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S

HNF-3208, Rev. 0

DOCUMENTATION OF REMAINING HAZARDOUS SUBSTANCES/DANGEROUS WASTE IN B PLANT

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B&W Hanford Company, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

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Abstract: This document serves to list and explain all the chemicals and radiation that will remain in B Plant upon closure.

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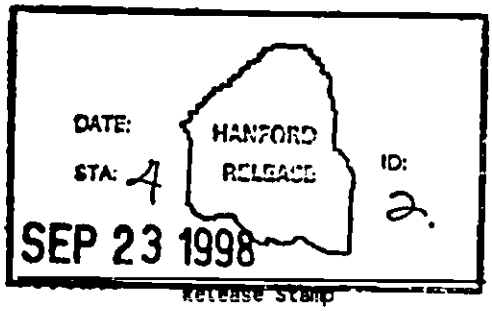

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Introduction

B Plant is a canyon facility located in the 200 East Area of the U.S. Department of Energy's (DOE) Hanford Reservation and is operated and managed by B&W Hanford Company. Since its construction in 1943, B Plant has had several missions. B Plant's first mission was the recovery of plutonium using a Bismuth Phosphate Chemical Separation Process (1945 to 1952). In the early 1960s, B Plant was modified for a second mission, the recovery and purification of cesium and strontium. Since the completion of the strontium and cesium recovery mission in the late 1980s, B Plant has been operated to provide safe management and storage of the B Plant radionuclides and mixed waste inventories.

In managing the mixed waste inventories, B Plant has operated several treatment, storage, and disposal (TSD) units for the management of mixed wastes including organic solvent waste, containerized solid waste, liquid process waste, lead waste, and contaminated equipment/debris. These operations are carried out in the 221B building which utilizes a remote process cell design to house the process tanks and associated equipment.

In September 1995, DOE issued a Memorandum of Agreement to place B Plant in transition to shutdown. DOE then entered into agreements with the Washington State Department of Ecology (Ecology) and the U. S. Environmental Protection Agency to transition the B Plant to shutdown. These agreements included requirements for B Plant to determine the status of tanks and vessels in the B Plant, including the 221-B canyon. In complying with this agreement, vessels located in the 221B canyon were checked for liquid contents. A total of seventeen (17) vessels were identified with solution volumes greater than minimum heel. Six of these tanks were determined by historical knowledge to contain solutions that could be sent to Tank Farms. The remaining contents were transferred either into Tank (Tk)-24-1 or TK-21-1 and sampled for characterization of contents. Composite samples were obtained from all but six of these vessels. Those vessels that could not be sampled were grouped according to their process history and carry the same pedigree as the sample that was obtained for that grouping.

Sampling of the tanks was done per HNF-SD-WM-EV-118, Rev. 0, "Sampling and Analysis Plan." Each of these samples was taken and analyzed per SW-846 protocol where possible. The sample analyses were validated to a Level C validation and the validation packages are attached to this document. This validation work was done via direction from Ecology.

Tanks and vessels, shown in Table 1, which contain solid heels were not sampled due to the extreme difficulty in obtaining solid samples in these high radiation fields. Estimates for the characterization of these solids were based on process flow sheets.

Spills in the process cells were estimated from dose rate information obtained using the GammaCam™ as explained in the methodology section of this document.

Other hazardous substances inventory reports such as lead are included as a separate table.

Purpose

This document serves to provide accountability of hazardous substances/dangerous wastes remaining in the B Plant canyon upon its deactivation. The hazardous substances/dangerous wastes are the result of over 50 years of chemical/nuclear processing. In addition, this document serves to satisfy end point 04.01.20 that supports completion of Tri-Party Agreement Milestone M-82-07, "Document Hazardous Substances/Dangerous Waste Remaining Within B Plant."

Scope

This document provides documentation of the remaining hazardous substances/waste remaining in the B Plant canyon. This includes wastes remaining in the tanks/vessels, the process cells, and on the canyon deck. These wastes consist of remaining heels/residual solids in the tanks/vessels, containerized waste located in Cell 4, lead waste including counterbalances and shielding material, and contaminated equipment/debris.

Characterization data collected for this document can be separated into three categories; process knowledge, chemical analysis, and radiological surveys. Chemical analysis was done by sampling a limited number of tanks and vessels to determine chemical constituents and their concentrations. Radiation surveys for the cells and deck in B Plant canyon were collected by the GammaCam™ and evaluated through the GammaCam™ software. This data was used to supplement process knowledge to determine remaining chemical constituents in the canyon process cells left from past processing missions.

Methodology

Tanks/Vessels:

In order to determine the composition of contents found in the 17 tanks/vessels that were determined to contain liquids above minimum tank heel in the 221-B canyon, agreements were reached with Ecology regarding sampling requirements. These requirements for sampling were documented in HNF-SD-WM-EV-118, Rev. 0, "Sampling and Analysis Plan" which states the following:

- Samples will be taken from two separate locations as follows: TK-21-1 and TK-24-1 in the B Plant Canyon.
- The solutions will be transferred into either TK-24-1 or TK-21-1 for sampling. These events can occur either in series or parallel depending on personnel availability and scheduling within the facility.

- The logic for sampling TK-24-1 will be as follows:
  - The solutions from TK-22-1, TK-29-2, TK-34-1 and TK-34-2 will be combined in TK-24-1 and sampled. The material from E-5-2 will be added to TK-24-1 and sampled. The solution from TK-9-2 will be added to TK-24-1 and sampled. The solution from TK-28-1 and TK-30-1 will be transferred into TK-24-1 and sampled. A split will also be sent to the 325 Analytical Chemistry Laboratory from this final sample.

- The logic for sampling TK-21-1 will be as follows:
  - The solutions from E-20-2, TK-18-2 and TK-18-3 will be transferred into TK-21-1 and then sampled. The solutions from TK-32-1 and TK-35-2 will be added to TK-21-1 and sampled. A split will also be sent to the 325 Analytical Chemistry Laboratory from this final sample.

The other two tanks, TK-27-3 and TK-28-3, will be sampled per low-level waste (LLW) sampling procedure BP-080-020.

No samples were taken from E-5-2, E-20-2, T-28-1 and T-30-1 for the following reasons: E-5-2 contents evaporated below pumpable levels. E-20-2 contents evaporated to dryness. Agreement was made with Ecology (Attachment M) not to sample T-28-1 and T-30-1 because they were at minimum levels.

Samples were also not taken from TK-27-3 and TK-28-3 because these solutions were solidified and no free liquids remain. Therefore, samples were not taken from these vessels. Documentation (Attachment A) is attached for the samples taken per the sampling plan. Table 1 lists the amount and compositions of chemicals that remain in B Plant upon its deactivation. Table 1 also shows an estimate of chemical that remains on the floor of Cells 27 and 28, and in the cell drain header. Each of these estimates comes from a video taken from the respective location.

