0.3\text{-}\mu$ filters collected about 90–99% of the particulate. The sludge on these filters looked like caramel. The sludge on the two $0.1\text{-}\mu$ filters that were removed from the second housing was all black. The discharge liquid from the PWTU was very clear.

Prior to the start of filtering, the pH of the solution was measured at 6. Approximately one week had passed from the time of sampling to the time of filtering the waste. Therefore, in a period of about a week, the pH of the waste in both tanks went from 9 down to 6.

2.4.2 Sampling and Analysis Results of Filtration, Trial 2

The sampling and analysis results of Trial 2 wastewater are shown in Table 6. Because sampling and analysis results from Trial 1 indicate that there are no TCLP pesticides, TCLP herbicides, and volatile organics, and because mercury was the only RCRA-regulated metal identified in the waste, the filter-treated wastewater was analyzed for mercury only. Samples were sent to both ECU and TCT labs. The sample sent to ECU was an equal mixture of waste from both tanks. Samples from each tank were sent to TCT. The first results were obtained from ECU, but because of the large discrepancy between the two labs' results in the previous trial, it was decided to wait until TCT's results arrived before taking any action. As can be seen in Table 6, the results from both labs are very close. The average value for the two tanks from TCT is 1.326 mg/l. The result from the mixed solution from ECU is 1.380 mg/l. The values indicate that not only is the waste above the RCRA limit of 0.2 mg/l, the average concentration of mercury in the waste increased from the Trial 1 treatment.

The increase in mercury in the solution is assumed to have come from an equilibrium adjustment of the waste as it sat for a week between Trial 1 and Trial 2 processing. During this equilibrium adjustment, a precipitated mercury complex that went through the 20- μ filters and the resin columns probably went back into solution. There are three pieces of evidence to support this theory. First, the pH of the solution went from 9 down to 6 while sitting in the tanks for a week; this can only occur if ions either go into or out of solution. Second, the filtering of the ECU sample while still at a pH of 9 indicated that filtering would remove the mercury. Third, ECU results and TCT results were very close, indicating that the mercury was in solution when the samples were taken.

Analysis of the data from ECU and TCT showing high levels of mercury, combined with the fact that the liquid waste has been thoroughly filtered and is free of solids, indicates that the mercury is probably in solution. Whether or not this mercury was in solution after the initial treatment is difficult to tell, but it seems most likely that a mercury complex that was a solid at a pH of 9 went back into solution at a pH of 6.

2.5 Reprocessing by Filtering and Ion Exchange, Trial 3

2.5.1 Reprocessing by Filtering and Ion Exchange, Trial 3

Because the treatability studies demonstrated that the ion exchange with S-920 works, it was decided to run the waste through the heavy metal ion exchange columns for a second time. In conjunction with this, the waste would be filtered through 0.3- μ filters.

The old resin in the two temporary columns was removed and placed into a drum. New S-920 resin was then packed into the resin columns. The temporary columns were plumbed into the system as they were in Trial 1. The permanent filter housings in the PWTU were fitted with 0.3- μ filters. The waste was processed at a flow rate of 1.2–1.4 gpm. The activated carbon beds and the radioactive ion exchange columns were bypassed.

A period of about three weeks had elapsed between the time of completing Trial 2 processing and the start of Trial 3 processing. Over that time the waste was becoming cloudy.

Originally, it was thought to possibly be something precipitating out as the water cooled, because night-time temperatures were averaging about 30°F. However, by the time Trial 3 processing started, it was obvious that the cloudiness was being caused by the growth of algae in the water.

The wastewater was pumped out of the storage tanks using the peristaltic pump used in Trial 1 processing. The waste was pumped at a flow rate of 1.2–1.4 gpm, again dictated by the volume of the resin. During processing of the waste, there was no pressure increase on the ion exchange columns due to clogging. Also, there was very little pressure increase on the filters and only one set of filters was required to process all the waste. The tanks were thoroughly rinsed with clean water, and this rinse solution was processed through the PWTU. The discharge came out clear. The waste was discharged to two polyethylene tanks identical to the ones used previously. When the filters were removed, they were coated with a green brown algae material. The resin in the columns appeared to stay clean, and no particulate was observed in them.

2.5.2 Sampling and Analysis Results of Filtering and Ion Exchange, Trial 3

The sampling and analysis results of Trial 3 are shown in Table 6. Again, only mercury was analyzed. The results from both labs indicate that mercury is below the RCRA limit. The highest values are from ECU at 0.0156 mg/l and 0.033 mg/l, respectively. The values from TCT are roughly half ECU values at 0.00919 mg/l and 0.0186 mg/l, respectively. These values are higher than the 0.0056 mg/l obtained from the treatability studies.

2.5.3 Wastewater Disposal

The wastewater was ultimately disposed of by discharging to the TAN warm waste pond TAN782, TSF-10. The final volume of solution treated was about 2,000 gal. This includes the original 1,800 gal of waste plus about 200 gal of water used to rinse the storage tanks and lines.

2.6 Sampling and Analysis of Filters and Resins

In the process of treating the TAN mercury-contaminated rinse solution waste, several components became contaminated with radioactivity and hazardous waste. The resin columns and the pump and filter unit will be saved and used to treat wastes in the future. The depleted filters and the resins used in the temporary heavy metal ion exchange columns were placed into drums. The filters and the resins were sampled to determine if they were a mixed waste or a radioactive waste only. The results of the sampling and analysis of the filters and resin are detailed below.

2.6.1 Sampling and Analysis Results of Filters

A total of 32 filters were used in the processing of the TAN mercury-contaminated rinse solution wastewater. Of these 32 filters, 12 of the dirtiest filters were sampled. The filters were sampled following the procedures in the PWTU sampling and analysis plan, which includes a section for filter sampling. A knife was used to cut a 6 x 8-in. section of the filtering material off of the filter support. This was then cut into three strips; then each strip was placed into one of three containers. This was repeated for each of the 12 filters that were sampled, resulting in a strip from all 12 filters being combined to produce three composite samples. The composite samples were sent to TCT to be analyzed for TCLP metals, TCLP pesticides, TCLP herbicides,

TCLP volatiles, and corrosivity. A sample was also sent to RML for gamma-ray analysis. Table 7 shows the mercury and lead TCLP results. The original TCT data are provided in Appendix E. The filters failed to meet the RCRA limit for both lead and mercury. The filters passed on all the other metals and no volatiles, pesticides, or herbicides were detected. Samples of the original sludge passed TCLP mercury, but failed TCLP lead. The reason that the sludge collected on the filters did not pass TCLP mercury is probably because of the generation of mercury oxide or other mercury complex during pH adjustment.

Table 8 shows the activity of the sludge collected on the filters. Most of the activity is from Co-60, with an average activity of 235 pCi/g. This kind of activity was expected to collect in the filters because the treatability studies demonstrated that most of the activity was concentrated in the sludge.

2.6.2 Sampling and Analysis Results of Resins

A total of about 1.3 ft³ of resin was used in the Trial 1 processing. The resins were sampled following the PWTU sampling and analysis plan. The resin was placed into a drum, thoroughly mixed, and then a scoop was used to take the samples. This produced a composite sample of the resin used in Trial 1. The resin used in Trial 3 processing was added to this waste container after the sampling and analysis. Some of the samples were sent to TCT to be analyzed for TCLP metals, TCLP pesticides, TCLP herbicides, TCLP volatiles, and corrosivity. A sample was also sent to RML for gamma-ray analysis. Table 7 shows the mercury and lead TCLP results. The original TCT results are provided in Appendix E. As can be seen, the resin failed to meet the RCRA limits for both lead and mercury. The resin passed on all the other metals and no volatiles, pesticides, or herbicides were detected.

Table 8 shows the activity of the resin. Most of the activity is from Co-60, with an average activity of 270 pCi/g. This activity may be primarily from the solid particulate that passed through the filters and was collected in the resin. The activity is also due in part to the cobalt and silver ions being removed from solution onto the resin.

The resins used in the treatability studies were tested for TCLP metals. This resin passed TCLP tests. This indicates that the reason the resin used to treat the bulk liquid failed TCLP metals testing is due to the sludge material that passed through the filtering system and became entrained in the resin.

Table 7. Mercury, lead, and chromium TCLP and corrosivity results from TCT lab.

Waste form	Mercury (mg/l)	Lead (mg/l)	Chromium (mg/l)	Corrosivity (mm/yr)
Resin Sample 1	2.1	141	0.141	2.6 E-4
Resin Sample 2	2.74	3.12	0.14	4.5 E-4
Filters Sample 1	3.64	329	0.983	1.8 E-4
Filters Sample 2	1.55	344	2.21	2.1 E-4

Table 8. Radioactive contamination in ion exchange resin and filters.

Waste form		Activity (pCi/g)	Total activity (pCi/g)
Resins (sampled from columns)	Co-60	$2.64 \pm 0.03 \text{ E}+2$	$2.65 \pm 0.03 \text{ E}+2$
	Ag _m -108	$10.0 \pm 0.08 \text{ E}-1$	
Resins (sampled from drum)	Co-60	$2.69 \pm 0.04 \text{ E}+2$	$2.7 \pm 0.04 \text{ E}+2$
	Ag _m -108	$9.9 \pm 0.07 \text{ E}-1$	
Filters	Co-60	$2.19 \pm 0.03 \text{ E}+2$	$2.29 \pm 0.03 \text{ E}+2$
	Ag _m -108	$2.48 \pm 0.04 \text{ E}+0$	
	Cs-137	$7.26 \pm 0.16 \text{ E}+0$	
	Eu-152	$6.3 \pm 0.7 \text{ E}-1$	
Filters	Co-60	$2.31 \pm 0.03 \text{ E}+2$	$2.42 \pm 0.03 \text{ E}+2$
	Ag _m -108	$2.81 \pm 0.05 \text{ E}+0$	
	Cs-137	$8.16 \pm 0.11 \text{ E}+0$	
	Eu-152	$6.4 \pm 0.7 \text{ E}-1$	

3. CONCLUSIONS

Initial separation of the liquid from the solid portion of the waste using the pump and filter system shown in Figure 2 worked very well. This system was also effective at pumping the sludge slurry to consolidate the sludge in the 33 original waste containers to four drums. The filter housings shown in Figure 2 are designed to replace the filter without draining the housings by removing the top of the housing. However, placing the filters into these housings and ensuring a proper seal between the filter and housing was very difficult because the filters would float in the wastewater.

Adjustment of pH of the waste in the drums is slow, poses several hazards, and should not be considered for normal operations. The addition of the acid in 10-ml increments through a pipet required a great deal of operator interaction with the concentrated nitric acid. Manual stirring of the waste with a stirring rod between each acid addition required a great deal of labor interaction and increased the potential for spills and splashing.

The unexpected amount of precipitation produced during pH adjustment and the inadequate filtering by the 20- μ filters resulted in particulate reaching the resins and the treated waste storage tanks. It is likely that the addition of sodium hydroxide to the three acidic drums produced mercury oxide or possibly a mercury complex that passed through the filtration system and the resin columns, and resulted in the failure of the Trial 1 treatment to reduce mercury concentrations to the required levels.

The filtering of the waste in Trial 2 treatment was ineffective. The pH of the waste had decreased from 9 to 6. This probably resulted in the mercury oxide or a mercury complex dissolving into solution, making filtration ineffective. The sample of the Trial 1 treated waste did not undergo the same spontaneous pH change, probably because an insufficient amount of precipitated material was in the sample to allow the same equilibrium reaction to occur.

The ion exchange treatment with proper filtration of the waste in Trial 3 effectively treated the waste and reduced the mercury levels to 0.0186 mg/l. The S-920 resin is an effective resin to reduce mercury levels to less than the RCRA limit of 0.2 mg/l, but may not be capable of attaining drinking water standards of 0.002 mg/l.

The final liquid waste solution was below the RCRA limit for mercury at less than 0.0186 mg/l and for lead at less than 0.240 mg/l. Radioactivity levels were less than 0.282 pCi/ml, which is less than the derived concentration guideline (DCG) values for Cs-137 and Co-60 at 3 pCi/ml and 5 pCi/ml, respectively. The waste was finally disposed of by discharging it into the warm waste pond at TAN.

The filters produced from this process are a mixed waste. Ultimate disposal will probably be incineration at WERF.

The solid particulate matter did not appear to affect the resin's ability to remove dissolved mercury and lead ions because there was a definite decrease between the concentrations of the

treated waste over the nontreated waste. However, the solid particulate matter that was entrained in the resin probably resulted in the resin's failure to pass TCLP. It is likely the resin from Trial 3 and future resins would pass TCLP if proper filtration were employed, because the resins in the treatability studies passed TCLP.

4. RECOMMENDATIONS

4.1 PWTU Changes

The treatment of the TAN mercury-contaminated rinse solution demonstrates that ion exchange is an effective treatment of mixed waste solutions containing dissolved ions. However, this treatment demonstration also pinpoints several deficiencies in the existing PWTU. The areas of concern that have been identified from the testing are:

- The inability to treat the waste at one location
- The hazards associated with pH adjustment of the waste while contained in the waste drum
- The limited acceptable pH range for wastes
- The inability of the pumping, piping, and filtration systems to handle very fine particulate
- The inability to allow increased resin capacity or addition of different resins without having to make piping changes to the system
- The inability of the system to adjust the pH of the treated waste prior to discharging the waste from the PWTU.

Each one of these concerns are addressed in detail below.

4.1.1 Permitting and Safety Documentation Changes

To perform the treatment of this waste, Part A of the RCRA permit had to be expanded to include waste codes D008 and D009 for lead and mercury, respectively. To continue processing mixed wastes, the PWTU permits must be modified. An evaluation must be performed to determine the hazardous materials in existing wastes at the INEL and the potential hazardous material that may be in future wastes. The RCRA and State permits should then be expanded to include the identified hazards. Also, the current safety documentation is very restrictive. To treat the TAN mercury-contaminated rinse solution, the sludge had to be removed at a separate location. This created the added hazard of transporting the waste from one location to another. An evaluation should be made of the PWTU SAR and hazard classification and compare this to wastes identified for potential treatment and future wastes that may be treated. Modifications should then be made to this documentation to ensure that the safety envelope covers as wide of a variety of wastes as possible.

4.1.2 pH Adjustment System Addition

For the purposes of demonstration testing, the pH adjustment of wastewater in the waste drum is acceptable. However, for regular day-to-day processing, this would not be an acceptable

practice. To ensure the safe processing of future waste streams, a pH adjustment system is required. The pH adjustment system must be capable of neutralizing both acidic and caustic solutions. The system should be able to adjust the pH of the waste feed stream at a continuous flow rate that matches the processing rate of the rest of the system.

To ensure optimal performance from the resins, the system should be designed to accept a variety of wastes at a pH range of 1–13. An analysis should be performed of the system to ensure all wetted piping material is compatible with potential wastes and desired operating pH range.

4.1.3 Filtration Changes

The filtering and pumping systems should be expanded to include more capability to handle solids. The filtering system must be able to handle more solids and must be able to filter to less than $0.45\ \mu$. To optimize filtering capability, the filtering system should consist of a series of two or more filtering assemblies. The filtering assemblies should have decreasing micron ratings with the last assembly in the series containing $0.45\text{-}\mu$ filters or smaller. The first filtering assembly should be designed to remove 80–90% of the solids from the waste stream. A pumping system must be added that is capable of removing the waste from the containers and also pumping thick sludges for waste consolidation and minimization.

4.1.4 Resin Column Expansion

To add the temporary columns to the present system, the activated carbon beds could not be operated. To treat a variety of waste solutions containing many different dissolved ions, the system should be capable of adding on resin columns without having to make extensive piping changes or without removing processing capabilities.

4.1.5 Radioactive Resin Evaluation

The appearance of Cs-137 in the treated solution indicates that cesium was being removed from the C-100H resin. An evaluation should be performed to investigate the vendor information to determine if C-100H resin is the best resin to use for radioactive ion removal. At present, this resin has removed radioactive isotopes from waste streams to less than DCG levels and C-100H has passed TCLP testing.

4.1.6 Final pH Adjustment Changes

Currently, the neutralization system at the discharge of the PWTU is capable of neutralizing weak acidic or caustic solutions. However, if heavy ion exchange takes place, as it did in the treatment of this waste, and lowers the pH of the treated solution, the system is not able to neutralize the waste for disposal. A means should be provided to neutralize this waste, either by providing a more efficient system at the discharge or by reprocessing through a pH adjustment system at the inlet of the PWTU.

4.2 PWTU Recommendation Summary

The following changes should be made to the PWTU in order to process mixed wastes in a safe and effective manner.

4.2.1 Permitting and Safety Documentation

The permitting should be expanded and made as liberal as possible. The permitting should not only include current waste hazards at the INEL, but possible future waste hazards that will be created as decontamination and decommissioning (D&D) and site remediation functions expand at the INEL.

The safety documentation should be expanded and made as liberal as possible to include as many hazardous and radioactive wastes as possible.

4.2.2 Larger Trailer

The current PWTU has about 100 ft² of area. At this time there is no room for expansion. To add on the capabilities of pH adjustment of the feed waste and the ability to add on resin columns requires the system to be installed into a larger PWTU trailer.

4.2.3 System Design Changes

The system installed into the larger PWTU trailer should contain the following systems at a minimum:

- Pumping system capable of removing wastewater and sludge from 55-gal waste drums.
- pH adjustment system capable of adjusting the pH of strong acidic and caustic solutions to a pH range of 1–13.
- Piping system capable of handling strong acidic and caustic solutions containing 20% particulate by weight.
- Filtering system capable of removing a large quantity of fine particulate. The filtering system must be capable of removing particulate down to 0.45 μ .
- System must continue to have organic removal capabilities with activated carbon beds.
- System should continue to have three general cationic resin columns to remove radioactivity, followed by a column with resin specific for heavy metals. This should be followed by spare connections to add on columns loaded with ion specific resins for individual waste streams.
- Increased pH adjustment of the treated waste prior to final discharge from the PWTU. This system should be able to adjust the treated waste to a pH of 6–8.