A brief description of the 17 vessels identified in the sampling plan along with the WESF LLW tank and their historical use is as follows:

E-5-2 This vessel contained 110 gallons of a demineralized water flush left in the concentrator. The concentrator was flushed to less than 1 Ci (Cs) /gal. No sample was obtained from this solution. However, based on the vessel use, the remaining heel carries the same pedigree as sample #S98B000059 (Attachment B). A heel of <110 gallons remains in the vessel.

E-20-2 This vessel contained 110 gallons of a demineralized water flush left in the concentrator. The concentrator was flushed to less than 1 Ci(Cs)/gal. No sample was obtained from this solution since it evaporated dry before a sample could be obtained. Due to its process history it carries the same pedigree as sample #S98B000059 (Attachment B).

T-28-1 This vessel contained 422 gallons of water heel from wet standby remaining in the solvent extraction tower. Because samples could not be obtained from this solution, 422 gallons remain as minimum heel. Based on process history, this solution carries the same pedigree as the aqueous solution that was sampled in TK-25-2 per sample #S95R000115/116 (Attachment F).

T-30-1 This vessel contained 175 gallons of water heel from wet standby remaining in the solvent extraction tower. Because samples could not be obtained from this solution, 175 gallons remain as minimum heel. Based on process history, this solution carries the same pedigree as the aqueous solution that was sampled in TK-25-2 per sample #S95R000115/116 (Attachment F). A heel of 175 gallons remains in the vessel.

TK-9-2 This solution is 463 gallons of low-level waste. This material was moved to TK-24-1 and sampled per sample #S97B000370 (Attachment C). The remaining heel in this tank has evaporated.

TK-18-2 This vessel contained 2,860 gallons of demineralized water on a resin bed. This solution is expected to contain cesium at a concentration of 1 Ci(Cs)/gal. This material was combined with the solution in TK-21-1 and sampled per sample #S98B000059 (Attachment B). A heel of 934 gallons of water and resin remains in the tank.

TK-18-3 This vessel contained 35 gallons of demineralized water pumped upflow through TK-18-2 to fluff the resin bed. This material was combined with the contents of TK-21-1 in TK-21-1 and sampled per sample #S96B00454 (Attachment D). A heel of less than 16 gallons remains.

TK-21-1 This vessel contained 2,500 gallons of flush solution from the E-20-2 concentrator and T-18-2. This was combined with the contents of TK-18-3, TK-32-1, TK-35-2, and T-18-2 in TK-21-1 and sampled per sample #S98B000059 (Attachment B). There is a heel of 140 gallons in the tank.

TK-22-1 This vessel contained 250 gallons of steam condensate from the vessel vent heater and condenser system. This material was sent to TK-24-1 and sampled per sample #S96B000453 (Attachment E). There is a heel of less than 50 gallons in the tank.

TK-24-1 This was the low-level waste tank for B Plant to Tank Farms. It was sampled per sample # S98B000169 (Attachment I). A heel of 752 gallons remains in the vessel.

TK-27-3 This vessel contained 1,600 gallons of phosphoric acid solution that was neutralized with caustic to precipitate trisodium phosphate. The precipitate will remain in the tank. No samples were obtained, but the resulting solids are documented in Attachment G.

TK-28-3 This vessel contained 1,300 gallons of weak phosphoric acid solution that was neutralized with caustic to precipitate trisodium phosphate. The precipitate will remain in the tank. No samples were obtained of the solids but the resulting solids are documented in Attachment G.

TK-29-2 This vessel contained 110 gallons of LLW remaining from the low-level waste route to remove steam condensate from the building to Tank Farms. This material was sent to TK-24-1 and sampled per sample #S96B000453 (Attachment C). A heel of less than 50 gallons remain.

TK-32-1 This vessel contained 1,220 gallons of solution used to flush the G-32-2 centrifuge in preparation for pretreatment processing. This material was combined with the contents of T-18-2, and TK-21-1 in TK-21-1 and sampled per sample #S97B000369 (Attachment C). A heel of 70 gallons remains in the vessel.

TK-34-1 The material in TK-34-1 was transferred into TK-24-1 and sampled per sample #S96B000453 (Attachment E). There is a heel of less than 50 gallons in the tank.

TK-34-2 This vessel contained 1,150 gallons of demineralized water containing diatomaceous earth that was used to test the filter system in cell 34. This material was sent to TK-24-1 and sampled per sample #S96B000453 (Attachment E). There is a heel of less than 50 gallons in the tank.

TK-35-2 This vessel contained 160 gallons of demineralized water contaminated with cesium. This material was sent to TK-21-1 and sampled per sample #S97B000369 (Attachment C). A heel of 50 gallons remains in the vessel.

TK-100 This vessel was the LLW transfer vessel for WESF to B Plant. It contains a sludge heel of 450 gallons. The sludge was sampled per sample #SB9600063 (Attachment H).

Radioactive contamination was categorized through the use of the GammaCam™ system. The GammaCam™ was designed and constructed by AIL Systems Inc. "The GammaCam™ is a camera that generates computer-based images of the gamma ray spectrum. Due to the properties of gamma ray photons, the GammaCam™ design is radically different than a camera used for images of visible light. Since gamma rays cannot be refracted, 'lens camera' designs are not possible for imaging gamma rays. The GammaCam™ design expands on the basic pinhole camera design. The GammaCam™

belongs to a class of cameras called Coded Aperture Cameras. This design achieves a large capture area (for greater sensitivity) yet still achieves high spatial resolution in the images. The GammaCam™ replaces the lens in a standard optical camera with a Coded Aperture. The coded aperture is a slab of lead or tungsten that has been machined into a complex pattern of open holes and blocks. The coded aperture casts a complicated shadow in the gamma ray spectrum. This shadow is detected by the scintillator, which glows visible light in the shadow pattern. The visible light glow of the scintillator is collected and amplified by a low noise optical assembly. The amplified shadow image is fed into a cooled low-noise charge coupled device camera, which outputs a digitized pixel image to the control computer. The computer software knows the pattern of the coded aperture. Using this knowledge and the collected shadow data, it calculates the spatial distribution of the gamma ray sources that created this shadow. The resultant image is placed on the computer screen over a black and white video image obtained from a small video camera in the GammaCam™ Sensor Head."

The GammaCam™ software allows the determination of the radiation level within the sensor head field of view. Tables 2 and 3 show the radiation level in the cells and on the deck respectively. In order for the camera to read accurate measurements, a threshold value needs to be over a certain amount to decrease the error in its reading. A calibration was performed by Battelle Northwest to correct for low threshold values (Attachment J). In addition, the nature of the GammaCam™ is such that it only detects the highest relative radiation in the camera field of view. Only these high readings were used to calculate the remaining contamination, since time did not allow for a more thorough and diligent mapping using a reduced field of view.

The amount of curies of cesium was calculated assuming a point source and the dose rates obtained in each cell. An assumption of 60/40 curies ratio was made between cesium and strontium. The amount of strontium was determined from the curies of cesium. Based on the dose rates obtained from the GammaCam™ readings and the location of the hot spots, process flow sheets were used to determine what chemicals were used at the spill location. The composition was scaled up to the appropriate amount of chemicals that would be in the process with cesium and strontium.

Attached to this document is a compact disk (CD) (Attachment L) that has all the pictures taken by the GammaCam™. The file formats are in bitmap, PCX, and GC formats. Only the PCX files can be read without the GammaCam™ software, which is available through AIL, Inc. The "readme" file explains in more detail the contents of the CD and is the following:

- The CD has three different types of files. The first type is a screenshot of the cells and decks as seen on the GammaCam™ software. The second type is bitmaps of each entire cell and deck. Piecing together various pictures of each cell or deck creates these images. The bitmaps only contain the top 50% of the radiation in the cell or deck. The third type of file is the GammaCam™ software file of all the pictures taken by the GammaCam™. The three sets of folders are marked 'Picture', 'bmp', or 'GC' followed by a reference to the cells or decks (i.e., bmp-Cells).

- Screenshots taken from the GammaCam™ software come in three different types of pictures. The first shows just a normal picture of the cell with the radiation field in overlay. The second shows the actual dose rate of each significant radiation field and is referenced by a 'd' in the filename after the cell number. The third shows the top 10% radiation in each cell and is referenced by a 't' in the same manner. Some of the pictures didn't have any radiation, so the dose rate and top 10% pictures weren't included.

- The GammaCam™ software files can only be used if the appropriate GammaCam™ software is on the computer.

- An isotopic analysis (Attachment N) was done on two smears taken from the canyon deck. For these 2 smears, the Cs/Sr ratio is 8.9/.22 and 5.97/.92. These smears are not necessarily representative and the data is included as information only.

- The final manned survey of the canyon deck (Attachment N) was completed on June 25, 1998, and is included as information only.

Process Cell and Canyon Deck:

The lead in the B Plant canyon process cells and on the canyon deck consists of material which has been used as shielding or counterweights for various process equipment or jumpers in the 221B canyon. In most cases, this lead in encased. The primary source of lead is from counterweights on jumpers, which are rigid lengths of pipe used to provide transfer routes for process liquids between tanks/vessels and throughout the B Plant canyon. Approximately 293,447 kg of contaminated debris/equipment and lead counterbalances are stored in the B Plant containment building as waste. This waste is comprised of 99% contaminated debris/equipment, and 1% lead. Efforts continue to find additional information in this area. The contaminated debris/equipment is derived from the processing of Resource Conservation and Recovery Act (RCRA) listed waste and carries several "F" listed waste codes.

The amount of lead in each process jumper is known from design drawings. The same is true for the amount of shielding for pieces of process equipment. In addition, historical process flow diagrams and operating knowledge provide a basis for determining what types of waste were processed using this equipment. No sampling and analysis of the lead waste and contaminated equipment/debris waste in the B Plant will be performed. Table 4 lists all the lead remaining in the B Plant containment building for storage upon its deactivation.

Aside from wastes remaining in the process cells and on the canyon deck, Cell 4 contains containerized waste from the Waste Encapsulation and Storage Facility. A cell inventory for Cell 4 is included in Attachment K. Waste containers located in Cell 4 will also remain in B Plant following building deactivation.

TABLE 1: Chemical Composition and Amount Left in Tanks and Vessels

TANK/ VESSEL ID.	BLDG # or LOCATION	CAPACITY (GAL)	PRESENT STATUS	COMPOSITION	REFERENCE DOCUMENTATION	EXIST. VOLUME (GAL)	DATE EMPTIED
221 B							
TK-2-1	Cell 2	3900	Spent resin from T-18-2	2500 kg of Duolite ARC-359 resin	See MSDS for Duolite Resin	1945	6/10/84
TK-5-1	Cell 5	500	Empty, Dry, Flushed	N/A	N/A	0	5/24/83
E-5-2	Cell 5	433	Liquid	Al 3.6 g,Ba 0.9 g, Cr 0.4 g, Fe 9.8 g, Mn 0.2 g, Na 470 g, Ni 0.4 g, Zr 0.5 g	Sample # S98B00059*	<110	10/2/97
E-5-3	Cell 5	400	Empty, flushed	N/A	N/A	0	5/24/83
TK-6-1	Cell 6	5200	Empty, dry, flushed	N/A	N/A	0	2/6/87
TK-6-2	Cell 6	5200	Empty, dry, flushed	N/A	N/A	0	6/1/93
TK-7-1	Cell 7	5200	Empty, dry, flushed	N/A	N/A	0	4/6/93
TK-7-2	Cell 7	5200	Empty, dry, flushed	N/A	N/A	0	5/10/93
TK-8-1	Cell 8	5200	Empty, dry, flushed	N/A	N/A	0	3/24/93
TK-8-2	Cell 8	5200	Empty, dry, flushed	N/A	N/A	0	3/24/93
TK-9-1	Cell 9	5200	Empty	Pb 78 g, Ba 2.4 g, Cr 5.7 g, Na 2.0 kg, Al 62 g, Fe 340 g, Mn 37 g, Ni 12 g, Zr 0.4 g	Sample # S978000370	0	10/9/97
TK-9-2	Cell 9	5200	Empty	Pb 78 g, Ba 2.4 g, Cr 5.7 g, Na 2.0 kg, Al 62 g, Fe 340 g, Mn 37 g, Ni 12 g, Zr 0.4 g	Sample # S978000370	0	10/09/97

*These tanks were not actually sampled, but are expected to have the same pedigree as this sample.

TANK/ VESSEL ID.	BLDG # or LOCATION	CAPACITY (GAL)	PRESENT STATUS	COMPOSITION	REFERENCE DOCUMENTATION	EXIST. VOLUME (GAL)	DATE EMPTIED
TK-10-1	Cell 10	9996	Inactive with liquid and sludge heel, 1 inch	Ag 35 g, Na 430 kg, P 2.9 kg Si 207 g, Zn 41 g, Zr 22 g	Sample # S98B000169*	980	5/6/98
TK-11-1	Cell 11	800	Empty, Dry	N/A	N/A	0	2/6/87
TK-11-2	Cell 11	3913	Empty, Dry	N/A	N/A	0	2/6/87
TK-12-1	Cell 12	4200	Empty, Dry, Flushed	N/A	N/A	0	2/6/87
G-12-2	Cell 12	122	Empty, < min. heel	Flush water-no analysis	N/A	< 1	2/6/87
TK-13-1	Cell 13	3972	Empty, dry, flushed	N/A	N/A	0	6/7/93
G-13-2	Cell 13	126	Empty, dry, flushed	N/A	N/A	0	2/6/87
TK-14-1	Cell 14	656	Empty, dry, flushed	N/A	N/A	0	2/6/87
TK-14-2	Cell 14	3861	Empty, dry, flushed	N/A	N/A	0	5/21/93
Decon Tank	Cell15	Approx. 500	Empty, dry	N/A	N/A	0	87
E-20-2	Cell16	410	Empty, dry, flushed	N/A	N/A	0	11/1/82
TK-17-1	Cell 17	4940	Empty, dry, flushed	N/A	N/A	0	4/22/93
TK-17-2	Cell 17	4995	Empty, dry, flushed	N/A	N/A	0	4/22/93
TK-18-1	Cell 18	1848	Empty, dry, flushed	N/A	N/A	0	2/6/87
T-18-2	Cell 18	3107	Empty, min heel, contains IX resin	Duolite Resin ES-286	Sample # S98B00059	934	2/13/98

*These tanks were not actually sampled, but are expected to have the same pedigree as this sample.