In addition to these changes, all existing features in the PWTU not mentioned here should be kept. No functions of the trailer should be eliminated when the process is transferred to a larger trailer.

Appendix A
PWTU Drawings

LEGEND:

	1 3/4" NYLON REINFORCED TYGON TUBING
	PLUG
	REDUCER
	UNION
	VALVE
	CHECK VALVE
	DIRECTION VALVE, DV
FI	FLOW INDICATOR
FM	FLOW METER
PH	PH SENSOR
SST	STAINLESS STEEL
SP	SAMPLE PORT
P	PUMP
V	VALVE
PI	PRESSURE INDICATOR

SECTION A-A

PLAN

- PUMP P-4
- FOR ELECTRICAL INFORMATION SEE DWG 177150
- 14' W x 25' H PLYWOOD BOX WITH PLEXIGLASS FRONT
- 5 GAL NACH CONTAINER

NOTES:

1. TRAILER SUPPLIED BY OTHERS.
2. THIS DRAWING TO BE USED IN CONJUNCTION WITH DRAWING 177140.
3. THIS IS A QUALITY LEVEL B SYSTEM.

QTY	UNIT	QUAL LEVEL	PART OR IDENTIFYING NO.	DESCRIPTION/MATERIAL/SPECIFICATION	ITEM/ FND
PARTS LIST					
1	EA			TAN	
1	EA			PORTABLE WATER TREATMENT UNIT	
1	EA			PLAN AND SECTION	
1	EA			177148	

RELEASED FOR USE
JUN 18 1992
Drawing Status Verified with
177149

NOTES:

1. FOR LEGEND AND NOTES SEE

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
-1	AS BUILT AS OF 5/12/92	-	-

RELEASED FOR USE

JUN 08 1992

Drawing Status Verified with
Engineering Document
Control at

(208) 526-1202 or 526-1203

Date _____ ay

QTY	QUAL. LEVEL	PART OR IDENTIFYING NO.	DESCRIPTION/MATERIAL/SPECIFICATION	ITEM NO.
			PARTS LIST	
DIMENSIONS AND TOLERANCES ARE AMERICAN NATIONAL STANDARDS UNLESS OTHERWISE SPECIFIED SURFACE FINISHES DIMENSIONS AND TOLERANCES ARE IN INCHES TOLERANCES DECIMALS FRACTIONS HOLE IN DO NOT SCALE DRAWING			TAN PORTABLE WATER TREATMENT UNIT SECTIONS	
PART 1			177149	

A . . .

Appendix B

Filtering and Decanting Procedure

EG&G IDAHO, INC.

FIELD CHANGE #:

PLNR:

SHORT TITLE: PRETREAT WASTE FOR P.W.T.U.

CHARGE NO: 3WST71000
3WST40801

DATE RQSTD: 07/09/92 DATE REQUIRED: 09/30/92

NEED EVENT:

AREA: TAN SUB-AREA: TSF BLDG: 607 RM: 101 EQ ID:

REQUESTOR: W.E.CLAPP

EXT: 6-6152

HOUR LIMIT: 420.0 BY WEC

SWR INPUT BY: W.E.CLAPP

EXT: 6-6152

SAFETY RVW RQD: Y INITIALS: WEC OTH SAF DOC: N PRIORITY: 3 TAGOUT: N
RAD-CON RVW RQD: Y INITIALS: IH RVW RQD: Y INITIALS:
SWP RQD: Y ALARA EVAL: N SSWP RQD: N RHA RQD: N ECL RQD: N

QUAL RVW RQD: Y INITIALS: WEC QUAL LEVEL: B CLEAN CODE: D

REQ MGR RVW: B.P.THIESEN

08/20/92 ° MATERIAL LIST INCLUDED: Y

QUAL RVW: A.K.PARK

08/20/92 °
° OP CHECKOUT REQ'D: N

SAF RVW: R.B.FIRTH

08/20/92 °

RAD-CON RVW: D.R.LIPP

08/24/92 °

IH RVW: M.M.GARCIA

08/25/92 °

BUD MGR RVW: B.P.THIESEN

08/20/92 °

FAC MGR RVW: K.E.STREEPER

08/27/92 °

SUP'R. APPR'L: W.E. Clapp DATE: 9/1/92 COMPLETED DT-INITIALS

JOB-DESCRIPTION:

R9/2/92 R9/9/92 W/9/9/92

THIS PROCEDURE PROVIDES THE INSTRUCTIONS NECESSARY TO FILTER 35 DRUMS OF TAN RADIOACTIVE LEAD AND MERCURY CONTAMINATED SOLUTIONS. 33 DRUMS HAVE INEL WASTE ID#123, AND 2 DRUMS HAVE INEL WASTE ID#170. ALL THE WASTE IS CONTAINED IN PLASTIC 55 GALLON DRUMS WITH A BUNG HOLE AND A VENT OPENING. EACH DRUM CONTAINS 3-5 INCHES OF SLUDGE. THE LIQUID PORTION OF THE WASTE WILL BE DECANTED FROM THE SLUDGE, FILTERED, AND PLACED INTO CLEAN PLASTIC 55 GALLON DRUMS. THE SLUDGE WILL BE CONSOLIDATED INTO AS FEW DRUMS AS POSSIBLE. FILTERING WILL TAKE PLACE IN THE TAN HOT SHOP OR AN AREA DESIGNATED BY THE SHIFT MANAGER. SECTIONS OF THIS PROCEDURE WILL BE REPEATED FOR ALL BARRELS.

DRUMS WILL BE TRANSPORTED TO TAN WITH RESTRICTIONS ON STORAGE LIMITS IN MIND AND WILL BE HANDLED ACCORDINGLY. STANDARD RADIOLOGICAL CONTROLS AND PRACTICES WILL BE PRACTICED AND HP SUPERVISION AND MONITORING WILL BE REQUIRED.

SWR CLOSEOUT REVIEW/APPROVAL

REQUESTOR: W.E. ClappDATE: 9/10/92RESP FOREMAN: W.E. ClappDATE: 10/20/92QUAL SUPERVISOR: W.E. ClappDATE: 10/20/92FAC SUPERVISOR: W.E. ClappDATE: 10/29/92

CRAFT : EO ° YARD ° SUPV ° O/E °
HOURS : 20.0 ° 1.0 ° 1.0 ° 216.0 °
DATE CMPLD : 9/1/92 9/1/92 9/1/92 9/1/92 9/1/92 9/1/92 9/1/92 9/1/92 9/1/92 9/1/92

DATE PRINTED: 08/27/92

PRINTOUT NUMBER: 1

SCHE: NO. P09PM148-A
EG&G IDAHO, INC.

SITE WORK RELEASE # 92F08
(CONTINUED)

PAGE 2

=====

OTHER FORMS

=====

APP.A SK 1

=====

SEQ NO CRAFT

1.50 O/E

PERFORM A DRY RUN AT THE DISGRESSION OF THE SHIFT MANAGER.

WECuff 8-27-92

2.00 SUPV

GENERATE A SAFE WORK PERMIT AND HAVE IT PROCESSED FOR ALL WORKERS
REQUIRING SUCH.

5.00 O/E

GATHER AND STAGE THE FOLLOWING MATERIAL AND EQUIPMENT.
SAFETY EQUIP. AS SPECIFIED ON THE SWP
DISPOSABLE PAPER WIPES
DRILL AND MIXING PROPELLER
BUNG WRENCH
PH PAPER

10.00 O/E

INITIAL AND DATE: R 9/2/92READ AND ACKNOWLEDGE THE SPECIFIC PRECAUTIONS CONTAINED HEREIN AND
BRIEF ALL PERSONNEL WORKING ON THIS SWR.DO NOT OPEN A FILTER HOUSING TO REMOVE A FILTER WHEN UNDER
PRESSURE! THE PIC IS RESPONSIBLE TO SEE EACH STEP IS INITIALED AND
DATED AS THE STEP IS COMPLETED.THE PIC IS RESPONSIBLE FOR AUTHORIZING AND CONTROLLING
ALL PERSONNEL IN CONTROLLED AREAS OF THIS WORK AND TO ENSURE SUCH
PERSONNEL ARE ON THE SWP AND ARE WEARING THE APPROPRIATE PERSONAL
PROTECTIVE CLOTHING.

12.00 O/E

INITIAL AND DATE: R 9/2/92THE PIC WILL ENSURE ALL PERSONNEL WORKING ON THIS JOB HAVE BEEN OSHA
HAZ WASTE OPERATOR AND SUPERVISOR TRAINED .

14.00 O/E

INITIAL AND DATE: R 9/2/92ENSURE THE HOT SHOP EXHAUST SYSTEM IS OPERATING AND IF IT SHUTS DOWN
FOR SOME REASON THAT WORK IS STOPPED UNTIL THE EXHAUST IS RESTORED.

16.00 YARD

INITIAL AND DATE: R 9/2/92

SET UP A SPILL CONTAINMENT IN THE WORK AREA.

SEQ NO CRAFT

18.00 O/E
INITIAL AND DATE: E 9/2/92

PLACE THE FILTER UNIT IN THE WORK AREA.

20.00 O/E
INITIAL AND DATE: JH 9/2/92

ENTER THE NUMBER OF THE BARREL BEING FILTERED.>
ENSURE THE BARREL IS MARKED CLEARLY AND WITH A PERMANENT LABEL OR
MARKING IF NOT MARK THEM AND NOTE HERE.

20.01 O/E
INITIAL AND DATE: JH 9/2/92

VERIFY VALVES 1,2,3,AND 4 ARE CLOSED.

20.03 O/E
INITIAL AND DATE: JH 9/2/92

CONNECT A REGULATED AIR SUPPLY TO THE AIR INLET OF THE DIAPHRAGM PUMP.
ADJUST THE REGULATOR TO 60 PLUS OR MINUS 5 PSIG.

20.05 O/E
INITIAL AND DATE: JH 9/2/92

STAGE THE FOLLOWING EQUIPMENT AT THE WORK AREA.
PAPER WIPES
BUNG WRENCH
PH PAPER

20.07 EO
INITIAL AND DATE: JH 9/2/92 *see sign off sheets*

TRANSPORT DRUMS FROM THE TAA TO THE HOT SHOP.

20.09 O/E
INITIAL AND DATE: JH 9/2/92 *see sign off sheets*

ENSURE HOT SHOP DOORS ARE CLOSED AFTER BARRELS ARE DELIVERED INTO THE
HOT SHOP.

20.11 O/E
INITIAL AND DATE: JH 9/2/92 *see sign off sheets*

MOVE THE DRUM FROM THE HOT SHOP DOOR TO THE WORK AREA IN THE SPILL
CONTAINMENT BOUNDARY

SEQ NO CRAFT

20.13 O/E

INITIAL AND DATE:

JH 9/2/92 see size of sheet

REMOVE THE LARGE BUNG FROM THE DRUM.

20.15 O/E

INITIAL AND DATE:

JH 9/2/92

PLACE THE INLET LINE OF THE DIAPHRAGM PUMP INTO THE SOLUTION ABOUT 5".

20.17 O/E

INITIAL AND DATE:

JH 9/2/92

MEASURE THE PH BY LIFTING THE LINE PARTIALLY OUT OF THE BARREL AND SWIPING THE OUTSIDE OF THE LINE WITH A PH PAPER TO PICKUP THE RESIDUAL LIQUID. VERIFY AND RECORD THE PH HERE>

PH SHOULD BE 8-9 EXCEPT FOR BARRELS 676A AND 677A WHICH WILL BE AROUND 2-3.

20.19 O/E

INITIAL AND DATE:

JH 9/2/92

PLACE THE FILTER OUTLET LINE APPROXIMATELY 3 INCHES INTO THE 55 GAL. BARREL TO BE USED TO TRANSPORT THE FILTERED WASTE TO THE PWTU. SINCE ONLY 4 BARRELS PER DAY WILL BE PROCESSED THESE DRUMS WILL BE USED OVER AFTER THE FILTERED WASTE IS SENT THROUGH THE PWTU.

20.20 O/E

INITIAL AND DATE:

JH 9/2/92

OPEN VALVES 1 AND 3

20.21 O/E

INITIAL AND DATE:

JH 9/2/92

SLOWLY OPEN VALVE 4 TO START THE DIAPHRAGM PUMP. ADJUST VALVE 4 TO OBTAIN FLOW THROUGH THE FILTER CHAMBERS. INCREASE THE FLOW UNTIL THE PRESSURE DROP ACROSS THE 0.1 OR 1 MICRON FILTER IS 2-5PSID OR UNTIL THE PUMP IS AT MAXIMUM SPEED WHICH EVER OCCURS FIRST.

20.23 O/E

INITIAL AND DATE:

JH 9/2/92

OBSERVE THE PRESSURE GAUGES ON THE FILTERS. VERIFY THAT THE DIFFERENTIAL PRESSURE BETWEEN FILTERS DOES NOT EXCEED 40 PSID. FILTERS SHOULD BE REPLACED WHEN THE DIFFERENTIAL PRESSURE ON THE 10 AND 1 MICRON FILTERS INCREASE 20 +5-0PSI. THE .1 MICRON FILTER SHOULD BE REPLACED WHEN THE DIFFERENTIAL PRESSURE INCREASES 5 +5-0 PSI. WHEN A FILTER NEEDS REPLACEMENT GO TO APPENDIX A.

SEQ NO CRAFT

20.25 O/E
INITIAL AND DATE: JH 9/2/92

OBSERVE THE FLUID IN THE DIAPHRAGM PUMP INTAKE LINE. IF AIR POCKETS APPEAR MOVE THE INTAKE LINE INTO THE WASTE LIQUID TO MAINTAIN A 5" DEPTH. CONTINUE THIS UNTIL THE LINE STARTS TO SUCK SLUDGE. RAISE THE LINE TO APPROXIMATELY 3 INCHES ABOVE THE SLUDGE.

20.27 O/E
INITIAL AND DATE: JH 9/2/92

WHEN ALL BUT THE LAST 2-3" OF LIQUID HAS BEEN DECANTED FROM THE DRUM STOP THE PUMP BY CLOSING VALVE 3. NOTE: DO NOT LET AIR INTO THE CHAMBERS AND DO NOT PUMP THE FILTER CHAMBERS DRY. IF THIS OCCURS THE CHAMBERS MAY HAVE TO BE VENTED TO ENSURE THEY ARE FILLED WITH LIQUID.

20.29 O/E
INITIAL AND DATE: JH 9/2/92

CLOSE VALVES 1 AND 3.

20.31 O/E
INITIAL AND DATE: JH 9/2/92

REMOVE THE FILTER LINE FROM THE WASTE DRUM CONTAINING THE FILTERED WASTE.

20.33 O/E
INITIAL AND DATE: JH 9/2/92

PLACE THE BUNGS ONTO THE WASTE DRUM CONTAINING THE FILTERED WASTE.

20.35 O/E
INITIAL AND DATE: JH 9/2/92

WITH A MAGIC MARKER (BLACK PREFERABLY) WRITE THE DRUM # THAT IS FOUND ON STEP 20.00 ON THE DRUM CONTAINING THE FILTERED WASTE. IF ANY OLD NUMBERS ARE ON THE BARREL WIPE THEM OFF OR CROSS THEM OUT WITH THE MAGIC MARKER.

30.00 O/E
INITIAL AND DATE: JH 9/2/92

START SLUDGE REMOVAL. IN THIS SECTION THE SLUDGE AT THE BOTTOM OF THE CONTAINERS WILL BE COMBINED INTO 5-10 DRUMS. FILL THE DRUM WITH SLUDGE TO ABOUT 2/3 FULL. IF AFTER A PERIOD OF TIME THE SLUDGE HAS SETTLED, THE LIQUID CAN BE DECANTED FOLLOWING STEPS IN SECTION 20.

SEQ NO CRAFT

30.01 O/E
INITIAL AND DATE: JH 9/2/92

REMOVE THE TOP FROM THE SLUDGE ACCUMULATION CONTAINER. VERIFY IT IS LESS THAN 2/3 FULL. PLACE THE RECYCLE LINE ABOUT 4 INCHES INTO THE SLUDGE ACCUMULATION DRUM AND TAPE INTO PLACE.

30.03 O/E
INITIAL AND DATE: JH 9/2/92

REMOVE THE BUNG FROM THE DRUM WITH THE RESIDUAL SLUDGE.

30.05 O/E
INITIAL AND DATE: JH 9/2/92

USING THE MIXING ROD ON THE DRILL, MIX THE SLUDGE TO SUSPEND IT IN SOLUTION. STOP MIXING WHEN THE SLUDGE APPEARS TO ALL BE SUSPENDED. REMOVE AND STORE MIXER FOR LATER USE.

30.07 O/E
INITIAL AND DATE: JH 9/2/92

PLACE THE INLET LINE ALL THE WAY INTO THE DRUM. OPEN VALVE 2.

30.09 O/E
INITIAL AND DATE: JH 9/2/92

OPEN VALVE 4 TO START THE PUMP. PUMP ALL THE SLUDGE OUT OF THE DRUM INTO THE ACCUMULATION DRUM. WHEN ALL THE SLUDGE HAS BEEN PUMPED OUT, CLOSE THE VALVE 4 TO STOP THE PUMP.

40.00 O/E
INITIAL AND DATE: JH 9/3/92

PUMP RINSE PROCEDURE. NOTE: IF THIS IS THE LAST DRUM TO BE PROCESSED FOR THE DAY CONTINUE TO THE NEXT STEP FOR RINSING. IF ANOTHER DRUM IS TO BE PROCESSED WRITE N/A IN THESE STEPS AND GO TO SECTION 50.00.

40.01 O/E
INITIAL AND DATE: JH 9/2/92

FILL A 1000ML BEAKER WITH 1000ML OF CLEAN WATER.

SEQ NO CRAFT

40.03 O/E
INITIAL AND DATE: JH 9/2/92

PLACE THE INLET LINE INTO THE WATER. OPEN VALVE 4 SLOWLY TO START THE PUMP. PUMP THE WATER ALL THE WAY THROUGH THE PUMP AND RECYCLE LINE AND INTO THE SLUDGE ACCUMULATION DRUM. PUMP THE LINES DRY, THEN STOP THE PUMP BY CLOSING VALVE 4.