TANK/ VESSEL ID.	BLDG # or LOCATION	CAPACITY (GAL)	PRESENT STATUS	COMPOSITION	REFERENCE DOCUMENTATION	EXIST. VOLUME (GAL)	DATE EMPTIED
TK-18-3	Cell 18	738	Empty, < min. heel	Na 0.9 g	Sample # S96B000454	< 16	9/19/96
TK-19-1	Cell 19	13306	Empty, dry	N/A	N/A	0	2/6/87
TK-20-1	Cell 20	492	Empty, dry, flushed	N/A	N/A	0	2/6/87
E-20-2	Cell 20	410	Evaporated dry	Al 3.6 g, Ba 0.9 g, Cr 0.4 g, Fe 9.8 g, Mn 0.2 g, Na 470 g, Ni 0.4 g, Zr 0.5 g	Sample # S98B00059*	0	10/26/97
E-20-3	Cell 20	400	Empty, not flushed	N/A	N/A	0	2/6/87
TK-21-1	Cell 21	14073	Empty, < min. heel	Al 82 g, Ba 20 g, Cr 9.7 g, Fe 220 g, Mn 5.2 g, Na 10 kg, Ni 8.7 g, Zr 10 g,	Sample # S98B00059	140	4/10/98
T-21-2	Cell 21	N/A	Empty, dry	N/A	N/A	N/A	Post 87
TK-22-1	Cell 22	469	Empty, < min. heel	Ba 2.2 g, Cr 1.2 g, Na 104 g, Pb 7.4 g	Sample # S96B000453	< 50	9/16/96
T-22-2	Cell 22	450	Empty	N/A	N/A	0	Post 87
E-22-3	Cell 22	220	Empty	N/A	N/A	0	Post 87
E-22-4	Cell 22	400	Empty	N/A	N/A	0	Post 87
F-22-5	Cell 22	480	Empty	N/A	N/A	0	Post 87
F-22-6	Cell 22	700	Empty	N/A	N/A	0	Post 87
F-22-8-1	Cell 22	180	Empty	N/A	N/A	0	Post 87

*These tanks were not actually sampled, but are expected to have the same pedigree as this sample.

TANK/ VESSEL ID.	BLDG # or LOCATION	CAPACITY (GAL)	PRESENT STATUS	COMPOSITION	REFERENCE DOCUMENTATION	EXIST. VOLUME (GAL)	DATE EMPTIED
F-22-8-2	Cell 22	180	Empty	N/A	N/A	0	Post 87
E-22-7	Cell 22	30	Empty	N/A	N/A	0	Post 87
TK-23-1	Cell 23	792	Not Flushed-Sludge	Ba 3.0 kg, Cr 1.6 kg, Na 140 kg, Pb 100 kg	Sample # S96B000453*	80	12/95
D-23-2	Cell 23	1433	Not Flushed	N/A	N/A	0	12/95
E-23-3	Cell 23	3000	Not Flushed-Sludge	Ba 32 kg, Cr 17 kg, Na 1500 kg, Pb 110 kg	Sample # S96B000453*	850	12/95
E-23-4	Cell 23	500	Not Flushed	N/A	N/A	0	12/95
TK-24-1	Cell 24	11090	Empty, < min. heel	Ag 27 g, Na 330 kg, P 2.2 kg, Si 160 g, Zn 32 g, Zr 17 g	Sample # S98B000169	752	5/30/98
TK-25-1	Cell 25	4874	Empty, dry, flushed	N/A	N/A	0	after 87
TK-25-2	Cell 25	4862	Solid TSP	8700 kg TSP, 2000 kg Na	DSI 6/8/98	3300	1/2/97
TK-26-1	Cell 26	3932	Empty, < min. heel	Ag 12 g, Na 150 kg, P 1.0 kg, Si 72 g, Zn 14 g, Zr 7.8 g	Sample # 98B000169*	80	5/18/98
TK-26-2	Cell 26	2636	Empty, dry, flushed	N/A	N/A	0	2/6/87
TK-26-3	Cell 26	2621	Empty, < min. heel	Water flush	N/A	69	5/5/98
T-27-1	Cell 27	615	Empty	N/A	N/A	0	2/6/87
TK-27-2	Cell 27	2003	Empty, < min. heel	Ag 3.4 g, Al 0.05 g, Cd 0.02 g, Cr 0.31 g, Fe 0.47 g, Na 2800 g, Ni 1.4 g, Pb 0.16 g	Sample # S95R000116*	44	93

*These tanks were not actually sampled, but are expected to have the same pedigree as this sample.

TANK/ VESSEL ID.	BLDG # or LOCATION	CAPACITY (GAL)	PRESENT STATUS	COMPOSITION	REFERENCE DOCUMENTATION	EXIST. VOLUME (GAL)	DATE EMPTIED
TK-27-3	Cell 27	3790	Solid TSP	1000 kg TSP	N/A	2110	5/6/98
TK-27-4	Cell 27	280	Empty, < min. heel	Ag 0.86 g, Al 0.01 g, Cr 0.08 g, Fe 0.12 g, Na 700 g, Ni 0.36 g, Pb 0.04 g	Sample # S95R000116*	11	2/6/87
T-28-1	Cell 28	698	Empty, < min. heel	Ag 33 g, Al 0.4 g, Cd 0.1 g, Cr 2.9 g, Fe 4.5 g, Na 27 kg, Ni 14 g,Pb 1.6 g	Sample # S95R000116*	<422	5/6/96
TK-28-2	Cell 28	1980	Empty, < min. heel	Ag 3.7 g, Al 0.05 g, Cd 0.02 g, Cr 0.33 g, Fe 0.51 g, Na 3000 g, Ni 1.5 g, Pb 0.18 g	Sample # S95R000116*	47	2/6/87
TK-28-3	Cell 28	3757	Solid TSP	18000 kg TSP	N/A	2932	5/5/98
TK-28-4	Cell 28	285	Empty, dry	N/A	N/A	0	Pre 87
T-29-1	Cell 29	603	Empty, dry	N/A	N/A	0	Pre 87
TK-29-2	Cell 29	3983	Empty, < min. heel	Ba 2.2 g, Cr 1.2 g, Na 104 g, Pb 7.4 g	Sample # S96B000453	<50	9/17/96
TK-29-3	Cell 29	4150	Empty, dry, flushed	N/A	N/A	0	5/21/93
TK-29-4	Cell 29	134	Empty, < min. heel	N/A	N/A	1	2/6/87
T-30-1	Cell 30	696	Liquid, < min. heel	Ag 14 g, Al 0.2 g, Cd 0.1 g, Cr 1.2 g, Fe 1.9 g, Na 11 kg, Ni 5.7 g, Pb 0.7 g	Sample # S95R000116*	175	5/6/96
TK-30-2	Cell 30	4129	Empty, dry, flushed	N/A	N/A	0	4/22/83

*These tanks were not actually sampled, but are expected to have the same pedigree as this sample.

TANK/ VESSEL ID.	BLDG # or LOCATION	CAPACITY (GAL)	PRESENT STATUS	COMPOSITION	REFERENCE DOCUMENTATION	EXIST. VOLUME (GAL)	DATE EMPTIED
TK-30-3	Cell 30	4136	Liquid, < min. heel	Ag 16 g, Na 200 kg, P 1.3 kg, Si 95 g, Zn 19 g, Zr 10 g	Sample # 98B000169*	451	4/27/98
TK-31-1	Cell 31	1533	Empty, dry	N/A	N/A	0	2/6/87
TK-31-2	Cell 31	715	Empty, Dry	N/A	N/A	0	2/6/87
TK-31-3	Cell 31	3250	Empty, Dry	N/A	N/A	0	2/6/87
TK-32-1	Cell 32	3969	Liquid, < min. heel	Ba 14 g, Cr 5.4 g, Na 7.5 kg	Sample # S97B00369	70	10/23/97
G-32-2	Cell 32	125	Empty, dry, flushed	N/A	N/A	0	10/31/86
TK-33-1	Cell 33	14057	Dry, approx. 6 inches of solids	La 7800 kg, Nd 2600 kg	Rare Earth nitrates-Process knowledge	430	1/28/90
TK-34-1	Cell 34	4140	Empty, < min. heel	Ba 2.2 g, Cr 1.2 g, Na 104 g, Pb 7.4 g	Sample #S96B000453	< 50	9/26/96
TK-34-2	Cell 34	4100	Empty, < min. heel	Ba 2.2 g, Cr 1.2 g, Na 104 g, Pb 7.4 g	Sample #S96B000453	< 50	9/19/96
TK-34-3	Cell 34	4100	Empty, dry, flushed	N/A	N/A	0	6/8/86
F-34-4	Cell 34	50	Empty, dry	N/A	N/A	0	6/8/86
TK-35-1	Cell 35	732	Empty, dry, flushed	N/A	N/A	0	6/8/86
TK-35-2	Cell 35	3963	Empty, < min. heel	Ba 0.6 g, Cr 0.2 g, Na 310 g	Sample # S97B00369*	< 50	9/27/96
E-35-3	Cell 35	27	Empty	N/A	N/A	0	2/6/87
TK-36-1	Cell 36	4107	Empty, Dry, Flushed	N/A	N/A	0	7/22/93

*These tanks were not actually sampled, but are expected to have the same pedigree as this sample.

TANK/ VESSEL ID.	BLDG # or LOCATION	CAPACITY (GAL)	PRESENT STATUS	COMPOSITION	REFERENCE DOCUMENTATION	EXIST. VOLUME (GAL)	DATE EMPTIED
TK-36-2	Cell 36	4147	Empty, Dry, Flushed	N/A	N/A	0	3/22/85
TK-36-3	Cell 36	4098	Empty, Dry, Flushed	N/A	N/A	0	4/7/85
TK-37-1	Cell 37	4049	Empty, Dry, Flushed	N/A	N/A	0	12/28/83
TK-37-2	Cell 37	4127	Empty, Dry, Flushed	N/A	N/A	0	4/22/83
TK-37-3	Cell 37	4098	Empty, Dry, Flushed	N/A	N/A	0	4/22/83
TK-38-1	Cell 38	498	Empty, dry, Flushed	N/A	N/A	0	12/28/83
TK-38-2	Cell 38	502	Empty, dry, flushed	N/A	N/A	0	12/28/83
TK-38-3	Cell 38	535	Empty, dry, Flushed	N/A	N/A	0	12/28/83
TK-38-4	Cell 38	498	Empty, dry, flushed	N/A	N/A	0	12/28/83
T-38-5	Cell 38	192	Solids, IX resin bed	290 kg Zeolite resin bed	See Zeolite info (Ref.9)	N/A	12/28/83
E-38-6	Cell 38	102	Empty, dry, Flushed	N/A	N/A	0	12/28/83
E-38-7	Cell 38	258	Empty, dry, flushed	N/A	N/A	0	12/28/83
TK-38-8	Cell 38	31	Empty, dry, flushed	N/A	N/A	0	12/28/83
TK-39-1	Cell 39	3466	Liquid, < min. heel	Ag 7.6 g, Na 92 kg, P 620 g, Si 44 g, Zn 8.8 g, Zr 4.8 g	Sample # 98B000169*	210	5/29/98
TK-39-2	Cell 39	1769	Empty, dry, flushed	N/A	N/A	0	4/1/93
TK-39-3	Cell 39	408	Empty, dry	N/A	N/A	0	2/6/87
TK-39-4	Cell 39	1421	Empty, dry	N/A	N/A	0	2/6/87

*These tanks were not actually sampled, but are expected to have the same pedigree as this sample.

TANK/ VESSEL ID.	BLDG # or LOCATION	CAPACITY (GAL)	PRESENT STATUS	COMPOSITION	REFERENCE DOCUMENTATION	EXIST. VOLUME (GAL)	DATE EMPTIED
TK-39-5	Cell 39	2042	Empty, flushed	N/A	N/A	0	6/27/93
TK-100	On Deck 34	4184	Sludge and water	B 10 g, Ca 11 g, Fe 1.6 g, Mg 3.1 g, P 240 g, Si 18 g, Na 530 g, S 6.1 g, Zn 1.3 g, 1,1,1-trichloroethane 53 g, 1,1-dichloroethan 9.4 g	S98B000067	450	8/98
Crane Truck	On Deck 12 and 13	N/A	Mostly stripped	Oil, Grease in joints, hydraulic fluids for crane and brakes.	Process knowledge	N/A	N/A
Cell Drain Header			Solids	Mostly sand and dirt, other trace elements	Process knowledge	150	N/A
Cell 27 floor			½ inch of solids	70% NPH, 20% Di-2-ethylhexylphosphine acid, 10% Tributylphosphate	Process knowledge	N/A	6/24/96
Cell 28 floor			¼ inch of solids	Same composition as T-28-1	Process knowledge	N/A	6/24/96

*These tanks were not actually sampled, but are expected to have the same pedigree as this sample.