50.00 O/E
INITIAL AND DATE: JH 9/2/92

SEAL THE WASTE DRUMS.

50.01 O/E
INITIAL AND DATE: JH 9/2/92

VERIFY VALVES 1, 2, 3, AND 4 ARE CLOSED ON THE PUMP AND FILTERING SYSTEM.

50.03 O/E
INITIAL AND DATE: JH 9/2/92

IF ANOTHER DRUM FOR WASTE IS GOING TO BE FILTERED, PLACE THE PUMP INLET LINE 5 INCHES INTO THE NEXT DRUM TO BE FILTERED, AND PLACE THE FILTER OUTLET LINE INTO A CLEAN DRUM. IF ANOTHER DRUM IS NOT GOING TO BE PROCESSED IMMEDIATELY, BAG OR OTHERWISE SEAL THE INLET, OUTLET, AND RECYCLE LINES.

50.05 O/E
INITIAL AND DATE: JH 9/2/92

PLACE THE LID ON TO THE SLUDGE ACCUMULATION DRUM.

50.07 O/E
INITIAL AND DATE: JH 9/2/92

POUR 1-2 GAL. OF ABSORBENT INTO THE EMPTY WASTE DRUM.

50.09 O/E
INITIAL AND DATE: JH 9/2/92

PLACE THE BUNGS IN THE EMPTY WASTE DRUMS. PREPARE THE EMPTY WASTE DRUM FOR DISPOSAL AS COMPACTIBLE WASTE.

SEQ NO CRAFT

50.11 O/E

INITIAL AND DATE:

JH 9/2/92

PLACE THE DRUMS OF FILTERED WASTE ONTO THE SKID FOR TRANSPORT TO THE PWTU.

50.14 O/E

INITIAL AND DATE:

JH 9/2/92

PICKUP AND STORE ALL TOOLS AND EQUIPMENT IN PREPARATION OF THE NEXT DRUM TO BE TREATED.

Quality

SLUDGE BARREL #1 Contains: # 568
570
697
569
637
635
638
636

#2 Contains: # 669
667 - (w/10")
668
666
612

#3 Contains: # 609
610
611
630
626
627
565
701
703
585
587
589

Barrel # 700 & 702
had no sludge

#4 Contains: # 575
590
564
572
571
576

INEL QUALITY MONTH 1991

STEP #	BARREL #3C#568		BARREL #2#570		BARREL #2#697		BARREL #2C#569	
	INIT	DATE	INIT	DATE	INIT	DATE	INIT	DATE
20.00	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
20.01	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
20.03	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
20.05	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
20.07	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
20.09	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
20.11	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
20.13	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
20.15	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
20.17	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
PH	PH-11 (clear)		PH-9 (clear)		P.H.-11 (clear)		P.H.-8 (clear)	
20.19	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
20.20	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
20.21	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
20.23	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
20.25	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
20.27	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
20.29	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
20.31	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
20.33	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
20.35	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
30.00	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
30.01	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
30.03	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
30.05	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
30.07	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
30.09	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
* 40.00	N/A	SEP 0 2 1992	N/A	SEP 0 2 1992	N/A	SEP 0 2 1992	N/A	SEP 0 2 1992
* 40.01	N/A	SEP 0 2 1992	N/A	SEP 0 2 1992	N/A	SEP 0 2 1992	N/A	SEP 0 2 1992
* 40.03	N/A	SEP 0 2 1992	N/A	SEP 0 2 1992	N/A	SEP 0 2 1992	N/A	SEP 0 2 1992
50.00	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
50.01	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
50.03	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
** 50.05	N/A	SEP 0 2 1992	N/A	SEP 0 2 1992	N/A	SEP 0 2 1992	N/A	SEP 0 2 1992
50.07	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
50.09	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
50.11	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992	JH	SEP 0 2 1992
50.14	JH	9-2-92	JH	9-2-92	JH	9-2-92	JH	9-2-92

Bar Code numbers are the last three numbers in the code 92-92 JH

* 40.00-40.03 N/A'd these steps we will be continuing with more water removal on 9-2-92

** 50.05 N/A'd step - will be pumping more sludge today JH 9-2-92

Page: 8 -

STEP #	BARREL #637		BARREL #635		BARREL #638		BARREL #636	
	INIT	DATE	INIT	DATE	INIT	DATE	INIT	DATE
20.00	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992
20.01	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992
20.03	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992
20.05	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992
20.07	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992
20.09	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992
20.11	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992
20.13	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992
20.15	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992
20.17	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992
pH	P.H. - 9 (clear)		P.H. - 7 (clear)		P.H. - 7 (clear)		P.H. - 9 (clear)	
20.19	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992
20.20	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992
20.21	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992
20.23	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992
20.25	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992
20.27	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992
20.29	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992
20.31	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992
20.33	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992
20.35	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992	JH	SEP 02 1992
30.00	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
30.01	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
30.03	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
30.05	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
30.07	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
30.09	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
40.00	NIA	SEP 03 1992	NIA	SEP 03 1992	NIA	SEP 03 1992	JH	SEP 03 1992
40.01	NIA	SEP 03 1992	NIA	SEP 03 1992	NIA	SEP 03 1992	JH	SEP 03 1992
40.03	NIA	SEP 03 1992	NIA	SEP 03 1992	NIA	SEP 03 1992	JH	SEP 03 1992
50.00	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
50.01	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
50.03	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
50.05	NIA	SEP 03 1992	NIA	SEP 03 1992	NIA	SEP 03 1992	JH	SEP 03 1992
50.07	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
50.09	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
50.11	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
50.14	JH	9-3-92	JH	9-3-92	JH	9-3-92	JH	9-3-92

Bar Code numbers are the last three numbers in the code JH 9-2-92

40.00-40.03 MA'd these stops, we will be continuing with more water removal JH 9-2-92

50.05 NIA'd stop - we will be we may be pumping sludge. JH 9-3-92

ONE SLUDGE BARREL FULL - BARREL labeled #1. Contains sludge from the first 8 barrels (steps 14-21)

Page 2 of 2

STEP #	BARREL #8C.669		BARREL #8C.667		BARREL #8C.668		BARREL #8C.666	
	INIT	DATE	INIT	DATE	INIT	DATE	INIT	DATE
20.00	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
20.01	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
20.03	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
20.05	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
20.07	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
20.09	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
20.11	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
20.13	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
20.15	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
20.17	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
PH	P.H. - 10 (clear)		P.H. - 9 (brackish)		P.H. - 10 (clear)		P.H. - 10 (clear)	
20.19	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
20.20	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
20.21	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
20.23	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
20.25	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
20.27	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
20.29	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
20.31	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
20.33	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
20.35	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
30.00	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
30.01	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
30.03	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
30.05	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
30.07	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
30.09	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
* 40.00	N/A	9-3-92	N/A	9-3-92	N/A	9-3-92	N/A	9-3-92
* 40.01	N/A	9-3-92	N/A	9-3-92	N/A	9-3-92	N/A	9-3-92
* 40.03	N/A	9-3-92	N/A	9-3-92	N/A	9-3-92	N/A	9-3-92
50.00	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
50.01	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
50.03	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
*** 50.05	N/A	9-3-92	N/A	9-3-92	N/A	9-3-92	N/A	9-3-92
50.07	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
50.09	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
50.11	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992	JH	SEP 03 1992
50.14	JH	9-3-92	JH	9-3-92	JH	9-3-92	JH	9-3-92

BAR CODE NUMBERS ARE THE LAST THREE NUMBERS IN THE CODE JH 9-3-92

* 40.00-40.03 N/A'd these steps we will be continuing w/ more water removal 9-3-92

*** 50.05 N/A'd step we will be pumping sludge JH 9-3-92

** Barrel # 667 (8 to 10" of sludge) Heavier sludge. Most barrels had 2-3" of sludge

* Barrel # 667 - the water coming out of barrel's three filters was "brackish". All others were more clear JH 9-3-92 (Plated the hose). (Sludge from this went into barrel #2)

AFTER 12 barre
(page 1 thru 3)

CHANGES
FILTERS
ON PUMP
JH
9-3-92

STEP #	BARREL #BC.#610		BARREL #BC.#611		BARREL #BC.#609		BARREL #BC.#612	
	INIT	DATE	INIT	DATE	INIT	DATE	INIT	DATE
20.00	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
20.01	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
20.03	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
20.05	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
20.07	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
20.09	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
20.11	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
20.13	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
20.15	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
20.17	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
PH	P.H. - 7 (color)		P.H. - 6 (color)		P.H. - 9 (color)		P.H. - 11 (color)	
20.19	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
20.20	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
20.21	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
20.23	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
20.25	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
20.27	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
20.29	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
20.31	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
20.33	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
20.35	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
30.00	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
30.01	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
30.03	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
30.05	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
30.07	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
30.09	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
40.00	JH	SEP 3 1992	N/A	JH 9-3-92	N/A	JH 9-3-92	N/A	JH 9-3-92
40.01	JH	SEP 3 1992	N/A	JH 9-3-92	N/A	JH 9-3-92	N/A	JH 9-3-92
40.03	JH	SEP 3 1992	N/A	JH 9-3-92	N/A	JH 9-3-92	N/A	JH 9-3-92
50.00	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
50.01	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
50.03	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
50.05	JH	SEP 3 1992	N/A	JH 9-3-92	N/A	JH 9-3-92	N/A	JH 9-3-92
50.07	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
50.09	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
50.11	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992	JH	SEP 3 1992
50.14	JH	9-3-92	JH	9-3-92	JH	9-3-92	JH	9-3-92

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BAR CODE NUMBERS ARE THE LAST THREE NUMBERS IN THE CODE JH 9-3-92

Changed filters before processing any barrels on this day JH 9-3-92

Barrel #3 609:612 the water pumped out was the color of tea/light coffee - same when filtered JH 9-3-92

Barrel #609 Plated the hoses - color of tygon is now tea/light coffee colored JH 9-3-92

SHUDDER BARREL #2 full - from barrels on sheet 3; barrel #612 on sheet 4 JH 9-3-92

SHUDDER FROM # 609, 610:611 pumped into drum #3

STEP #	BARREL #8C*630		BARREL #8C*627		BARREL #8C*626		BARREL #8C*565	
	INIT	DATE	INIT	DATE	INIT	DATE	INIT	DATE
20.00	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.01	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.03	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.05	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.07	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.09	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.11	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.13	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.15	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.17	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
pH	P.H. - 10 (clear)		P.H. - 10 (clear)		P.H. - 10 (clear)		P.H. - 9 (clear)	
20.19	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.20	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.21	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.23	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.25	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.27	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.29	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.31	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.33	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.35	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
30.00	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
30.01	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
30.03	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
30.05	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
30.07	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
30.09	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
* 40.00	NIA	9-8-92	NIA	9-8-92	NIA	9-8-92	NIA	9-8-92
* 40.01	NIA	9-8-92	NIA	9-8-92	NIA	9-8-92	NIA	9-8-92
* 40.03	NIA	9-8-92	NIA	9-8-92	NIA	9-8-92	NIA	9-8-92
50.00	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
50.01	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
50.03	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
50.05	NIA	9-8-92	NIA	9-8-92	NIA	9-8-92	NIA	9-8-92
50.07	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
50.09	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
50.11	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
50.14	JH	9-3-92	JH	9-3-92	JH	9-3-92	JH	9-3-92

BAR CODE NUMBERS ARE THE LAST THREE NUMBERS IN THE CODE. 9-8-92

* 40.00 - 40.03 N/A - these steps we will be continuing with more water removal 9-8-92

** 50.05 N/A - this step we will be pumping more sludge today

All of these drums the sludge was pumped into Sludge drum #3

STEP #	BARREL #3C #702		BARREL #2C #700		BARREL #1C #701		BARREL #2C #703	
	INIT	DATE	INIT	DATE	INIT	DATE	INIT	DATE
20.00	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.01	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.03	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.05	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.07	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.09	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.11	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.13	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.15	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.17	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
PH	P.H. 3 (clear)		P.H. 3 (clear)		P.H. 3 (clear)		P.H. 6 (clear)	
20.19	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.20	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.21	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.23	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.25	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.27	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.29	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.31	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.33	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.35	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
30.00	N/A	9-8-92	N/A	9-8-92	JH	SEP 8 1992	JH	SEP 8 1992
30.01	N/A	9-8-92	N/A	9-8-92	JH	SEP 8 1992	JH	SEP 8 1992
30.03	N/A	9-8-92	N/A	9-8-92	JH	SEP 8 1992	JH	SEP 8 1992
30.05	N/A	9-8-92	N/A	9-8-92	JH	SEP 8 1992	JH	SEP 8 1992
30.07	N/A	9-8-92	N/A	9-8-92	JH	SEP 8 1992	JH	SEP 8 1992
30.09	N/A	9-8-92	N/A	9-8-92	JH	SEP 8 1992	JH	SEP 8 1992
40.00	N/A	9-8-92	N/A	9-8-92	N/A	9-8-92	N/A	9-8-92
40.01	N/A	9-8-92	N/A	9-8-92	N/A	9-8-92	N/A	9-8-92
40.03	N/A	9-8-92	N/A	9-8-92	N/A	9-8-92	N/A	9-8-92
50.00	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
50.01	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
50.03	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
50.05	N/A	9-8-92	N/A	9-8-92	N/A	9-8-92	N/A	9-8-92
50.07	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
50.09	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
50.11	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
50.14	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992

PAGE 6 of 5

CHANGED FILTERS ON PUMP.
(BARRELS: 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000)

BAR CODE NUMBERS ARE THE LAST THREE NUMBERS IN THE CODE 9-8-92
 N/A'd the sludge removal steps for barrels 702 & 700 - NO SLUDGE
 Pumped ~ 1/2 gal of 702 into barrel #700
 Pumped ~ 1/2 gal of 700 into barrel #701
 Barrel 701 had ~ 1/2 gal of sludge pumped into sludge barrel #3
 Barrel 703 had ~ 4 inches of sludge
 40.00 - 48.03 N/A'd continuing with more barrels - NO mixing 9-8-92
 BARRELS 702, 700, 701, 703 - THE WATER IS CLEAR 9-8-92

STEP #	BARREL #3c #590		BARREL #2c #588		BARREL #3c #587		BARREL #3c #589	
	INIT	DATE	INIT	DATE	INIT	DATE	INIT	DATE
20.00	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.01	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.03	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.05	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.07	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.09	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.11	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.13	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.15	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.17	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
pH	P.H. 9 (clean)		P.H. 10 (clean)		P.H. 7 (light)		P.H. 10 (light)	
20.19	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.20	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.21	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.23	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.25	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.27	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.29	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.31	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.33	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
20.35	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
30.00	N/A	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
30.01	N/A	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
30.03	N/A	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
30.05	N/A	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
30.07	N/A	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
30.09	N/A	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
40.00	N/A	9-8-92	N/A	9-8-92	N/A	9-8-92	N/A	9-8-92
40.01	N/A	9-8-92	N/A	9-8-92	N/A	9-8-92	N/A	9-8-92
40.03	N/A	9-8-92	N/A	9-8-92	N/A	9-8-92	N/A	9-8-92
50.00	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
50.01	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
50.03	N/A	9-8-92	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
50.05	JH	SEP 8 1992	N/A	9-8-92	N/A	9-8-92	N/A	9-8-92
50.07	N/A	9-8-92	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
50.09	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
50.11	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992
50.14	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992	JH	SEP 8 1992

Pump is
Ruined -
sludge for
#590 has
plugged it.