TABLE 2: Radioactive Contamination in the Cells From the GammaCam™ Survey

CELL	LOCATION in CELL	DOSAGE at 30 cm (Rad/hr)	CURIES of Sr	CURIES of Cs	TYPE	COMPOSITION
221 B						
4	East side in container	74	12	18	Internal	Sr 220 mg, Cs 340 mg, Mg 62 mg, Ca 100 mg, Ba 350 mg, Al 69 mg, Fe 140 mg, Na 59 mg
4	Northeast corner in box	39	6.3	9.5	Internal	Sr 120 mg, Cs 180 mg, Mg 33 mg, Ca 54 mg, Ba 190 mg, Al 37 mg, Fe 76 mg, Na 31 mg
5	Southwest corner on floor	6800	1100	1600	Spill	Al 330 mg, Ba 1.5 g, Ca 44 g, Cd 27 mg, Cr 320 mg, Fe 2.1 g, Mg 24 g, Mn 47 g, Na 17 g, Ni 220 mg, Pb 150 mg, La 340 mg, Si 69 mg, Sr 22 g, Zr 560 mg, Nd 110 mg
5	North end of E-5-3	270	27	40	Internal	Al 13 mg, Ba 61 mg, Ca 1.8 g, Cd 1 mg, Cr 13 mg, Fe 82 mg, Mg 0.95 g, Mn 1.9 g, Na 0.68 g, Ni 9 mg, Pb 6 mg, La 10 mg, Nd 4 mg, Si 3 mg, Sr 0.86 g, Zr 22 mg, Cs 0.77 g
5	Southeast outlet pipe of E-5-2	850	140	200	Internal	Al 41 mg, Ba 190 mg, Ca 5.5 g, Cd 3 mg, Cr 40 mg, Fe 260 mg, Mg 3.0 g, Mn 5.9 g, Na 2.1 g, Ni 27 mg, Pb 19 mg, La 43 mg, Si 8 mg, Sr 2.7 g, Zr 69 mg, Nd 14 mg
7	Southwest corner on wall	8.8	1.4	2.1	Spill	Sr 30 mg, Ba 1 mg, Na 3 mg, Cs 40 mg
7	In TK-7-2	3.9	0.6	0.9	Internal	Sr 10 mg, Na 1 mg, Cs 20 mg
7	Northwest corner on floor	8.5	1.4	2.1	Spill	Sr 30 mg, Ba 1 mg, Na 3 mg, Cs 40 mg
7	In TK-7-1	5.8	0.9	1.4	Internal	Sr 20 mg, Na 2 mg, Cs 30 mg
9	Southeast corner on wall	230	37	55	Spill	Na 13 g, Al 66 g, Fe 18 g, Be 42 mg, Cr 2.3 g, Ni 1.4 g, C 2.3 g, Ca 0.14 g, Cu 0.32 g, Mg 0.11 g, Mn 0.28 g, Si 0.89 g, Cs 1.0 g,Sr 0.72 g

CELL	LOCATION in CELL	DOSAGE at 30 cm (Rad/hr)	CURIES of Sr	CURIES of Cs	TYPE	COMPOSITION
9	On TK-9-2	67	11	16	Spill	Na 3.9 g, Al 20 g, Fe 5.4 g, Be 12 mg, Cr 0.69 g, Ni 0.42 g, C 0.67 g, Ca 40 mg, Cu 94 mg, Mg 33 mg, Mn 82 mg, Si 0.26 g, Cs 0.31 g, Sr 0.21 g
9	Northwest corner on wall	49	8	12	Spill	Na 2.9 g, Al 14 g, Fe 4.0 g, Be 9 mg, Cr 0.51 g, Ni 0.31 g, C 0.50 g, Ca 30 mg, Cu 70 mg, Mg 25 mg, Mn 61 mg, Si 0.19 g, Cs 0.23 g, Sr 0.15 g
9	Southwest corner on wall	513	83	124	Spill	Na 30 g, Al 150 g, Fe 41 g, Be 95 mg, Cr 5.3 g, Ni 3.2 g, C 5.1 g, Ca 0.31 g, Cu 0.72 g, Mg 0.26 g, Mn 0.62 g, Si 2.0 g, Cs 2.4 g, Sr 1.6 g
11	Southwest corner on floor	470	76	110	Spill	Na 160 g, Al 680 g, Fe 91 g, Be 1.3 g, Cr 12 g, Ni 6.6 g, C 52 g, Ca 950 mg, Cu 1.4 g, Mg 1.3 g, Mn 1.4 g, Si 8.8 g, Cs 2.2 g
11	Northwest corner on floor	660	110	160	Spill	Na 230 g, Al 970 g, Fe 130 g, Be 1.8 g, Cr 18 g, Ni 9.5 g, C 75 g, Ca 1.4 g, Cu 2.0 g, Mg 1.8 g, Mn 2.0 g, Si 12 g, Cs 3.1 g
14	Northwest corner on wall	75	12	18	Spill	Sr 240 mg, Ca 7.2 g, Mg 4.4 g, Mn 17 g, Fe 120 mg, Al 87 mg, Nd 76 mg, Cs 350 mg, La 230 mg
14	Southwest corner on wall	76	12	18	Spill	Sr 0.24 g, Ca 7.2 g, Mg 4.4 g, Mn 17 g, Fe 0.12 g, Al 87 mg, La 0.17 g, Nd 59 mg, Cs 0.35 g
14	West side on wall	22	4	5	Spill	Sr 70 mg, Ca 2.1 g, Mg 1.3 g, Mn 4.9 g, Fe 34 mg, Al 25 mg, La 50 mg, Nd 17 mg, Cs 0.1 g
14	Northeast corner on wall	17	3	4	Spill	Sr 50 mg, Ca 1.5 g, Mg 0.92 g, Mn 3.5 g, Fe 24 mg, Al 18 mg, La 36 mg, Nd 12 mg, Cs 80 mg
14	On TK-14-2	39	6	10	Spill	Sr 0.13 g, Ca 3.9 g, Mg 2.4 g, Mn 9.1 g, Fe 63 mg, Al 47 mg, La 93 mg, Nd 32 mg, Cs 0.18 g
15	South end of cell	3.9	0.6	0.9	Spill	Cs 20 mg, Sr 10 mg
16	Northwest end of cell	1000	160	240	Spill	Cs 4.6 g, Al 170 mg, Fe 410 mg, K 28 g, Mg 250 mg, Mn 100 mg, Na

CELL	LOCATION in CELL	DOSAGE at 30 cm (Rad/hr)	CURIES of Sr	CURIES of Cs	TYPE	COMPOSITION
						25 g, Pb 360 mg, Rb 70 mg, Sr 3.2 g
16	Southwest end of cell	1400	230	340	Spill	Cs 6.5 g, Al 0.24 g, Fe 0.58 g, K 39 g, Mg 0.35 g, Mn 0.14 g, Na 35 g, Pb 0.51 g, Rb 96 mg, Sr 4.5 g
16	West side of cell	260	43	64	Spill	Cs 1.2 g, Al 45 mg, Fe 0.11 g, K 7.4 g, Mg 65 mg, Mn 27 mg, Na 6.6 g, Pb 95 mg, Rb 18 mg, Sr 0.84 g
16	Northeast middle of the cell	360	59	87	Spill	Cs 1.7 g, Al 62 mg, Fe 0.15 g, K 10 g, Mg 89 mg, Mn 37 mg, Na 9.1 g, Pb 0.13 g, Rb 25 mg, Sr 1.2 g
16	Northeast end of cell	600	97	145	Spill	Cs 2.8 g, Al 100 mg, Fe 240 mg, K 17 g, Mg 150 mg, Mn 61 mg, Na 15 g, Pb 220 mg, Rb 40 mg, Sr 1.9 g
17	Southwest corner on wall	800	130	200	Spill	Cs 3.7 g, Al 140 mg, Fe 330 mg, K 22 g, Mg 200 mg, Mn 82 mg, Na 20 g, Pb 290 mg, Rb 55 mg, Sr 2.6 g
17	Southwest corner on floor	80	13	19	Spill	Cs 8.3 g, Al 310 mg, Fe 740 mg, K 50 g, Mg 440 mg, Mn 180 mg, Na 45 g, Pb 650 mg, Rb 120 mg, Sr 5.7 g
17	In TK-17-1	2600	420	630	Internal	Sr 8.2 g, Ca 250 g, Mg 150 g, Mn 580 g, Fe 4.0 g, Al 3.0 g, La 7.9 g, Cs 12 g, Nd 2.6 g
17	Northwest corner on floor	610	99	150	Spill	Sr 2.0 g, Ca 59 g, Mg 36 g, Mn 140 g, Fe 940 mg, Al 710 mg, La 1.9 g, Cs 2.8 g, Nd 620 mg
17	On TK-17-2	830	130	200	Spill	Cs 3.8 g, Al 0.14 g, Fe 0.34 g, K 23 g, Mg 0.20 g, Mn 85 mg, Na 21 g, Pb 0.3 g, Rb 57 mg, Sr 2.6 g
17	Southeast corner on wall	320	52	78	Spill	Cs 1.5 g, Al 55 mg, Fe 0.13 g, K 8.9 g, Mg 78 mg, Mn 33 mg, Na 8.0 g, Pb 0.12 g, Rb 22 mg, Sr 1.0 g
18	Southwest corner on floor	80	13	20	Spill	Sr 250 mg, Ca 7.5 g, Mg 4.6 g, Mn 18 g, Fe 120 mg, Al 91 mg, La 240 mg, Cs 370 mg, Nd 80 mg
18	West wall	67	11	16	Spill	Sr 210 mg, Ca 6.3 g, Mg 3.8 g, Mn 15 g, Fe 100 mg, Al 76 mg, La

CELL	LOCATION in CELL	DOSAGE at 30 cm (Rad/hr)	CURIES of Sr	CURIES of Cs	TYPE	COMPOSITION
						200 mg, Cs 310 mg, Nd 67 mg
19	In TK-19-1	1400	230	340	Internal	Cs 6.5 g, Al 240 mg, Fe 570 mg, K 39 g, Mg 340 mg, Mn 140 mg, Na 35 g, Pb 100 mg, Rb 100 mg, Sr 4.4 g
20	South end of wall	720	120	180	Spill	Cs 3.4 g, Al 0.12 g, Fe 0.3 g, K 20 g, Mg 0.18 g, Mn 74 mg, Na 18 g, Pb 0.26 g, Rb 49 mg, Sr 2.3 g
20	Southwest corner on floor	6400	1000	1600	Spill	Cs 30 g, Al 1.1 g, Fe 2.6 g, K 180 g, Mg 1.6 g, Mn 0.65 g, Na 160 g, Pb 2.3 g, Rb 0.44 g, Sr 20 g
20	Northeast outlet pipe of E-20-2	2500	400	600	Internal	Cs 11 g, Al 0.42 g, Fe 1.0 g, K 68 g, Mg 0.6 g, Mn 0.25 g, Na 61 g, Pb 0.88 g, Rb 0.17 g, Sr 7.8 g
20	Northeast corner on pipes	2300	380	560	Spill	Cs 11 g, Al 0.4 g, Fe 0.95 g, K 65 g, Mg 0.57 g, Mn 0.24 g, Na 58 g, Pb 0.84 g, Rb 0.16 g, Sr 7.4 g
20	Southeast corner on floor	2000	323	485	Spill	Cs 9.2 g, Al 340 mg, Fe 820 mg, K 56 g, Mg 490 mg, Mn 200 mg, Na 50 g, Pb 720 mg, Rb 140 mg, Sr 6.3 g
20	West wall	2500	400	610	Spill	Cs 12 g, Al 420 mg, Fe 1.0 g, K 70 g, Mg 610 mg, Mn 250 mg, Na 62 g, Pb 900 mg, Rb 170 mg, Sr 7.9 g
21	Southeast corner on floor	25	4	6	Spill	Cs 0.11 g, Al 4 mg, Fe 10 mg, K 0.66 g, Mg 6 mg, Mn 2 mg, Na 0.59 g, Pb 9 mg, Rb 2 mg, Sr 80 mg
22	Outlet pipe of F-22-8-1	150	24	36	Internal	Sr 470 mg, Cs 710 mg, Mg 130 mg, Ca 220 mg, Ba 740 mg, Al 140 mg, Fe 300 mg, Na 120 mg
22	Outlet pipe of F-22-5	47	8	11	Internal	Sr 220 mg, Cs 330 mg, Mg 61 mg, Ca 100 mg, Ba 340 mg, Al 68 mg, Fe 140 mg, Na 57 mg
23	South wall in pipes	6.8	1	2	Internal	Sr 20 mg, Na 570 g, Ca 370 mg, Al 34 mg, Cr 47 mg, Zr 83 mg, Pb 85 mg, Ba 12 mg, Cd 10 mg, Fe 5.0 mg, Mg 2.0 mg, Mn 5.0 mg, Ni 5.0 mg, Cs 30 mg, La 13 mg, Nd 4.0 mg

CELL	LOCATION in CELL	DOSAGE at 30 cm (Rad/hr)	CURIES of Sr	CURIES of Cs	TYPE	COMPOSITION
23	Northwest corner on floor	5.4	0.9	1.3	Spill	Sr 20 mg, Na 570 g, Ca 370 mg, Al 34 mg, Cr 47 mg, Zr 83 mg, Pb 85 mg, Ba 12 mg, Cd 10 mg, Fe 5.0 m, Mg 2.0 mg, Mn 5.0 mg, Ni 5.0 mg, Cs 20 mg, La 13 mg, Nd 4.0 mg
23	Northeast corner on wall	0.70	0.1	0.2	Spill	Sr 2 mg, Na 57 g, Ca 37 mg, Al 3 mg, Cr 5 mg, Zr 8 mg, Pb 9 mg, Ba 1 mg, Cd 1 mg, Fe 1 mg, Mn 1 mg, Ni 1 mg, La 1 mg, Cs 4 mg
24	Southwest corner on box	35	6	8	Spill	Na 2.0 g, Al 10 g, Fe 2.8 g, Be 6 mg, Cr 0.36 g, Ni 0.22 g, C 0.34 g, Ca 21 mg, Cu 49 mg, Mg 17 mg, Mn 42 mg, Si 0.14 g, Cs 0.16 g, Sr 0.11 g
24	East side on floor of box	100	16	24	Spill	Na 5.8 g, Al 29 g, Fe 8.0 g, Be 18 mg, Cr 1.0 g, Ni 0.62 g, C 0.99 g, Ca 60 mg, Cu 0.14 g, Mg 50 mg, Mn 0.12 g, Si 0.39 g, Cs 0.46 g, Sr 0.32 g
25	East side on floor	9	1	2	Spill	Cs 40 mg, Na 280 g, Sr 30 mg
25	West side on floor	23	4	6	Spill	Co 0.5 mg, Cs 110 mg, Na 760 g, Sr 2.9 g
26	East side of cell	2	0.3	0.5	Spill	Al 750 mg, Ca 11 g, Fe 110 mg, Mg 8.0 mg, Mn 2.3 g, Sr 10 mg, Cs 10 mg
26	Middle of cell	3	0.5	0.7	Spill	Al 750 mg, Ca 11 g, Fe 110 mg, Mg 8.0 mg, Mn 2.3 g, Sr 10 mg, Cs 10 mg
27	In TK-27-3	2.2	0.4	0.5	Internal	Al 71 mg,Ca 1.1 g,Fe 23 mg,Mg 1 mg,Mn 0.23 g,Sr 10 mg, Cs 10 mg
28	Northwest corner on wall	0.82	0.1	0.2	Spill	Al 3 mg, Ca 53 mg, Fe 1 mg, Mg 5 mg, Mn 17 mg, Na 3 mg, Sr 2mg, Cs 4 mg,
28	Outlet pipe of TK-28-3	5.3	0.9	1.3	Internal	Al 31 mg, Ba 1.0 mg, Ca 530 mg, Fe 8.0 mg, Mg 50 mg, Mn 170 mg, Na 26 mg, Sr 20 mg, Cs 20 mg
28	Southwest corner on floor	4.4	0.7	1.1	Spill	Al 15 mg, Ba 0.5 mg, Ca 260 mg, Fe 4.0 mg, Mg 25 mg, Mn 85 mg, Na 13 mg, Sr 10 mg, Cs 20 mg