BAR CODE NUMBERS ARE THE LAST THREE NUMBERS IN THE CODE
 Barrel 590 has 6-8" of sludge, #588 has 2-3" of sludge, water from #588 left a foam on top; has a bad odor.
 Barrel 587 has 2-3" of sludge, #589 has 2-3" of sludge.
 Barrel #590 - the sludge is real thick - plugged the hose. changed out hose in 9-8-92
 * Barrel #590 will not pump out (sludge too thick) this will be left alone; call'd sludge drum #5
 SEE SHEET 9 of 9 (sludge removed & put into sludge drum #5)
 Sludge Barrel #3 full contains sludge from barrels on pg 4, #609, 611, 610, all barrels on pg 5; 6, barrels on the
 - 589, 587 & 588. Barrel #590 - sludge drum #4

BC = BAR CODE

SWR 92F08 RECORD SHEET

PAGE 8 of 9

STEP #	BARREL #BC #575		BARREL #BC #576		BARREL #BC #572		BARREL #BC #578	
	INIT	DATE	INIT	DATE	INIT	DATE	INIT	DATE
20.00	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
20.01	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
20.03	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
20.05	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
20.07	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
20.09	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
20.11	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
20.13	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
20.15	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
20.17	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
pH	P.H. 9 (Red/Black Tint)		P.H. 11 (Red/Black Tint)		P.H. 8 (Red/Black Tint)		P.H. 9 (Dark Color)	
20.19	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
20.20	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
20.21	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
20.23	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
20.25	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
20.27	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
20.29	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
20.31	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
20.33	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
20.35	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
30.00	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
30.01	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
30.03	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
30.05	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
30.07	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
30.09	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
40.00	N/A	9-9-92	N/A	9-9-92	N/A	9-9-92	N/A	9-9-92
40.01	N/A	9-9-92	N/A	9-9-92	N/A	9-9-92	N/A	9-9-92
40.03	N/A	9-9-92	N/A	9-9-92	N/A	9-9-92	N/A	9-9-92
50.00	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
50.01	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
50.03	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
50.05	N/A	9-9-92	N/A	9-9-92	N/A	9-9-92	N/A	9-9-92
50.07	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
50.09	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
50.11	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992
50.14	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992	JH	SEP 9 1992

REMOVED FROM
BEFORE DECANT
OF THESE
BARRELS,

9-9-92

BAR CODE NUMBERS ARE THE LAST THREE NUMBERS IN THE CODE 9-9-92

BC = Data Code

SWR 92F08 RECORD SHEET

Page 1 of 1

STEP #	BARREL # 564		BARREL # 590		BARREL #		BARREL #	
	INIT	DATE	INIT	DATE	INIT	DATE	INIT	DATE
20.00	JH	2001 6 23						
20.01	JH	SEP 9 1992						
20.03	JH	SEP 9 1992						
20.05	JH	SEP 9 1992						
20.07	JH	SEP 9 1992						
20.09	JH	SEP 9 1992						
20.11	JH	SEP 9 1992						
20.13	JH	SEP 9 1992						
20.15	JH	SEP 9 1992						
20.17	JH	SEP 9 1992						
pH	P.H. 9	(Smoke colored)						
20.19	JH	1992						
20.20	JH	SEP 9 1992						
20.21	JH	SEP 9 1992						
20.23	JH	SEP 9 1992						
20.25	JH	SEP 9 1992						
20.27	JH	SEP 9 1992						
20.29	JH	SEP 9 1992						
20.31	JH	SEP 9 1992						
20.33	JH	SEP 9 1992						
20.35	JH	SEP 9 1992	***					
30.00	JH	SEP 9 1992	JH					
30.01	JH	SEP 9 1992	JH					
30.03	JH	SEP 9 1992	JH					
30.05	JH	SEP 9 1992	JH					
30.07	JH	SEP 9 1992	JH					
30.09	JH	SEP 9 1992	JH					
40.00	N/A	9-9-92	JH					
40.01	N/A	9-9-92	JH					
40.03	N/A	9-9-92	JH					
50.00	JH	SEP 9 1992	JH					
50.01	JH	SEP 9 1992	JH					
50.03	N/A	9-9-92	JH					
50.05	JH	SEP 9 1992	JH					
50.07	N/A	SEP 9 1992	JH					
50.09	JH	SEP 9 1992	JH					
50.11	JH	SEP 9 1992	JH					
50.14	JH	SEP 9 1992	JH					

BAR CODE NUMBERS ARE THE LAST THREE NUMBERS IN THE CODE 9-9-92

*** Barrel # 590 was brought back in the ship. Added 1-2 gal of waste water from barrel # 564 & mixed up the thick sludge. Sludge was then pumped into sludge barrel # 4 on 9-9-92

PRE-JOB BRIEFING SHEET

Date: 9-2-92

Time: 0730

Description of job to be accomplished: Retreat waste contained
in 33 drums

Applicable Documentation (if any): Planning sheets from SWR 92F08

SWR # 92F08

DOP # _____

Other _____

All personnel understand all applicable aspects of the job to be performed, the associated hazards, and the actions that are or will be taken to mitigate those hazards.

Job Supervisor

Randy K. Elwood
(Print)

[Signature]
(Signature)

NAME (Print)	INITIALS	"S" #	ORG #
Chere Morgan	CM	57253	7A10
Ed J. Lang	EL	50699	7A10
STEVE PORTER	P	35069	7220
ILENE HARDELL	HA	45638	7220
John S. Cummings	HC	63597	7220
REX B FIRTH	RF	68318	7220
Kevin Streppner	KS	34795	7220
Ernest C. Garcia	EG	59810	7320
Bob Branson	RB	27375	7230
CRAIG BARNES	CB	38517	7230
Brian Thieser	BT	59812	E830
D. G. COOK	DC	20944	7220

1.0μ is very dirty Yam

~~After 10/1/92~~

SWR NO: 92F08

Page No. A-1

Title: WASTE PRETREATMENT FOR THE PWTU

Rev. No. 0

Subject: TAN WASTE FILTRATION

APPENDIX A - FILTER REPLACEMENT

Appendix A describes the steps necessary to replace the filters in the waste water filtering unit. Since this procedure may be performed several times initial the sign off matrix on page A-3 as each step is performed.

- A.1 FILTER REPLACEMENT *on 9-3-92 after processing 12 barrels also changed out the hoses
ON 9-8-92 " " 9 barrels (NO HOSE CHANGE OUT) VM.*
- A.1.1 Write the date this Appendix is performed.
- A.1.2 Verify valve 4 is closed.
- A.1.3 Verify valve 3 is open.
- A.1.4 Verify that there is no pressure in the system. If there is pressure in the system place the recycle line into the waste drum with the inlet line and open valves 1 and 2. If there is still pressure in the system open the vent plugs at the top of the filter housings. Use a disposable wipe to absorb any leakage.
- A.1.5 Obtain the proper micron replacement filter.
- A.1.6 Remove the four retaining nuts from the top of the filter housing.
- A.1.7 Using disposable swipes to catch any spills remove the cover plate on the filter housing.
- A.1.8 Using a pliers or other grasping tool, remove the filter. Place the filter into a radiation bag.
- A.1.9 Hold at this point for a sample of the sludge on the filter to be taken. Follow the approved sampling analysis plan for this step. Note, this step may be marked not applicable (NA) with project managers or designated alternates approval.
- A.1.10 Add excess absorbent to the filter in the radiation bag. Place the bagged filter into a radioactive waste drum. The filters will be sent to the MNSF pending TCLP tests for the sludge waste.
- A.1.11 Place the new filter into the filter housing. Make sure the proper micron filter is placed into the housing, and that the filter is properly aligned.

SWR NO: 92F08

Page No. A-2

Title: WASTE PRETREATMENT FOR THE PWTU

Rev. No. 0

Subject: TAN WASTE FILTRATION

- A.1.12 Replace the cover plate and bolt it in place.

A.1.13 Close valve 2

A.1.14 Open valves 1 and 3.

A.1.15 Slowly open valve 4 to resume filtering. Observe the housing to verify there is no leakage.

A.1.16 Return to section 4.2.8

Title: WASTE PRETREATMENT FOR THE PWTU

Rev. No. 0

Subject: TAN WASTE FILTRATION

APPENDIX A SIGN-OFF TABLE

SECTION	***PIC INITIALS***									
DATE	9/3/92	9/4/92	9/9/92							
A.1.2	JH	JH	JH							
A.1.3	JH	JH	JH							
A.1.4	JH	JH	JH							
A.1.5	JH	JH	N/A	JH 9-9-92						
A.1.6	JH	JH	JH							
A.1.7	JH	JH	JH							
A.1.8	JH	JH	JH							
A.1.9	N/A	N/A	N/A	JH 9-9-92						
A.1.10	JH	JH	JH							
A.1.11	JH	JH	N/A	JH 9-9-92						
A.1.12	JH	JH	JH							
A.1.13	JH	JH	JH							
A.1.14	JH	JH	N/A							
A.1.15	JH	JH	N/A	JH 9-9-92						
A.1.16	JH	JH	N/A							

ON 9-9-92 we removed all filters from system and did not replace them. Job is complete at this time
 JH 9-9-92

Appendix C

Resin and Resin Column Vendor Data

PARTS LIST
P-4800H
MAY 1992

RESIN RECLAMATION CHAMBER

MODELS: CL630RS-1
CL640RS-1
CL660RS-1
*CUL630R-F1

PRICE CODE NOS.: 2702
2703
2704
0375A

RESIN	.25 CU.FT.	.5 CU.FT.	1.0 CU.FT.	10 or more cu.ft. (per cu. ft.)
	PRICE CODE NUMBERS			
For precious metal recovery Alkaline Acid	1314	1315	1316	1317
	1320	1321	1322	1323
For deionizing water mixed bed resin (DWT)	1326	1327	1328	1329

When ordering, indicate quantity (Price Code No.) required.

*Chambers with acrylic shells do not use swing bolts.

**Recommended spare parts.

Refer to Operation and Service Guide O-930
and Master Price List F-800

		MODELS	
		CL630RS CL640RS CL660RS	CUL630R
ITEM	DESCRIPTION	PART NUMBERS	
1	Elbow hose adapter, Polypropylene	33-0245	
2	Tee handle 3/8-16 (4 req'd)	11-0265	
3	Flat stn. stl. washer 3/8 size (4 req'd)	11-0447	
4	Cover assembly CPVC, w/"O"-ring & vent assembly (Item 6)	88-0756	
**5	Cover "O"-ring, EPDM	22-0365	
6	ECTFE vent plug, w/EPDM "O"-ring	88-1282A	
7	Swing bolt, 3/8-16x3 1/2" stn. stl. (4 req'd)	11-0497-1	-
8	Swing bolt bracket, vinyl coated steel	88-0596	-
9	Hex head bolt, 3/8-16x3 1/2" stn. stl. (4 req'd) Hex nut, self locking 3/8-16 stn. stl. (4 req'd)	11-0444-1 11-0519	- -
10	Hex head bolt, stn. stl. 1/2-20x1 1/4 Flat washer, stn. stl. 1/4" size Whizz nut, stn. stl. 1/4-20	11-0390 11-0121 11-0103	- - -
11	CPVC shell 41-5/8" long 61-5/8" long Acrylic shell 31-5/8" long	88-0601 88-0929 -	- - 88-0192-1
11A	CPVC Base	88-0924	88-0924A
11B	Shell & base assembly, Model CL630RS-1 only	77-9980	-
12	Resin screen 290 micron - models, polypropylene (3 req'd)	88-0818	
13	Plug, CPVC w/EPDM "O"-ring 1/2" NPT	33-0791	
14	Plug, CPVC w/ EPDM "O"-ring 1" NPT (2 req'd)	33-0792	
16	Tie rods 3/8-16 stn. stl. length 40" (4 req'd)	-	77-0404-2
16A	Stud, 3/8-16 stn. stl. length 7"	11-0435	-
17	Resin, refer to chart		
18	Hex nut 3/8-16 stn. stl. (16 req'd)	11-0105	
19	Flat washer 3/8" stn. stl. (16 req'd)	11-0123	
21	Hold down bracket, vinyl coated steel	77-0787	
**22	Gasket, EPDM	22-0199	
23	Lock washer, 3/8" stn. stl. (8 req'd)	11-0140	

F.O.B. Northbrook, Illinois

Terms: Net 30 Days

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PUROLITE®

ION EXCHANGE RESINS

C-100H

Strong Acid Cation
Hydrogen Form
(Hydrogen Form Purolite C-100—C-101)

Technical Data

PRODUCT DESIGN

Purolite C-100H is a premium grade cation exchanger that can be used in water demineralization. C-100H is produced exactly the same as Purolite C-100, using a crosslinked styrene divinylbenzene polymer matrix with 8% crosslinking. Bead stability and a minimum of 95% whole clear

beads make C-100H a premium grade gel without the added cost of buying an upgraded cation product. The data presented herein are applicable for hydrogen cycle cation exchange operation only. For sodium cycle information see C-100.

Typical Chemical and Physical Characteristics

Polymer Structure	Polystyrene crosslinked with divinylbenzene
Functional Groups	R—SO ₃ H
Physical Appearance	Clear Spherical Beads
Ionic Form (as shipped)	Hydrogen
Screen Size, U.S. Std. Mesh (Wet)	16-45
Particle Size Range	+16 mesh <5%, -50 mesh <1%
Water Retention	49-55%
Swelling (Na→H)	5%
pH Limitations	None
Temperature Limitations	280°F (140°C)
Whole Clear Beads	95% minimum
Shipping Weights	50 lbs./ft. ³ , (800 grams/liter)
Total Capacity (H Form)	1.8 meq/ml. minimum Volumetric 4.9 meq/gm. minimum Weight
Standard Packaging	5 cu. ft. polyethylene-lined fiber drums
D.V.B. Content	8%
Color	Black or Amber

STANDARD OPERATING CONDITIONS

Operation	Rate	Solution	Minutes	Amount
Service	1-5 gpm/ft ³	Influent Water		
Backwash	3-5 gpm/ft ² (40-60 °F)	Influent Water	5-20	10-25 gals./ft ³
Regeneration	0.2-0.8 gpm/ft ³	0.5-5% H ₂ SO ₄ , 4-10% HCl	30	4-10 lbs.
Rinse (Slow)	0.2-0.8 gpm/ft ³	Decationized	60	20 gals./ft ³
Rinse (Fast)	1-5 gpm/ft ³	Decationized	60	30 gals./ft ³

Backwash Expansion 50-75%
Design Rising Space 100%

Stepwise Regeneration of Purolite C-100H

Regeneration Level lbs. (66° Be) H ₂ SO ₄ per cu. ft. Resin	lbs. (66° Be) H ₂ SO ₄ 2%	lbs. (66° Be) H ₂ SO ₄ 4%	lbs. (66° Be) H ₂ SO ₄ 6%	lbs. (66° Be) H ₂ SO ₄ 8%
3	2	1	—	—
4	2	2	—	—
5	2	3	—	—
6	2	3	1	—
7	2	3	2	—
8	2	3	3	—
9	2	3	3	1
10	2	3	3	2

Purolite C-100H when exhausted with a high amount of calcium should be regenerated with hydrochloric acid to prevent precipitation. Due to availability and cost, hydrochloric acid may not be the regenerant of choice. Then, sulfuric acid can be used. High amounts of calcium can cause

precipitation but could be minimized if a stepwise regeneration is used. By starting your regeneration with a low percentage of sulfuric acid (2% or less) and gradually increasing, precipitation can be avoided (see table above).

CAPACITY

Purolite C-100H Sulfuric Acid Regeneration (stepwise)

Influent 200 ppm TDS as CaCO_3 36" Bed Depth 2 gal/min/cu.ft.

Figure 1.
Influent Sodium = 0-50%

Figure 2.
Influent Sodium = 70%

Figure 3.
Influent Sodium = 85%

Figure 4.
Influent Sodium = 100%

Figure 5
FLOWRATE CORRECTION

Figure 6.
ALKALINITY CORRECTION

Example:

Regeneration at 6 pounds H_2SO_4
at 10 gpm/sq. ft.

Cations	Anions
Ca...100	HCO_3 ...160
Mg...100	Cl...140
Na...200	SO_4 ...100
400	...400

Temperature 60°F

1. Determine your base operating capacity from Figure 1.
2. Determine alkalinity correction from Figure 6.
3. Determine your flowrate correction from Figure 5.
4. Determine temperature correction factor "K" from Figure 16.

Base Operating Capacity
x Alkalinity Correction
x Flowrate Correction
x "K" Temperature Correction

$15.5 \times 1.07 \times 1.0 \times .96 = 16.6$ Kilograins/cu.ft.

5. Leakage is determined from Figures 7 through 12.

PUROLITE C-100H CATION LEAKAGE CHARACTERISTICS

Purolite C-100H
(Counter Current Regeneration)

Operating Capacity—To End Point 500 ppb Na
H₂SO₄ Regeneration—Stepwise—Counter Current

Figure 13
Influent Sodium 0-50%

Figure 14
Influent Sodium 75%

Figure 15
Leakage

Figure 16
Capacity Correction for Water Temperature

**Purolite C-100H
(Counter Current Regeneration)**

**Operating Capacity—To End Point 500 ppb Na
HCl Regeneration—Counter Current**

Figure 17
Influent Sodium 0-50%

Figure 18
Influent Sodium 75%

Sodium Leakage

Figure 19

Figure 20

The Purolite Company and Purolite International Limited have one of the most complete lines of ion exchange resins worldwide. For more information call:

The Purolite Company and Purolite International Limited, Divisions of the Bro-Tech Corporation

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All suggestions and recommendations given above concerning the use of Purolite products are based on tests and data believed to be reliable. However, as Purolite cannot control the use of its products by others, no guarantee is either expressed or implied by any such suggestion or recommendation by Purolite nor is any information contained in this leaflet to be construed as a recommendation to infringe any patent currently valid.

Technical Data

Section III.

PRODUCT DESCRIPTION

Purolite S-920 is a macroporous polystyrenic based chelating resin, with thiouronium groups designed for the selective removal of mercury and for the recovery of precious metals from the industrial effluents. The mercury, in particular, is strongly bound to the functional groups to form highly stable complexes, with high selective affinity compared with those of other heavy metals. These properties are largely unaffected by high chloride (or sulphate) content of the effluent. Effluent solutions which may typically contain 2—20ppm of mercury can be treated to reduce the concentration in solution to less than 0.005ppm. **Purolite S-920** can load up to 150g of mercury, or gold, or 60g approx. of platinum or palladium for each litre of resin, equivalent to 9.4, and 3.75 lb/ft³ respectively. **Purolite S-920** is designed for the removal

of low concentrations of soluble mercury salts from waste streams and for the recovery of precious metals from rinse waters in the galvanic and electronic industries. **Purolite S-920** is also used in hydrometallurgy for the separation of precious metals from acid liquors. Mercury and precious metals are so strongly held, and run lengths are so long (thousands of hours) that it is not normally considered economic to regenerate the resin for reuse, hence the resin is burnt to recover the loaded metals.

Purolite S-920 is more resistant to oxidation than many thiol based resins and contact with the atmosphere is not detrimental, however free chlorine and other strong oxidising agents may damage the resin and their removal from solution by filtering through activated carbon is recommended.

Typical Chemical & Physical Characteristics

Polymer Matrix Structure	Macroporous Styrene-divinylbenzene
Physical form & Appearance	Opaque Cream Spheres
Whole Bead Count	>95%
Functional Groups	Thiouronium
Ionic Form (as shipped)	H ⁺
Shipping Weight	740g/l (46lb/ft ³)
Screen Size Range (British Standard Screen)	14-52 mesh, wet
Particle Size range	+1.2mm <5%, -0.3mm <1%
Moisture Retention, H ⁺ Form	48-54%
Reversible Swelling, (H ⁺ → Hg ⁺⁺)	< 5%
Specific Gravity, Moist H ⁺ Form	1.12
Specific Gravity, Moist Hg ⁺⁺ Form	1.40
Total Exchange Capacity, H ⁺ Form (wet, volumetric)	150g Hg/l
Max, Operating Temperature, H ⁺ Form	80°C (176°F)
Operating pH Range	1—13

STANDARD OPERATING CONDITIONS

It is recommended that **Purolite S-920** is used in a two column, lead and trail system. In this way, maximum loading of the resin is achieved. When use is for mercury uptake, it is usual to pretreat the solution with lime

neutralisation and to fully oxidise the metals and sulphites with H_2O_2 . This is followed by flocculation with an inorganic polyelectrolyte, sedimentation, sand and activated carbon filtration.

Recommended linear flow rate:

6-18 m/h

Minimum bed depth:

1000mm

Backwash flow rate:

4-8 m/h (see fig. 2), for 20 min.

PRINCIPLE OF REACTION

Mercury Removal

The mercury is strongly complexed by the sulphur and nitrogen groups. When the resin is well rinsed with water before use, the mercury salt as a whole is accommodated on the resin. In most instances the pH of the water to be treated will lie in the range of 3—10, which is generally very suitable for highest mercury uptake. pH may be reduced slightly

by the mercury exchange (release of acid held by the weakly basic thiouronium groups).

In general **Purolite S-920** will complex precious metals when they are present as free cations. The free cation state is governed by the pH of the solution.

HYDRAULIC CHARACTERISTICS

The pressure drop (or headloss) across a properly classified bed of ion-exchange resin depends on the particle size distribution, bed depth, and voids volume of the exchange material, and on the flowrate and viscosity (and hence on the temperature) of the influent solution. Anything affecting any of these parameters, for example the presence of a particulate matter filtered out by the bed, abnormal compaction of the resin bed

or the incomplete classification of the bed will have an adverse effect, and result in an increased headloss.

Service flow rates from 10—30 bed volumes per hour, depending on the application, may be regarded as the normal range used on this resin. Typical pressure drop figures to be expected for ordinary aqueous solutions, are given in Fig. 1

Fig. 1. PRESSURE DROP VS FLOW RATE

Fig. 2. BACKWASH EXPANSION
(New resin)

During upflow backwash, the resin bed should be expanded in volume by between 50 and 75%, to clear the bed of bubbles and voids, and to classify the resin particles as much as possible, ensuring minimum resistance to flow. Bed expansion increases

with flow rate and decreases with temperature, as shown in Fig. 2. This applies to unused resin. Since the resin is not regenerated, backwash at exhaustion is not required. Care should always be taken to avoid resin loss by over-expansion of the bed.

CONVERSION OF UNITS

1 m/h (cubic metres per square metre per hour)	= 0.341	gpm./ft².
	= 0.409	U.S.gpm./ft².
1 Kg/cm²/m (Kilograms per square cm. per metre of bed)	= 4.33	psi/ft.
	= 1.03	atm./m.
	= 10	ft. H ₂ O/ft.

OPERATING PERFORMANCE

The operating capacity will be higher on the first cycle since both lead and trail columns will use new resin. This cycle will be complete when the lead column is saturated (that is when influent and effluent have reached equilibrium). The substantial leakage which occurs from the lead column towards the end of the cycle is of course taken out by the trail column. This uses capacity depending upon the conditions of operation. In subsequent runs the throughput obtained from the lead

column will be reduced according to load previously taken up while the bed was in the trail position.

The Fig. 3. gives a typical exhaustion profile from the outlet of the trail column in terms of bed volumes throughput for the lead column. In a typical operation as shown the lead column is loaded with a total of 30g/l of mercury of which 70-85g/l may be loaded while the bed is in the lead position.

Fig. 3. OPERATING PROFILE: Typical from trail column

Inlet Mercury — 2ppm
to Lead Column
Temperature 20°C
pH 8.0
Flow Rate 8BV/h

Appendix D

RML Radiochemistry Results

SAMPLE ID KEY

EGG SAMPLE NUMBER	SAMPLE SOURCE	ANALYSIS PERFORMED	DATE
PWTUFILE8CLR	CONSOLIDATED LIQUIDS	(RML) RADIOCHEMISTRY	9/10/92
PWTUFILE8CLT	CONSOLIDATED LIQUIDS	(TCT) FULL TCLP	9/10/92
PWTUFILE8CLTB1	TRIP BLANK	(TCT) TCLP VOA	9/10/92
PWTUFILE8CLTB2	TRIP BLANK	(TCT) TCLP VOA	9/10/92
PWTUFILE8TLS1	TRIAL 1 TREATED LIQUID TANK 1	(ECU) FULL METALS SCREENING	9/15/92
PWTUFILE8TLS2	TRIAL 1 TREATED LIQUID TANK 2	(ECU) FULL METALS SCREENING	9/15/92
PWTUFILE8TLT1	TRIAL 1 TREATED LIQUID TANK 1	(TCT) TCLP METALS, SEMI-VOA, PESTICIDES, AND HERBICIDES	9/16/92
PWTUFILE8TLT2	TRIAL 1 TREATED LIQUID TANK 2	(TCT) TCLP METALS, SEMI-VOA, PESTICIDES, AND HERBICIDES	9/16/92
PWTUFILE8TLV1	TRIAL 1 TREATED LIQUID TANK 1	(TCT) TCLP VOA	9/16/92
PWTUFILE8TLV2	TRIAL 1 TREATED LIQUID TANK 2	(TCT) TCLP VOA	9/16/92
PWTUFILE8TLTB3	TRIP BLANK	(TCT) TCLP VOA	9/16/92
PWTUTW1T	TRIAL 2 TREATED LIQUID TANK 1	(TCT) TCLP METALS, SEMI-VOA, PESTICIDES, AND HERBICIDES	9/30/92
PWTUTW2T	TRIAL 2 TREATED LIQUID TANK 2	(TCT) TCLP METALS, SEMI-VOA, PESTICIDES, AND HERBICIDES	9/30/92
PWTUTW1V	TRIAL 2 TREATED LIQUID TANK 1	(TCT) TCLP VOA	9/30/92
PWTUTW2V	TRIAL 2 TREATED LIQUID TANK 2	(TCT) TCLP VOA	9/30/92
PWTUTWTB	TRIP BLANK	(TCT) TCLP VOA	9/30/92

EGG SAMPLE NUMBER	SAMPLE SOURCE	ANALYSIS PERFORMED	DATE
PWTUTLTW1M	TRIAL 2 TREATED LIQUID REANALYSIS TANK 1	(TCT) TCLP MERCURY ONLY	10/6/92
PWTUTLTW2M	TRIAL 2 TREATED LIQUID REANALYSIS TANK 2	(TCT) TCLP MERCURY ONLY	10/6/92
PWTUTW12TSM	TRIAL 2 TREATED LIQUID REANALYSIS TANK 1&2 MIX	(ECU) TCLP MERCURY ONLY	10/6/92
PWTUTWF1TS	TRIAL 3 TREATED LIQUID TANK 1	(ECU) TCLP MERCURY ONLY	10/22/92
PWTUTWF2TS	TRIAL 3 TREATED LIQUID TANK 2	(ECU) TCLP MERCURY ONLY	10/22/92
PWTUTWF1M	TRIAL 3 TREATED LIQUID TANK 1	(TCT) TCLP MERCURY ONLY	10/22/92
PWTUTWF2M	TRIAL 3 TREATED LIQUID TANK 2	(TCT) TCLP MERCURY ONLY	10/22/92
PWTUTW1R	TRIAL 1 TREATED LIQUID TANK 1	(RML) RADIOCHEMISTRY	9/30/92
PWTUTW2R1	TRIAL 1 TREATED LIQUID TANK 2	(RML) RADIOCHEMISTRY	9/30/92
PWTUTW2R2	TRIAL 1 TREATED LIQUID TANK 2	(RML) DUPLICATE RADIOCHEMISTRY	9/30/92
PWTUIOXR1	ION EXCHANGE RESIN CONSOLIDATED SAMPLE 1	(RML) RADIOCHEMISTRY	9/30/92
PWTUIOXR2	ION EXCHANGE RESIN CONSOLIDATED SAMPLE 2	(RML) RADIOCHEMISTRY	9/30/92
PWTUPFR1	FILTERS CONSOLIDATED SAMPLE 1	(RML) RADIOCHEMISTRY	9/30/92
PWTUPFR2	FILTERS CONSOLIDATED SAMPLE 2	(RML) RADIOCHEMISTRY	9/30/92
PWTUIOXT1	ION EXCHANGE RESIN CONSOLIDATED SAMPLE 1	(TCT) FULL TCLP	9/30/92
PWTUIOXT2	ION EXCHANGE RESIN CONSOLIDATED SAMPLE 2	(TCT) FULL TCLP	9/30/92
PWTUIOXC1	ION EXCHANGE RESIN CONSOLIDATED SAMPLE 1	(TCT) CORROSIVITY	9/30/92

EGG SAMPLE NUMBER	SAMPLE SOURCE	ANALYSIS PERFORMED	DATE
PWTUIOXC2	ION EXCHANGE RESIN CONSOLIDATED SAMPLE 2	(TCT) CORROSIVITY	9/30/92
PWTUPFT1	FILTERS CONSOLIDATED SAMPLE 1	(TCT) FULL TCLP	9/30/92
PWTUPFT2	FILTERS CONSOLIDATED SAMPLE 2	(TCT) FULL TCLP	9/30/92
PWTUPFC1	FILTERS CONSOLIDATED SAMPLE 1	(TCT) CORROSIVITY	9/30/92
PWTUPFC2	FILTERS CONSOLIDATED SAMPLE 2	(TCT) CORROSIVITY	9/30/92

GAMMA-RAY ANALYSIS SUMMARY 1
WMSF Treatability Study - PWTU Liquid Samples

COLLECTION PERIOD:
091092 TO 091092

PREPARED BY THE
RADIATION MEASUREMENTS LABORATORY

24-OCT-92

EG&G IDAHO INC.
IDAHO NATIONAL ENGINEERING LABORATORY
IDAHO FALLS, IDAHO

CHECKED BY *Theresa Dufek*
APPROVED BY *Theresa Dufek*

MWSF Treatability Study - PWTU Liquid Samples

SAMPLE INFORMATION

FOR THE PERIOD
091092 TO 093092

SMPL ID	COLLECTION DATE	LAB SAMPLE ID	SAMPLE VOLUME (mL)	LAB BACKGROUND ID(S)...		
PWTUFILE8CLR	091092	A5091092038	540.00	A5070892031	A5080392033	A5100592038 <i>Consolidated Liquid</i>
PWTUTW1R	093092	D2100192028	540.00	D2070892033	D2080392036	D2100692031 <i>Treated H₂O Tank 1</i>
PWTUTW2R1	093092	D4100192030	540.00	D4082692041	D4082792041	D4100592043 <i>Treated H₂O Tank 1</i>
PWTUTW2R2	093092	D3100192029	540.00	D3070892034	D3080392037	D3100692032 <i>Treated H₂O Tank 1</i>

1st
2nd

X

MWSF Treatability Study - PWTU Liquid Samples

SAMPLE ACTIVITY (pCi/ML)

FOR THE PERIOD
091092 TO 093092

SMPL ID	MN 54	CO 60	ZN 65	RURI 106
PWTUFILE8CLR	(-1.2 +/- 0.6)E-02	+(2.10 +/- 0.03)E+00	(2.4 +/- 1.2)E-02	(3. +/- 5.1)E-02
PWTUTW1R	(-1. +/- 4.1)E-03	+(5.2 +/- 0.5)E-02	(-10. +/- 6.1)E-03	(-1. +/- 3.1)E-02
PWTUTW2R1	(3. +/- 4.1)E-03	+(5.1 +/- 0.5)E-02	(-6. +/- 7.1)E-03	(2. +/- 5.1)E-02
PWTUTW2R2	(-2. +/- 3.1)E-03	+(4.6 +/- 0.5)E-02	(4. +/- 6.1)E-03	(-4. +/- 4.1)E-02
SMPL ID	AGM 108	AGM 110	SB 125	CS 134
PWTUFILE8CLR	(7. +/- 7.1)E-03	(3. +/- 6.1)E-03	(-6. +/- 13.1)E-03	(-1.5 +/- 0.7)E-02
PWTUTW1R	(9. +/- 40.1)E-04	(-2. +/- 3.1)E-03	(4. +/- 10.1)E-03	(1. +/- 5.1)E-03
PWTUTW2R1	(2. +/- 5.1)E-03	(-2. +/- 3.1)E-03	(-0.0 +/- 1.0)E-02	(2. +/- 4.1)E-03
PWTUTW2R2	(-3. +/- 4.1)E-03	(0. +/- 3.1)E-03	(-1.0 +/- 0.9)E-02	(1. +/- 4.1)E-03
SMPL ID	CS 137	CE 144	EU 152	EU 154
PWTUFILE8CLR	+(2.4 +/- 1.0)E-02	(-0. +/- 2.1)E-02	(-1.2 +/- 1.4)E-02	(-4. +/- 12.1)E-03
PWTUTW1R	+(1.59 +/- 0.07)E-01	(-2. +/- 2.1)E-02	(9. +/- 12.1)E-03	(2.3 +/- 1.1)E-02
PWTUTW2R1	+(2.31 +/- 0.08)E-01	(-1.1 +/- 1.9)E-02	(-6. +/- 11.1)E-03	(1.7 +/- 1.1)E-02
PWTUTW2R2	+(2.23 +/- 0.08)E-01	(-2. +/- 2.1)E-02	(3. +/- 12.1)E-03	(-1.5 +/- 1.1)E-02
SMPL ID	EU 155	U 235	AM 241	
PWTUFILE8CLR	(-4. +/- 9.1)E-03	(-1. +/- 2.1)E-02	(-0.0 +/- 1.1)E-02	
PWTUTW1R	(0. +/- 9.1)E-03	(3. +/- 2.1)E-02	(-1.0 +/- 0.5)E-01	
PWTUTW2R1	(2. +/- 6.1)E-03	(6. +/- 30.1)E-03	(1.1 +/- 0.6)E-02	

MMSF Treatability Study - PWTU Liquid Samples

SAMPLE ACTIVITY (pCi/ML) CONTINUED

SAMPLE ID	EU 155	U 235	AM 241
PWTUTW2R2	(-1.0 +/- 0.9)E-02	(2.6 +/- 1.8)E-02	(2. +/- 5.)E-02

NOTE: a plus sign before a parenthesis "+(" indicates the activity is greater than 2 standard deviations, i.e. true positive.

TABLE 1

ANALYST'S RESULTS OF MANMADE GAMMA-EMITTING RADIONUCLIDES

MWSF Treatability Study - PWTU Liquid Samples

COLLECTION DATES
091092 TO 093092

Sample ID	RML Sample ID	Radionuclide (gamma)	Activity(S) (pCi/ML)	Uncertainties(%) statistical geometry efficiency	Activity(T) (pCi/ML)
Requested gamma-emitting radionuclides determined to be true-positive.					
PWTUFILE0CLR	A5091092038	CO 60	(2.10 +/- 0.03)E+00	5.0	(2.09 +/- 0.15)E+00
PWTUTW1R	D2100192028	CO 60 CS 137	(5.2 +/- 0.5)E-02 (1.59 +/- 0.07)E-01	5.0 5.0	(5.2 +/- 0.6)E-02 (1.59 +/- 0.13)E-01
PWTUTW2R1	D4100192030	CO 60 CS 137	(5.1 +/- 0.5)E-02 (2.31 +/- 0.08)E-01	5.0 5.0	(5.1 +/- 0.6)E-02 (2.31 +/- 0.18)E-01
PWTUTW2R2	D3100192029	CO 60 CS 137	(4.6 +/- 0.5)E-02 (2.23 +/- 0.08)E-01	5.0 5.0	(4.6 +/- 0.6)E-02 (2.23 +/- 0.18)E-01

Other gamma-emitting radionuclides determined to be true-positive.

None.

- NOTES: (1) Activity(S) includes the statistical uncertainty, from counting statistics and photopeak fitting, expressed as 1 standard deviation.
- (2) Activity(T) includes the total uncertainty resulting from the statistical, sample/detector geometry and efficiency. These uncertainties have been propagated in quadrature, expressed as 1 standard deviation.

TABLE 1 -R
ANALYST'S RESULTS OF REJECTED GAMMA-EMITTING RADIONUCLIDES
MWSF Treatability Study - PWTU Liquid Samples

COLLECTION DATES
091092 TO 093092

Sample ID	RML Sample ID	Radionuclide (gamma)	Analysis Rejection Code(s) (See the last page for the key.)
PWTUFILE8CLR	A5091092038	CS 137	1,8,11

Requested gamma-emitting radionuclides determined to be false-positive.

Other gamma-emitting radionuclides determined to be false-positive.

None.

D-10

Rejection Criteria Codes:

1. Uncertainty too high to be accepted by analyst. 2. Area counts too low to be accepted by analyst. 3. Radionuclide had no supporting photopeaks to make a judgement. 4. Energy calibration change/gain shift. 5. Analyst determined that spectral characteristics could not be adequately interpreted by routine computer analysis. 6. Reduced chi-squared (photopeak fit) unacceptable by analyst. 7. Peak width unacceptable by analyst. 8. Radionuclide result below quoted RML detection limits.	9. Activity artificially increased by background correction. 10. Other radionuclide gamma-ray interferences. 11. Graphical display of analyzed photopeaks showed unacceptable photopeak fitting results. 12. No parent activity, therefore the state of equilibrium is unknown and the radionuclide cannot be quantified. 13. Naturally occurring radionuclide with expected activity. 14. Other

GAMMA-RAY ANALYSIS SUMMARY 2

MWSF Treatability Study - PWTU Non-Liquid Samples

COLLECTION PERIOD:
093092 TO 093092

PREPARED BY THE
RADIATION MEASUREMENTS LABORATORY

24-OCT-92

EG&G IDAHO INC.
IDAHO NATIONAL ENGINEERING LABORATORY
IDAHO FALLS, IDAHO

CHECKED BY

APPROVED BY

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Handwritten signature

MWSF Treatability Study - PWTU Non-Liquid Samples

SAMPLE INFORMATION

FOR THE PERIOD
093092 TO 093092

SMPL ID	COLLECTION DATE	LAB. SAMPLE ID	SAMPLE WEIGHT (g)	LAB BACKGROUND ID(S)...		
PWTUIOXR1 - <i>resist</i>	093092	D1100192018	450.00	D1070992025	D1080392035	D1090792058
PWTUIOXR1D - <i>resist</i>	093092	D2100892023	450.00	D2070892033	D2080392036	D2090792059
PWTUIOXR2 - <i>resist</i>	093092	D2100192019	447.00	D2070892033	D2080392036	D2090792059
PWTUPFR1 - <i>prof/H₂S</i>	093092	D2102092027	115.00	D2070892033	D2080392036	D2090792059
PWTUPFR2 - <i>prof/H₂S</i>	093092	D3102092028	112.00	D3070892034	D3080392037	D3090792060
						D1100692030
						D2100692031
						D2100692031
						D2100692031
						D3100692032

MMSF Treatability Study - PWTU Non-Liquid Samples
FOR THE PERIOD
093092 TO 093092
SAMPLE ACTIVITY (pCi/G)

SMPL ID	MN	54	CO	60	ZN	65	RURH 106
PWTUOXR1	(6. +/-	15.)E-02	+(2.64 +/-	0.03)E+02	+(1.2 +/-	0.4)E+00	(1.2 +/- 1.4)E+00
PWTUOXR1D	(-4. +/-	17.)E-02	+(2.63 +/-	0.04)E+02	+(10. +/-	3.)E-01	(1.2 +/- 0.9)E+00
PWTUOXR2	(-1.3 +/-	1.3)E-01	+(2.69 +/-	0.04)E+02	+(1.0 +/-	0.3)E+00	(9. +/- 10.)E-01
PWTUPFR1	(-10. +/-	7.)E-02	+(2.19 +/-	0.03)E+02	+(6. +/-	2.)E-01	(-0. +/- 5.)E-01
PWTUPFR2	(7. +/-	8.)E-02	+(2.31 +/-	0.03)E+02	+(1.0 +/-	0.3)E+00	(3. +/- 5.)E-01

SMPL ID	AGM 108	AGM 110	SB	125	CS	134
PWTUOXR1	(10.0 +/-	0.8)E-01	(-0. +/-	4.)E-01	(1.4 +/-	1.6)E-01
PWTUOXR1D	(8.0 +/-	0.8)E-01	(-0. +/-	3.)E-01	(-6. +/-	14.)E-02
PWTUOXR2	(9.9 +/-	0.7)E-01	(-0. +/-	3.)E-01	(0.0 +/-	1.4)E-01
PWTUPFR1	+(2.48 +/-	0.04)E+00	(2. +/-	2.)E-01	(-8. +/-	8.)E-02
PWTUPFR2	+(2.81 +/-	0.05)E+00	(1.7 +/-	1.7)E-01	(1. +/-	11.)E-02

SMPL ID	CS	137	CE	144	EU	152	EU	154
PWTUOXR1	(1.6 +/-	1.1)E-01	(1. +/-	6.)E-01	(2. +/-	3.)E-01	(-2. +/-	2.)E-01
PWTUOXR1D	(-2.7 +/-	1.3)E-01	(1. +/-	5.)E-01	(3. +/-	30.)E-02	(1. +/-	2.)E-01
PWTUOXR2	(8. +/-	14.)E-02	(-2. +/-	6.)E-01	(6. +/-	3.)E-01	(2.3 +/-	1.8)E-01
PWTUPFR1	+(7.26 +/-	0.16)E+00	(0. +/-	2.)E-01	+(6.3 +/-	0.7)E-01	(1.0 +/-	1.1)E-01
PWTUPFR2	+(8.16 +/-	0.11)E+00	(-4. +/-	2.)E-01	+(6.4 +/-	0.7)E-01	(7. +/-	11.)E-02

SMPL ID	EU	155	0	240	AM	241
PWTUOXR1	(-3. +/-	3.)E-01	(-2. +/-	6.)E-01	(1.7 +/-	0.9)E+00

MWSP Treatability Study - PWTU Non-Liquid Samples

SAMPLE ACTIVITY (PCI/G) CONTINUED

SMPL ID	EU 155	U 235	AM 241
PWTUIOXR1D	(-4. +/- 2.)E-01	(-4. +/- 6.)E-01	(-0.0 +/- 1.2)E+00
PWTUIOXR2	(-0. +/- 2.)E-01	(-3. +/- 4.)E-01	(10. +/- 10.)E-01
PWTUPFR1	(-3. +/- 8.)E-02	(-8. +/- 17.)E-02	(8. +/- 30.)E-02
PWTUPFR2	(-1.5 +/- 0.8)E-01	(-9. +/- 18.)E-02	(-2. +/- 3.)E-01

NOTE: a plus sign before a parenthesis "+(" indicates the activity is greater than 2 standard deviations, i.e. true positive.

TABLE 2

ANALYST'S RESULTS OF MANMADE GAMMA-EMITTING RADIONUCLIDES

MWSF Treatability Study - PWTU Non-Liquid Samples

COLLECTION DATES
093092 TO 093092

Sample ID	RML Sample ID	Radionuclide (gamma)	Activity(S) (pCi/G)	Activity(T) (pCi/G)	statistical	geometry	efficiency	Activity(T) (pCi/G)
Requested gamma-emitting radionuclides determined to be positive.								
PWTUOXR1	D1100192018	CO 60 AGM 108	(2.64 +/- 10.0 +/-	0.03E+02 0.8E-01	1.2 7.5	5.0 5.0	5.0 5.0	(2.64 +/- 10.0 +/- 0.19E+02 1.0E-01
PWTUOXR1D	D2100892023	CO 60 AGM 108	(2.63 +/- 8.0 +/-	0.04E+02 0.8E-01	1.5 10.1	5.0 5.0	5.0 5.0	(2.63 +/- 8.0 +/- 0.19E+02 1.0E-01
PWTUOXR2	D2100192019	CO 60 AGM 108	(2.69 +/- 9.9 +/-	0.04E+02 0.7E-01	1.5 6.8	5.0 5.0	5.0 5.0	(2.69 +/- 9.9 +/- 0.19E+02 1.0E-01
PWTUPFR1	D2102092027	CO 60 AGM 108 CS 137 EU 152	(2.19 +/- 2.48 +/- 7.26 +/- 6.3 +/-	0.03E+02 0.04E+00 0.16E+00 0.7E-01	1.4 1.5 2.2 10.7	50.0 50.0 50.0 50.0	5.0 5.0 5.0 5.0	(2.2 +/- 2.5 +/- 7. +/- 6. +/- 1.1E+02 1.2E+00 4.1E+00 3.1E-01
PWTUPFR2	D3102092028	CO 60 AGM 108 CS 137 EU 152	(2.31 +/- 2.81 +/- 8.16 +/- 6.4 +/-	0.03E+02 0.05E+00 0.11E+00 0.7E-01	1.2 1.6 1.4 11.2	50.0 50.0 50.0 50.0	5.0 5.0 5.0 5.0	(2.3 +/- 2.8 +/- 8. +/- 6. +/- 1.2E+02 1.4E+00 4.1E+00 3.1E-01

Other gamma-emitting radionuclides determined to be true-positive.

None.

NOTES: (1) Activity(S) includes the statistical uncertainty, from counting statistics and photopeak fitting, expressed as 1 standard deviation.

(2) Activity(T) includes the total uncertainty resulting from the statistical, sample/detector geometry and efficiency. These uncertainties have been propagated in quadrature, expressed as 1 standard deviation.

TABLE 2 - R

ANALYST'S RESULTS OF REJECTED GAMMA-EMITTING RADIONUCLIDES

MMSF Treatability Study - PWTU Non-Liquid Samples

COLLECTION DATES
093092 TO 093092

Sample ID	RML Sample ID	Radionuclide (gamma)	Analysis Rejection Code(s) (See the last page for the key.)
Requested gamma-emitting radionuclides determined to be false-positive.			
PWTUOXR1	D1100192018	ZN 65	1,11
PWTUOXR1D	D2100892023	ZN 65	1,11
PWTUOXR2	D2100192019	ZN 65	1,11
PWTUPFR1	D2102092027	ZN 65	1,11
PWTUPFR2	D3102092028	ZN 65	1,11

Other gamma-emitting radionuclides determined to be false-positive.

None.

Rejection Criteria Codes:

1. Uncertainty too high to be accepted by analyst.
2. Area counts too low to be accepted by analyst.
3. Radionuclide had no supporting photopeaks to make a judgement.
4. Energy calibration change/gain shift.
5. Analyst determined that spectral characteristics could not be adequately interpreted by routine computer analysis.
6. Reduced chi-squared (photopeak fit) unacceptable by analyst.
7. Peak width unacceptable by analyst.
8. Radionuclide result below quoted RML detection limits.
9. Activity artificially increased by background correction.
10. Other radionuclide gamma-ray interferences.
11. Graphical display of analyzed photopeaks showed unacceptable photopeak fitting results.
12. No parent activity, therefore the state of equilibrium is unknown and the radionuclide cannot be quantified.
13. Naturally occurring radionuclide with expected activity.
14. Other.

Appendix E
TCT TCLP Test Results

SAMPLE ID KEY

EGG SAMPLE NUMBER	SAMPLE SOURCE	ANALYSIS PERFORMED	DATE
PWTUFILE8CLR	CONSOLIDATED LIQUIDS	(RML) RADIOCHEMISTRY	9/10/92
PWTUFILE8CLT	CONSOLIDATED LIQUIDS	(TCT) FULL TCLP	9/10/92
PWTUFILE8CLTB1	TRIP BLANK	(TCT) TCLP VOA	9/10/92
PWTUFILE8CLTB2	TRIP BLANK	(TCT) TCLP VOA	9/10/92
PWTUFILE8TLS1	TRIAL 1 TREATED LIQUID TANK 1	(ECU) FULL METALS SCREENING	9/15/92
PWTUFILE8TLS2	TRIAL 1 TREATED LIQUID TANK 2	(ECU) FULL METALS SCREENING	9/15/92
PWTUFILE8TLT1	TRIAL 1 TREATED LIQUID TANK 1	(TCT) TCLP METALS, SEMI-VOA, PESTICIDES, AND HERBICIDES	9/16/92
PWTUFILE8TLT2	TRIAL 1 TREATED LIQUID TANK 2	(TCT) TCLP METALS, SEMI-VOA, PESTICIDES, AND HERBICIDES	9/16/92
PWTUFILE8TLV1	TRIAL 1 TREATED LIQUID TANK 1	(TCT) TCLP VOA	9/16/92
PWTUFILE8TLV2	TRIAL 1 TREATED LIQUID TANK 2	(TCT) TCLP VOA	9/16/92
PWTUFILE8TLTB3	TRIP BLANK	(TCT) TCLP VOA	9/16/92
PWTUTW1T	TRIAL 2 TREATED LIQUID TANK 1	(TCT) TCLP METALS, SEMI-VOA, PESTICIDES, AND HERBICIDES	9/30/92
PWTUTW2T	TRIAL 2 TREATED LIQUID TANK 2	(TCT) TCLP METALS, SEMI-VOA, PESTICIDES, AND HERBICIDES	9/30/92
PWTUTW1V	TRIAL 2 TREATED LIQUID TANK 1	(TCT) TCLP VOA	9/30/92
PWTUTW2V	TRIAL 2 TREATED LIQUID TANK 2	(TCT) TCLP VOA	9/30/92
PWTUTWTB	TRIP BLANK	(TCT) TCLP VOA	9/30/92

EGG SAMPLE NUMBER	SAMPLE SOURCE	ANALYSIS PERFORMED	DATE
PWTUTLTW1M	TRIAL 2 TREATED LIQUID REANALYSIS TANK 1	(TCT) TCLP MERCURY ONLY	10/6/92
PWTUTLTW2M	TRIAL 2 TREATED LIQUID REANALYSIS TANK 2	(TCT) TCLP MERCURY ONLY	10/6/92
PWTUTW12TSM	TRIAL 2 TREATED LIQUID REANALYSIS TANK 1&2 MIX	(ECU) TCLP MERCURY ONLY	10/6/92
PWTUTWF1TS	TRIAL 3 TREATED LIQUID TANK 1	(ECU) TCLP MERCURY ONLY	10/22/92
PWTUTWF2TS	TRIAL 3 TREATED LIQUID TANK 2	(ECU) TCLP MERCURY ONLY	10/22/92
PWTUTWF1M	TRIAL 3 TREATED LIQUID TANK 1	(TCT) TCLP MERCURY ONLY	10/22/92
PWTUTWF2M	TRIAL 3 TREATED LIQUID TANK 2	(TCT) TCLP MERCURY ONLY	10/22/92
PWTUTW1R	TRIAL 1 TREATED LIQUID TANK 1	(RML) RADIOCHEMISTRY	9/30/92
PWTUTW2R1	TRIAL 1 TREATED LIQUID TANK 2	(RML) RADIOCHEMISTRY	9/30/92
PWTUTW2R2	TRIAL 1 TREATED LIQUID TANK 2	(RML) DUPLICATE RADIOCHEMISTRY	9/30/92
PWTUIOXR1	ION EXCHANGE RESIN CONSOLIDATED SAMPLE 1	(RML) RADIOCHEMISTRY	9/30/92
PWTUIOXR2	ION EXCHANGE RESIN CONSOLIDATED SAMPLE 2	(RML) RADIOCHEMISTRY	9/30/92
PWTUPFR1	FILTERS CONSOLIDATED SAMPLE 1	(RML) RADIOCHEMISTRY	9/30/92
PWTUPFR2	FILTERS CONSOLIDATED SAMPLE 2	(RML) RADIOCHEMISTRY	9/30/92
PWTUIOXT1	ION EXCHANGE RESIN CONSOLIDATED SAMPLE 1	(TCT) FULL TCLP	9/30/92
PWTUIOXT2	ION EXCHANGE RESIN CONSOLIDATED SAMPLE 2	(TCT) FULL TCLP	9/30/92
PWTUIOXC1	ION EXCHANGE RESIN CONSOLIDATED SAMPLE 1	(TCT) CORROSIVITY	9/30/92

EGG SAMPLE NUMBER	SAMPLE SOURCE	ANALYSIS PERFORMED	DATE
PWTUIOXC2	ION EXCHANGE RESIN CONSOLIDATED SAMPLE 2	(TCT) CORROSIVITY	9/30/92
PWTUPFT1	FILTERS CONSOLIDATED SAMPLE 1	(TCT) FULL TCLP	9/30/92
PWTUPFT2	FILTERS CONSOLIDATED SAMPLE 2	(TCT) FULL TCLP	9/30/92
PWTUPFC1	FILTERS CONSOLIDATED SAMPLE 1	(TCT) CORROSIVITY	9/30/92
PWTUPFC2	FILTERS CONSOLIDATED SAMPLE 2	(TCT) CORROSIVITY	9/30/92

TCT - St. Louis

Consulting Engineers, Scientists and Analytical Services

October 22, 1992
9259-00002,7

1908 Innerbelt Business Center Drive
St. Louis, Missouri 63114-5700
Phone (314) 426-0880
Fax (314) 426-4212

Ms. Donna Kirchner
Field Data Coordinator
ERP Administrative Record
and Document Control
EG&G Idaho, Inc.
P.O. Box 1625
Idaho Falls, ID 83415-3904

Re: Data Package for Task Order 15 Under Subcontract C92-170021

Dear Ms. Kirchner:

Enclosed is a data report for the analysis of samples received by TCT-St. Louis under subcontract No. C92-170021/Task Order 15, (TOS No. ERD-TOS-02, MOD 1). This report contains analytical sample data for samples collected from treatability studies being conducted at the Test Reactor Area (TRA).. The samples were analyzed specifically for TCLP metals, TCLP pesticides, and TCLP herbicides.

The samples were received by TCT-St. Louis on September 16 and 18, 1992 with a stated turn-around time of 35 days from receipt of the last sample in the SDG. The due date for the final report is October 23, 1992. The preliminary report of the quick turn around water samples was delivered on October 2 and 5, 1992 to Isabel Anderson.

The EG&G site codes, corresponding File I.D.'s, TCT-St. Louis laboratory sample numbers for each sample delivery group are shown in the following tables.

SDG SDG PWTBT1 - VOA

<u>EG&G SITE ID</u>	<u>FILE ID</u>	<u>TCT LAB NO.</u>	<u>DATE COLLECTED</u>
<i>Original</i> <i>Tested</i> PWTUTBT1 AND 2	PWTBT1	92006116	9/10/92
<i>Tested</i> PWTUFILE8TLV1	FILLV1	92006146	9/16/92
<i>Tested</i> PWTUFILE8TLV2	FILLV2	92006147	9/17/92
<i>Tested</i> PWTUFILE8TB3	FILTB3	92006148	9/17/92

SDG PWTCLT - TCLP METALS, PESTICIDES, HERBICIDES, SEMIVOLATILES

<u>EG&G SITE ID</u>	<u>FILE ID</u>	<u>TCT LAB NO.</u>	<u>DATE COLLECTED</u>
<i>Original</i> <i>Tested</i> PWTUFILE8CLT	PWTCLT	92006115	9/10/92
<i>Tested</i> PWTUFILE8TLT1	FILLT1	92006144	9/16/92
<i>Tested</i> PWTUFILE8TLT2	FILLT2	92006145	9/17/92

TCT-St. Louis
9259-0002,7
page 2

For reporting purposes, the contract number is ERDTOS02 and case number TOS02. All samples were analyzed and reported per the requirements of C92-170021 TASK ORDER NO. 15, ERD-TOS-02 MOD 2.

The yellow original chain-of-custodies were mailed to Donna Kirchner on September 16 and 18, 1992.

TCLP VOLATILES - SDG PWTBT1

The samples were analyzed within the required holding times. A CLP equivalent data package has been prepared. A matrix spike and a matrix spike duplicate were performed on sample FILLT2. The surrogate recoveries for sample FILLT2 were out of range in both the sample analysis and the matrix spike sample analysis. A sample matrix effect is indicated since the surrogates were out of range in three analyses of this sample. The trip blank was analyzed for total volatiles and is included in the same SDG with the TCLP samples.

TCLP PESTICIDES - SDG PWTCLT

The samples were analyzed within the required holding times. A CLP equivalent data package has been prepared. A matrix spike and a matrix spike duplicate were performed on sample FILLT2.

TCLP HERBICIDES - SDG PWTCLT

The samples were analyzed within the required holding times. A CLP equivalent data package has been prepared. A matrix spike and a matrix spike duplicate were performed on sample FILLT2.

TCLP SEMIVOLATILES - SDG PWTCLT

The samples were analyzed within the required holding times. A CLP data package has been prepared. A matrix spike and matrix spike duplicate were performed on sample FILLT2.

TCLP METALS - SDG PWTCLT

The samples were analyzed within the required holding times. A CLP equivalent data package has been prepared. A matrix spike and duplicate analysis were performed on sample FILLT2. The Selenium matrix spike was not recovered. This is due in part to the 20 fold dilution required by the TCLP sample matrix. The bench spike recoveries were acceptable for TCLP analysis of Selenium.

TCT-St. Louis
9259-00002,7
page 3

This work will be invoiced under purchase order number C92-170021 and TCT-St. Louis project number - 9259-00002,7.

If you have any questions concerning this data report, please call me at (314) 426-0880.

Sincerely,

A handwritten signature in cursive script, appearing to read "Fred Grabau".

Fred Grabau
Project Manager

15
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TCLP

EG&G Sample No.

FILLT1

(TCLP)

Lab Name: TCT-ST. LOUIS

Contract: ERDTOSO2

Lab Code: TCT

Case No.: TOSO2

SAS No.:

SDG No.: PWTCLT

Sample Matrix: (soil/water/other) WATER

Lab Sample ID: 92006144

Extract Matrix: (water) WATER

Lab File ID: >D8533

Extract vol: 500 (ml) ML

Date Received: 09/18/92

Level: (low/med) LOW

Date of TCLP Ext. 09/21/92

% Moisture: dec. not dec.

Date Extracted: 09/22/92

Extraction: (Sepf/Cont/Sonc) SEPF

Date Analyzed: 09/24/92

GPC Cleanup: (Y/N) N

pH: 8

Dilution Factor: 1

CAS NO.		COMPOUND	CONCENTRATION UNITS (ug/L)	Q	TCLP MAXIMUM CONCENTRATION (ug/L)
01	106-44-5	4-Methylphenol	20	U	200000
02	108-39-4	3-Methylphenol	20	U	200000
03	95-48-7	2-Methylphenol	20	U	200000
04		Cresol	20	U	200000
05	67-72-1	Hexachloroethane	20	U	3000
06	98-95-3	Nitrobenzene	20	U	2000
07	87-68-3	Hexachlorobutadiene	20	U	500
08	88-06-2	2,4,6-Trichlorophenol	20	U	2000
09	95-95-4	2,4,5-Trichlorophenol	100-20	U	400000
10	121-14-2	2,4-Dinitrotoluene	20	U	130
11	118-74-1	Hexachlorobenzene	20	U	130
12	87-86-5	Pentachlorophenol	100-20	U	100000
13	106-46-7	1,4-Dichlorobenzene	20	U	7500
14	110-86-1	Pyridine	20	U	5000

mw
10-12 g

FORM I SV-TCLP

7/91 Rev. 1

(1) Treated Liquid Tank 1 - Semi-VCA

IC
ICID
TCL

FILTY

Contract: ERD TDS Q2

Lab Code: TCT Case No.: TOS-02 SAS No.: SDG No.: PNTCLT

Sample Matrix: (soil/water/other) WATER Lab Sample ID: 93006144

Extract Matrix: (water) WATER Lab File ID: _____

Extract vol: 500 (mL) mL Date Received: 9-18-92

Level: (low) Low Date of TCLP Extraction: 9-21-92

% Moisture: not dec. NA dec. NA Date Extracted: 9-22-92

Preparatory Extraction: (SepF/Cont) SEPF Date Analyzed: 9-24-92

GPC Cleanup: (Y/N) N pH: 8.0 Dilution Factor: 1

CONCENTRATION
UNITS
(ug/L)

TCLP MAXIMUM
CONCENTRATION
(ug/L)

7/91 Rev.

10
ICIDE
ICLP

File T 1

Contract: ERDT0502

SAS No.: NA SDG No.: PWTCLT

Lac Sample ID: 22006144

Lac File ID. NA

Date Received: 9-13-92

Date of TCLP Extraction: 9-21-92

Date Extracted: 9-22-92

Date Analyzed: 9-24-92

Dilution Factor: 1.0CAS NO.

COMPOUND

CONCENTRATION
UNITS
(ug/L)

TC₂ MAXIMUM
CONCENTRATION
(UG/L)

04-5-7

2.4.2

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14 x

10000

265-72.

$$S: \vee \bar{x}$$

0.50

48

1992

X = see 1-10 diln. for actual sample concentration

FORM I OCHERB-TCLP

7/91 Rev.

10
CID
TEL

FILL T1 DL

Contract: EROTC502

Case No.: TQSC2

SAS No.: N/A

SDG No.: PWTCLT

Lac Sample ID: 92006144

Las Fina 12. NA

Date Received: 9-18-92

Date of TLC Extraction: 9-21-92

Date Extracted: 9-22-92

Date Analyzed: 9-24-92

Dilution Factor: 10.0

[illegible]

7/91 Rev.

ENVIROFORMS/INORGANIC TCLP

SAMPLE NO.

1
INORGANIC ANALYSIS DATA SHEET

FILLT1

Lab Name: TCT St. Louis

Contract: ERDTOS02

Lab Code: TCT

Case No.: TOSO2

SAS No.:

SDG No.: ~~FWTCLT~~

Matrix (soil/water): WATER

Lab Sample ID: 92006144 ¹⁰⁻²⁴⁻⁹²

Level (low/med): LOW

Date Received: 09/18/92

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	71.0	U		P
7440-39-3	Barium	271	B	EN	P
7440-43-9	Cadmium	9.0	B		P
7440-47-3	Chromium	6.0	U		P
7439-92-1	Lead	22.0	U		P
7439-97-6	Mercury	264	B		CV
7782-49-2	Selenium	40.0	U	NW	F
7440-22-4	Silver	5.0	B		P

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

FORM I - IN

13
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TCLP

EG&G Sample No.

FILLT2

Site: TCT-ST. LOUIS

Contract: ERDTOSO2

Site: TCT

Case No.: TOSO2

SAS No.:

SDG No.: PWTCLT

Matrix: (soil/water/other) WATER

Lab Sample ID: 92006145

Matrix: (water) WATER

Lab File ID: >D8534

Vol: 500 (ml) ML

Date Received: 09/18/92

(low/med) LOW

Date of TCLP Ext. 09/21/92

Pressure: dec.

not dec.

Date Extracted: 09/22/92

Extraction: (Sepf/Cont/Sonc) SEPF

Date Analyzed: 09/24/92

Sanup: (Y/N) N

pH: 8

Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L)	Q	TCLP MAXIMUM CONCENTRATION (ug/L)
06-44-5	4-Methylphenol	20	U	200000
08-39-4	3-Methylphenol	20	U	200000
05-48-7	2-Methylphenol	20	U	200000
	Cresol	20	U	200000
7-72-1	Hexachloroethane	20	U	3000
3-95-3	Nitrobenzene	20	U	2000
7-68-3	Hexachlorobutadiene	20	U	500
8-06-2	2,4,6-Trichlorophenol	20	U	2000
5-95-4	2,4,5-Trichlorophenol	100 20	U	400000
21-14-2	2,4-Dinitrotoluene	20	U	130
18-74-1	Hexachlorobenzene	20	U	130
7-86-5	Pentachlorophenol	100 20	U	100000
06-46-7	1,4-Dichlorobenzene	20	U	7500
10-86-1	Pyridine	20	U	5000

mw
10/2/92

FORM I SV-TCLP

7/91 Rev. 1

ENVIROFORMS/INORGANIC TCLP

SAMPLE NO.

1
INORGANIC ANALYSIS DATA SHEET

FILLT2

Lab Name: TCT St. Louis

Contract: ERDTOS02

Lab Code: TCT

Case No.: TOSO2

SAS No.:

SDG No.: ~~FILED~~ ^{PWTCLT}

Matrix (soil/water): WATER

Lab Sample ID: 92006145

Level (low/med): LOW

Date Received: 09/18/92

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	71.0	U		P
7440-39-3	Barium	321	B	EN	P
7440-43-9	Cadmium	20.0	B		P
7440-47-3	Chromium	11.0	B		P
7439-92-1	Lead	104	B		P
7439-97-6	Mercury	8.7	B		CV
7782-49-2	Selenium	46.0	B	NW	F
7440-22-4	Silver	10.0	B		P

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

FORM I - IN

11

F-22V2

E-16

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EG&G SAMPLE NO.

PWTBT1

Lab Name: TCT-ST.LOUIS

Contract: ERDT0S02

Lab Code: TCT

Case No.: TOS02

SAS No.:

SDG No.: PWTBT1

Matrix: (soil/water) WATER

Lab Sample ID: 92006116

Sample wt/vol: 5 (g/ml) ML

Lab File ID: >E2113

Level: (low/med) LOW

Date Received: 09/16/92

% Moisture: not dec.

Date Analyzed: 09/23/92

Column: (pack/cap) CAP

Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/Kg)	ug/L	
74-87-3	Chloromethane	10	IU	
74-83-9	Bromomethane	10	IU	
75-01-4	Vinyl chloride	10	IU	
75-00-3	Chloroethane	10	IU	
75-09-2	Methylene Chloride	5	IU	
67-64-1	Acetone	10	IU	
75-15-0	Carbon Disulfide	5	IU	
75-35-4	1,1-Dichloroethene	5	IU	
75-34-3	1,1-Dichloroethane	5	IU	
540-59-0	1,2-Dichloroethene (total)	5	IU	
67-66-3	Chloroform	84		
107-06-2	1,2-Dichloroethane	5	IU	
78-93-3	2-Butanone	10	IU	
71-55-6	1,1,1-Trichloroethane	5	IU	
56-23-5	Carbon Tetrachloride	5	IU	
108-05-4	Vinyl Acetate	10	IU	
75-27-4	Bromodichloromethane	2	IU	
78-87-5	1,2-Dichloropropane	5	IU	
10061-01-5	cis-1,3-Dichloropropene	5	IU	
79-01-6	Trichloroethene	5	IU	
124-48-1	Dibromochloromethane	5	IU	
79-00-5	1,1,2-Trichloroethane	5	IU	
71-43-2	Benzene	5	IU	
10061-02-6	trans-1,3-Dichloropropene	5	IU	
75-25-2	Bromoform	10	IU	
108-10-1	4-Methyl-2-pentanone	10	IU	
591-78-6	2-Hexanone	5	IU	
127-18-4	Tetrachloroethene	5	IU	
79-34-5	1,1,2,2-Tetrachloroethane	5	IU	
108-88-3	Toluene	5	IU	
108-90-7	Chlorobenzene	5	IU	
100-41-4	Ethylbenzene	5	IU	
100-42-5	Styrene	5	IU	
1330-20-7	Xylene (total)			

ENVIROFORMS/INORGANIC TCLP

SAMPLE NO.

1
INORGANIC ANALYSIS DATA SHEET

PWTCIT

Lab Name: TCT St. Louis

Contract: ERDTOS02

Lab Code: TCT

Case No.: TOS02

SAS No.:

SDG No.: ~~PWTCIT~~
010.4.12

Matrix (soil/water): WATER

Lab Sample ID: 92006115

Level (low/med): LOW

Date Received: 09/16/92

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	71.0	U		P
7440-39-3	Barium	2.0	U	EN S	P
7440-43-9	Cadmium	5.0	U		P
7440-47-3	Chromium	17.0	B		P
7439-92-1	Lead	2780			P
7439-97-6	Mercury	7000			CV
7782-49-2	Selenium	40.0	U	NW	F
7440-22-4	Silver	8.0	B		P

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

FORM I - IN

010.4.12 E-18

13
SEMI-VOLATILE ORGANICS ANALYSIS DATA SHEET
TCLP

EG&G Sample No.

PWTCLT

Lab Name: TCT-ST. LOUIS

Contract: ERDTOSO2

Lab Code: TCT

Case No.: TOSO2

SAS No.:

SDG No.: PWTCLT

Sample Matrix: (soil/water/other) WATER

Lab Sample ID: 92006115

Extract Matrix: (water) WATER

Lab File ID: >D8532

Extract vol: 500 (ml) ML

Date Received: 09/16/92

Level: (low/med) LOW

Date of TCLP Ext. 09/21/92

% Moisture: dec.

not dec.

Date Extracted: 09/22/92

Extraction: (Sepr/Cont/Sonc) SEPF

Date Analyzed: 09/24/92

GFC Cleanup: (Y/N) N

pH: 11

Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L)	Q	TCLP MAXIMUM CONCENTRATION (ug/L)
01	106-44-5	4-Methylphenol	20 U	200000
02	108-39-4	3-Methylphenol	20 U	200000
03	95-48-7	2-Methylphenol	20 U	200000
04		Cresol	20 U	200000
05	37-72-1	Hexachloroethane	20 U	3000
06	98-95-3	Nitrobenzene	20 U	2000
07	87-68-3	Hexachlorobutadiene	20 U	500
08	88-06-2	2,4,6-Trichlorophenol	20 U	2000
09	95-95-4	2,4,5-Trichlorophenol	100 20 U	400000
10	121-14-2	2,4-Dinitrotoluene	20 U	130
11	118-74-1	Hexachlorobenzene	20 U	130
12	87-86-5	Pentachlorophenol	100 20 U	100000
13	106-46-7	1,4-Dichlorobenzene	20 U	7500
14	110-86-1	Pyridine	20 U	5000

mw
10-12-5

FORM I SV-TCLP

7/91 Rev. 1

IC
ID
CL

PWTCLT

Contract: ERD TDS 22

SAS No.: _____ SDG No.: PNTCLT

WATER Lab Sample ID: 93006-115

Lab File ID:

Date Received: 9-16-92

Date of TCLP Extraction: 9-21-92

Date Extracted: 9-22-92

Date Analyzed: 9-24-92

Dilution Factor: 1 . .

CONCENTRATION
UNITS
(ug/L)

TCLP MAXIMUM
CONCENTRATION
(ug/L)

C

X - see 1-100 DILUTION for sample DL

IC
CID
TCL

PWTCLT DL

Contract: ERD TDS Q2

PWTCLT DL

Lab Code: TCT Case No.: TOS-02 SAS No.: SDG No.: PNTCLT

Sample Matrix: (soil/water/other) WATER Lab Sample ID: 92D06115

Extract Matrix: (water) WATER Lab File ID: _____

Extract vol: 500 (mL) mL Date Received: 9-16-92

Level: (low) Low Date of TCLP Extraction: 9-21-92

% Moisture: not dec. NA dec. NA Date Extracted: 9-22-92

Preparatory Extraction: (SepF/Cont) SEP Date Analyzed: 9-24-92

GPC Cleanup: (Y/N) N pH: 11.0 Dilution Factor: 100

CONCENTRATION
UNITS
(ug/L)

C

TCLP MAXIMUM
CONCENTRATION
(ug/L)

18

PWTCLT D.

Contract: E20T0502

Case No.: TCSc2

SAS No.: NA

SDG No.: PWTCLT

Lac Samois ID: 9206115

Lab Time: NA

Date Received: 9-18-92

Date of TCU Extraction: 9-21-92

Date Ext'd used: 9-22-92

Date Analyzed: 9-25-92

Dilution Factor: 25.0

CONCENTRATION
UNITS
(UG/L)

TOLP MAXIMUM
CONCENTRATION
(UG/L)

1945

24-3

12.5

4

100C3

201-202

 $\bar{z} = \bar{z}$

12.0

14.

1002

7/91 Rev.

TCT - St. Louis

Consulting Engineers, Scientists and Analytical Services

November 5, 1992
9259-00009

1908 Innerbelt Business Center Drive
St. Louis, Missouri 63114-5700
Phone (314) 426-0880
Fax (314) 426-4212

Ms. Donna Kirchner
Field Data Coordinator
ERP Administrative Record
and Document Control
EG&G Idaho, Inc.
P.O. Box 1625
Idaho Falls, ID 83415-3904

Uncl. ☒
Conf. ☒
FOR EG&G IDIHO USE ONLY
Date: 11-6-92

RECEIVED

NOV 6 1992

ENVIRONMENTAL RESTORATION DEPT.

Re: Data Package for Task Order 15 Under Subcontract C92-170021

Dear Ms. Kirchner:

Enclosed is a data report for the analysis of samples received by TCT-St. Louis under subcontract No. C92-170021/Task Order 15, (TOS No. ERD-TOS-02, MOD 2). This report contains analytical sample data for samples collected from treatability studies being conducted at the Test Reactor Area (TRA).. The samples were analyzed specifically for TCLP metals, TCLP pesticides, TCLP herbicides, TCLP volatiles and corrosivity.

The samples were received by TCT-St. Louis on October 2, 1992 with a stated turn-around time of 35 days from receipt of the last sample in the SDG. The due date is November 6, 1992.

The EG&G site codes, corresponding File LD.'s, TCT-St. Louis laboratory sample numbers for each sample delivery group are shown in the following tables.

SDG TUPFP1

TCLP (VOLATILES, PESTICIDES, HERBICIDES, SEMIVOLATILE, AND METALS)

<u>EG&G SITE ID</u>	<u>FILE ID</u>	<u>TCT LAB NO.</u>	<u>DATE COLLECTED</u>
PWTUPFT1	TUPFT1	92006648	9/30/92
PWTUPFT2	TUPFT2	92006650	9/30/92
PWTUIOXT1	UIOXT1	92006652	9/30/92
PWTUIOXT2	UIOXT2	92006654	9/30/92

SDG TUPFC1 - CORROSIVITY

<u>EG&G SITE ID</u>	<u>FILE ID</u>	<u>TCT LAB NO.</u>	<u>DATE COLLECTED</u>
PWTUPFC1	TUPFC1	92006649	9/30/92
PWTUPFC2	TUPFC2	92006651	9/30/92
PWTUIOXC1	UIOXC1	92006653	9/30/92
PWTUIOXC2	UIOXC2	92006655	9/30/92

TCT-St. Louis
9259-00009
page 2

For reporting purposes, the contract number is ERDTOS02 and case number TOS02. All samples were analyzed and reported per the requirements of C92-170021 TASK ORDER NO. 15, ERD-TOS-02 MOD 2.

A copy of the original chain-of-custody was mailed to Donna Kirchner on October 19, 1992.

Several corrections were made to the chain of custody after phone conversations with Isabel Anderson on October 2, 1992. TCLP pesticides and herbicides were added to the first four samples. The last four samples were changed to corrosivity. A limited amount of filter material was available for analysis. Ms. Anderson informed me that additional sample from the corrosivity bottle could be used to perform the requested analyses. The priority for analysis should be: 1 - metals with matrix spike, 2 - BNA with matrix spike, 3 - VOA with matrix spike, 4 - pesticide and herbicide with matrix spike.

TCLP METALS

The samples were analyzed within the required holding times. A CLP equivalent data package has been prepared. The TCLP metals samples are contained in SDG TUPFT1. This SDG contains several waste matrix types. A matrix spike was performed on each waste type, TUPFT1 and UIOXT1. A duplicate analysis was also performed for sample UIOXT1.

CORROSIVITY

The four samples were analyzed by Method 1110 Corrosivity Toward Steel. The corrosivity results are included at the end of the case narrative.

TCLP BNA

The samples were analyzed within the required holding times. A CLP equivalent data package has been prepared. The TCLP BNA samples are contained in SDG TUPFP1. A matrix spike and a matrix spike duplicate were performed on samples TUPFT1 and UIOXT1. Several surrogate compounds were not recovered within acceptable limits in the TCLP blank and the method blank. All surrogate recoveries were acceptable in the samples. Non-target compound contamination was observed for the TCLP blank. The non-target compounds should not reduce the validity of the TCLP sample analyses. The non-target compound contamination was discussed with Rod Grant. Insufficient sample was available to re-extract the samples.

TCT-St. Louis
9259-00009
page 3

TCLP PESTICIDES

The samples were analyzed within the required holding times. A CLP equivalent data package has been prepared. The TCLP Pesticides are contained in SDG TUPFP1. A matrix spike has been performed on sample TUPFT1. A matrix spike and a matrix spike duplicate has been performed on sample UIOXT1.

TCLP HERBICIDES

The samples were analyzed within the required holding times. A CLP equivalent data package has been prepared. The TCLP Herbicides are contained in SDG TUPFP1. A matrix spike was performed on sample TUPFT2. A matrix spike and a matrix spike duplicate were performed on sample UIOXT2. The matrix spikes were not recovered for any of the matrix spikes for these samples. The laboratory control sample had good recovery demonstrating acceptable method performance. A sample matrix effect was suspected. Due to insufficient sample volume the samples could not be re-extracted and re-analyzed.

TCLP VOLATILES

The samples were analyzed within the required holding times. A CLP equivalent data package has been prepared. The TCLP volatiles are contained in SDG TUPFP1. A matrix spike was performed for sample TUPFT1. A matrix spike and a matrix spike duplicate were performed for sample UIOXT1. The recovery of 2-Butanone was within SW-846 limits but was slightly below the EG&G TCLP range for sample UIOXT1. Good recoveries were obtained in the laboratory control sample. The LCS was injected two minutes after the 12 hour time limit from the BFB tune.

This work will be invoiced under purchase order number C92-170021 and TCT-St. Louis project number - 9259-00009.

If you have any questions concerning this data report, please call me at (314) 426-0880.

Sincerely,

Fred Grabau
Project Manager

Qualifying Engineers Sections and Analytical Services

1900 Inverloch (Inverloch Centre Drive)
St Louis Missouri 63114 5700
Fax (314) 426 4212
(314) 426 0880

SHEET 1 of 1

Corrosivity

TIME IN 17:30

out 17:30

TOTAL TIME 24 (hrs)

ANALYST Philip J. M. O. C. A. DATE 10-28-92

CHK'D BY _____ DATE _____

WM 3030

[illegible]

# 110	=	50	$R = 1.82$	$t = .22$	# 50	$r = .56$	$R = 1.8$	$t = .22$
-------	---	----	------------	-----------	------	-----------	-----------	-----------

$\mu 13$	$r = .55$	$R = 1.8$	$t = .23$
$\mu 32$	$r = .60$	$R = 1.79$	$t = .22$
$\mu 35$	$r = .56$	$R = 1.69$	$t = .22$
$\mu 39$	$r = .60$	$R = 1.81$	$t = .23$

$$\text{CORROSIVITY (mm/yr)} = \frac{\text{NET WT (g)} \times 11.145}{\text{COUPON AREA (cm}^2\text{)} \times \text{TIME (hr)}}$$

OKF6 11/4/92

EG&G Sample No.

TUPFT1

Contract: ERDTOS02

Case No. : TOS02

SAS No. :

SDG No. : TUPFP1

Sample Matrix: (soil/water/other) SOIL

Extract Matrix: (water) . WATER

Lab Sample ID: 92006648

Extract vol: 5 (ml)

Lab File ID: UH1400

Level: (low/med) LOW

Date Received: 10/02/92

% Moisture: not dec. dec.

Date of ZHE: 10/07/92

Column: (nar/wide/pack) WIDE

Date Analyzed: 10/19/92

Dilution factor: 5

FORM I VOA-TCLP

7/91 Rev

1C
CIDE
TCLP

TUPET 1

CONCENTRATION
UNITS
(ug/L)

**TCLP MAXIMUM
CONCENTRATION
(ug/L)**

FORM 1 OCPEST-TCLP

E-30

10

TCLP

Contract: ERD TOSC 2

TUPFT1

SAS No.: NA

SDG No.: TUPFPI

Lab Sample ID: 92006648

Lac File ID: NA

Date Received: 10-2-92

Date of TCLP Extraction: 10-~~8~~¹⁹-92 10-29-92

Date Extracted: 10-16-92

Date Analyzed: 10-26-92

Dilution Factor: 1.0

CONCENTRATION
UNITS
(ug/L)

TC₅₀ MAXIMUM
CONCENTRATION
(ug/L)

CAS NO.

COMPOUND

UNITS
(ug/L)

0

1:94-75-7

2.4-D

2.44

• • •

2193-72-1

Silvēn

0.500

10000

100C

7/91 Rev.

ENVIROFORMS/INORGANIC TCLP

SAMPLE NO.

1
INORGANIC ANALYSIS DATA SHEET

TUPFT1

Lab Name: TCT St. Louis

Contract: ERDTOS02

Lab Code: TCT

Case No.: TOS02

SAS No.:

SDG No.: TUPFT1

Matrix (soil/water): WATER

Lab Sample ID: 92006648

Level (low/med): LOW

Date Received: 10/02/92

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	71.0	U		P
7440-39-3	Barium	78.0	B		P
7440-43-9	Cadmium	27.0	R		P
7440-47-3	Chromium	983			P
7439-92-1	Lead	329000			P
7439-97-6	Mercury	3640			CV
7782-49-2	Selenium	20.0	U	NW	F
7440-22-4	Silver	4.0	B		P

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts: NO

Comments:

FORM I - IN

EG&G Sample No.

Contract: ERDTOS02

SDG No.: TUPFP1

Lab Sample ID: 92006650

Lab File ID: UH1402

Date Received: 10/02/92

Date of ZHE: 10/07/92

Date Analyzed: 10/19/92

Dilution factor: 5

7/91 Rev

10

TCLP

TUPET-2

SDG No.: TUPFPI

Lab Sample ID: 92006650

Lac File ID: NA

Date Received: 10-2-92

Date of TCLP Extraction: 10-7-92

Date Extracted: 10-14-92

Date Analyzed: 10-26-92

Dilution Factor: 1.0[illegible]

7/91 Rev.

1C

TCLP

TUPFT2

Lab Name: TCT- ST. LOUIS

Contract: EROTOSC2

Lab Code: TCT Case No.: 70502

SAS No.: SDG No.: TUPEP1

Sample Matrix: (soil/water/other) OTHER

Lab Sample ID: 9200650

Extract Matrix: (water) WATER

Lab File ID: _____

Extract vol: 50 (mL) ml

Date Received: 10-2-92

Level: (low) _____

Date of TCLP Extraction: 10-7-92

% Moisture: not dec. NA dec. NA

Date Extracted: 10-13 92

Preparatory Extraction: (SepF/Cont) SEPF

Date Analyzed: 10-23-92

GPC Cleanup: (Y/N) N pH: 5

Dilution Factor: 1[illegible]

FORM 1 OCPEST-TCLP

7/91 Rev.

ENVIROFORMS/INORGANIC TCLP

SAMPLE NO.

1
INORGANIC ANALYSIS DATA SHEET

TUPFT2

Lab Name: TCT St. Louis

Contract: ERDTOS02

Lab Code: TCT

Case No.: TOS02

SAS No.:

SDG No.: TUPFT1

Matrix (soil/water): WATER

Lab Sample ID: 92006650

Level (low/med): LOW

Date Received: 10/02/92

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	71.0	U		P
7440-39-3	Barium	137	B		P
7440-43-9	Cadmium	81.0	-		P
7440-47-3	Chromium	2210	-		P
7439-92-1	Lead	344000	-		P
7439-97-6	Mercury	1550	-		CV
7782-49-2	Selenium	20.0	U	NW	F
7440-22-4	Silver	4.0	U		P

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts: NO

Comments:

FORM I - IN

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET
TCLP

EG&G Sample No.

UIOXT1

Lab Name: TCT-ST. LOUIS

Contract: ERDTOS02

Lab Code: TCT

Case No.: TOS02

SAS No.:

SDG No.: TUPFP1

Sample Matrix: (soil/water/other) SOIL

Extract Matrix: (water) WATER

Lab Sample ID: 92006652

Extract vol: 5 (ml)

Lab File ID: UH1403

Level: (low/med) LOW

Date Received: 10/02/92

% Moisture: not dec. dec.

Date of ZHE: 10/07/92

Column: (nar/wide/pack) WIDE

Date Analyzed: 10/19/92

Dilution factor: 5

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L)	Q	TCLP MAXIMUM CONCENTRATION (ug/L)
01	75-01-4 Vinyl chloride	50	U	200
02	75-35-4 1,1-Dichloroethene	25	U	700
03	67-66-3 Chloroform	25	U	6000
04	107-06-2 1,2-Dichloroethane	25	U	500
05	78-93-3 2-Butanone	55	U	200000
06	56-23-5 Carbon Tetrachloride	25	U	500
07	79-01-6 Trichloroethene	25	U	500
08	71-43-2 Benzene	25	U	500
09	127-18-4 Tetrachloroethene	6	J	700
10	108-90-7 Chlorobenzene	25	U	100000

*243 ul
10-29-92*

FORM I VOA-TCLP

7/91 Rev

EG&G Sample No.

UIOXT1

SDG No. : TUPFP1

Lab Sample ID: 92006652

Lab File ID: >D8651

Date Received: 10/02/92

Date of TCLP Ext. 10/07/92

Date Extracted: 10/10/92

Date Analyzed: 10/20/92

Dilution Factor: 1

7/91 Rev. 1

TCLP

U10XT1

Contract: ERDT0502

SAS No.: NA

SDG No.: TuPFPI

Lao Samnue ID: 92004652

Lac File ID: NA

Date-Received: 10-2-92

Date of TCLP Extraction: 10-7-92

Date Extracted: 10-14-92

Date Analyzed: 10-26-92

Dilution Factor: 1.0

CONCENTRATION
UNITS
(ug/L)

TC₅₀ MAXIMUM
CONCENTRATION
(ug/L)

CAS NO.

COMPOUND

1:94-75-7

2.4-D

2193-72-1

Siivex

0.500

4

10006

$$\begin{array}{r} 500 \\ \hline 0.500 \end{array}$$

4

1000
1000

7/91 Rev.

ENVIROFORMS/INORGANIC TCLP

SAMPLE NO.

1
INORGANIC ANALYSIS DATA SHEET

UIOXT1

Lab Name: TCT St. Louis

Contract: ERDTOS02

Lab Code: TCT

Case No.: TOS02

SAS No.:

SDG No.: TUPFT1

Matrix (soil/water): WATER

Lab Sample ID: 92006652

Level (low/med): LOW

Date Received: 10/02/92

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	71.0	U		P
7440-39-3	Barium	308	B		P
7440-43-9	Cadmium	5.0	U		P
7440-47-3	Chromium	141	B		P
7439-92-1	Lead	14100	-		P
7439-97-6	Mercury	2100			CV
7782-49-2	Selenium	20.0	U	N	F
7440-22-4	Silver	4.0	B		P

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts: NO

Comments:

FORM I - IN

10
CID
TCL

410XT2

Contract: ERD T0502

SAS No.: NA

SDG No.: TYPFPI

Lac Sample ID: 92006654

Lab File ID: NA

Date-Received: 10-2-92

Date of TCLP Extraction: 10-7-92

Date Extracted: 10-14-92

Date Analyzed: 10-26-92

Dilution Factor: 1.0

[illegible]

7/91 Rev.

100

U10XT2

Contract: ERDT0302

SDG No.: TU2FP1

05-22 Lab Sample ID: 92006654

Lab File ID: _____

Date Received: 10-2-92

Date of TCLP Extraction: 10-7-92

Date Extracted: 10-13-92

Date Analyzed: 10-23-92

Dilution Factor: 1

CONCENTRATION
UNITS
(ug/L)

TCLP MAXIMUM
CONCENTRATION
(ug/L)

Q

ENVIROFORMS/INORGANIC TCLP

SAMPLE NO.

1
INORGANIC ANALYSIS DATA SHEET

UIOXT2

Lab Name: TCT St. Louis

Contract: ERDTOS02

Lab Code: TCT

Case No.: TOS02

SAS No.:

SDG No.: TUPFT1

Matrix (soil/water): WATER

Lab Sample ID: 92006654

Level (low/med): LOW

Date Received: 10/02/92

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	71.0	U		P
7440-39-3	Barium	338	B		P
7440-43-9	Cadmium	5.0	U		P
7440-47-3	Chromium	140	B		P
7439-92-1	Lead	3120	-		P
7439-97-6	Mercury	2740	-		CV
7782-49-2	Selenium	20.0	U	N	F
7440-22-4	Silver	4.0	U		P

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts: NO

Comments:

FORM I - IN

TCT - St. Louis

Consulting Engineers, Scientists and Analytical Services

November 25, 1992
9259-000013

1908 Innerbelt Business Center Drive
St. Louis, Missouri 63114-5700
Phone (314) 426-0880
Fax (314) 426-4212

Ms. Donna Kirchner
Field Data Coordinator
ERP Administrative Record
and Document Control
EG&G Idaho, Inc.
P.O. Box 1625
Idaho Falls, ID 83415-3904

Re: Data Package for Task Order 15 Under Subcontract C92-170021

Dear Ms. Kirchner:

Enclosed is a data report for the analysis of samples received by TCT-St. Louis under subcontract No. C92-170021/Task Order 15, (TOS No. ERD-TOS-02, MOD 2). This report contains analytical sample data for samples collected from treatability studies being conducted at the Test Reactor Area (TRA).. The samples were analyzed specifically for TCLP Mercury.

The samples were received by TCT-St. Louis on October 23, 1992 with a stated turn-around time of the final report in 35 days from receipt of the last sample in the SDG. The due date for the final report is November 27, 1992. The preliminary report of the quick turn around water samples was delivered on October 27, 1992 to Isabel Anderson.

The EG&G site codes, corresponding File I.D.'s, TCT-St. Louis laboratory sample numbers for each sample delivery group are shown in the following tables.

SDG UTWF1M - TCLP MERCURY

<u>EG&G SITE ID</u>	<u>FILE ID</u>	<u>TCT LAB NO.</u>	<u>DATE COLLECTED</u>
PWTUTWF1M	UTWF1M	92007340	10/22/92
PWTUTWF2M	UTWF2M	92007341	10/22/92

For reporting purposes, the contract number is ERDTOS02 and case number TOS02. All samples were analyzed and reported per the requirements of C92-170021 TASK ORDER NO. 15, ERD-TOS-02 MOD 2.

The yellow original chain-of-custodies were mailed to Donna Kirchner on November 10, 1992.

TCLP METALS - SDG UTWF1M

The samples were analyzed within the required holding times. A CLP equivalent data package has been prepared. A matrix spike and duplicate analysis were performed on

sample UTWF1M.

This work will be invoiced under purchase order number C92-170021 and TCT-St. Louis project number - 9259-000012.

If you have any questions concerning this data report, please call me at (314) 426-0880.

Sincerely,

A handwritten signature in cursive script, appearing to read "Fred Grabau".

Fred Grabau
Project Manager

ENVIROFORMS/INORGANIC TCLP

SAMPLE NO.

1
INCRGANIC ANALYSIS DATA SHEET

EXTBNK

Lab Name: TCT St. Louis

Contract: ERDTOS02

Lab Code: TCT

Case No.: TOS02

SAS No.:

SDG No.: UTWFLM

Matrix (soil/water): WATER

Lab Sample ID: OPA7288

Level (low/med): LOW

Date Received: ~~10/23/92~~

% Solids: 0.0

jan 11-24-92

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

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ENVIROFORMS/INORGANIC TCLP

SAMPLE NO.

1
INORGANIC ANALYSIS DATA SHEET

UTWFLM

Lab Name: TCT St. Louis

Contract: ERDTOSO2

Lab Code: TCT

Case No.: TOSO2

SAS No.:

SDG No.: UTWFLM

Matrix (soil/water): WATER

Lab Sample ID: 92007340

Level (low/med): LOW

Date Received: 10/23/92

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	9.2			CV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC TCLP

SAMPLE NO.

1
INORGANIC ANALYSIS DATA SHEET

UTWF2M

Lab Name: TCT St. Louis

Contract: ERDTOS02

Lab Code: TCT

Case No.: TOS02

SAS No.:

SDG No.: UTWF1M

Matrix (soil/water): WATER

Lab Sample ID: 92007341

Level (low/med): LOW

Date Received: 10/23/92

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	16.8			CV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

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**DATE
FILMED**

7 / 19 / 93