CELL	LOCATION in CELL	DOSAGE at 30 cm (Rad/hr)	CURIES of Sr	CURIES of Cs	TYPE	COMPOSITION
29	South end on floor	240	38	58	Spill	Al 92 mg, Ba 200 mg, Ca 740 mg, Cd 21 mg, Cr 1.0 g, Fe 1.1 g, Mg 66 mg, Na 2.2 g, Sr 750 mg, Cs 1.1 g, La 2.0 g, Nd 680 mg
29	Pipe leaving east wall	110	17	26	Internal	Al 41 mg, Ba 90 mg, Ca 340 mg, Cd 9.0 mg, Cr 470 mg, Fe 500 mg, Mg 30 mg, Na 1.0 g, Sr 340 mg, Cs 490 mg, La 920 mg, Nd 310 mg
29	Pipe leaving west wall	310	51	76	Internal	Al 0.12 g, Ba 0.26 g, Ca 0.99 g, Cd 28 mg, Cr 1.4 g, Fe 1.4 g, Mg 88 mg, Na 3.0 g, La 2.0 g, Nd 0.70 g, Sr 1.0 g, Cs 1.5 g
30	South end on floor	44	7	11	Spill	Ca 16 mg, Cd 7.0 mg, Cr 300 mg, Cu 120 mg, Fe 27 g, Mg 1.0 mg, Mn 7.0 g, Na 200 g, Ni 1.1 g, Pb 1.3 g, Sr 140 mg, Cs 200 mg, La 1.1 g, Nd 370 mg
30	Northwest corner on floor	35	6	8	Spill	Ca 13 mg, Cd 5.0 mg, Cr 240 mg, Cu 90 mg, Fe 21 g, Mg 1.0 mg, Mn 5.5 g, Na 150 g, Ni 880 mg, Pb 1.0 g, Sr 110 mg, Cs 160 mg, La 880 mg, Nd 290 mg
31	Outlet pipe of TK-31-3	1.7	0.3	0.4	Internal	Al 3 mg, Fe 3 mg, Mn 1 mg, Na 8 mg, Sr 10 mg, Cs 10 mg
31	Outlet pipe from west wall	1.5	0.2	0.4	Internal	Al 3 mg, Fe 3 mg, Mn 1 mg, Na 8 mg, Sr 5 mg, Cs 10 mg
32	Middle of cell	0.83	0.1	0.2	Spill	Al 1 mg, Fe 1 mg, Mn 1 mg, Na 3 mg, Sr 2 mg, Cs 4 mg
32	Middle of cell	1.2	0.2	0.3	Spill	Al 3 mg, Fe 3 mg, Mn 1 mg, Na 8 mg, Sr 5 mg, Cs 10 mg
32	Middle of cell	1.5	0.2	0.4	Spill	Al 1 mg, Fe 2 mg, Mn 1 mg, Na 4 mg, Sr 3 mg, Cs 5 mg
33	Southwest corner on wall	94	15	23	Spill	Na 160 g, Sr 300 mg, Cs 430 mg
33	South end of box	144	23	35	Spill	Sr 460 mg, Cs 670 mg, Mg 120 mg, Ca 200 mg, Ba 690 mg, Al 140 mg, Fe 280 mg, Na 120 mg
34	Between TK-34-2 and	540	88	132	Spill	Na 3.3 g, Cs 2.5 g, K 1.7 g, Fe 430 mg, Al 170 mg, Rb 98 mg

CELL	LOCATION in CELL	DOSAGE at 30 cm (Rad/hr)	CURIES of Sr	CURIES of Cs	TYPE	COMPOSITION
	TK-34-1 on floor					
35	Middle of cell on floor	760	120	180	Spill	Sr 2.4 g, Ba 61 mg, Ca 14 mg, La 2 mg, Nd 1 mg, Zr 1 mg, Cs 3.5 g
35	South end of cell	350	57	85	Spill	Sr 1.1 g, Ba 28 mg, Ca 7 mg, La 1 mg, Cs 1.6 g
36	West side on floor	14	2.3	3.4	Spill	Sr 40 mg, Ba 0.9 mg, Ca 0.2 mg, Cs 60 mg
36	In TK-36-1	30	4.9	7.3	Internal	Sr 0.10 g, Ba 3 mg, Ca 1 mg, Cs 0.14 g
37	In TK-37-2	18300	3000	4400	Internal	Fe 5.6 kg, Al 270 g, Na 3.3 kg, Cr 330 g, Ni 220 g, Ca 17 g, Sr 58 g, Cs 85 g, Zr 130 g
37	Southeast corner on wall	1500	250	370	Spill	Fe 470 g, Al 23 g, Na 280 g, Cr 28 g, Ni 18 g, Ca 1.5 g, Sr 4.8 g, Cs 7.1 g, Zr 11 g
38	Outlet pipes of west wall	2100	330	500	Spill	Cs 6.9 g, Al 0.25 g, Fe 0.60 g, K 41 g, Mg 0.36 g, Mn 0.14 g, Na 37 g, Pb 0.53 g, Rb 0.10 g, Sr 6.5 g
38	Northeast corner on floor	1000	160	240	Spill	Cs 4.6 g, Al 170 mg, Fe 400 mg, K 28 g, Mg 240 mg, Mn 94 mg, Na 24 g, Pb 350 mg, Rb 67 mg, Sr 3.2 g
39	South end on floor	11300	1800	2700	Spill	Cs 52 g, Al 42 mg, Ba 1.1 g, Fe 0.5 mg, K 2.2 g, Mg 5.0 mg, Mn 2 mg, Na 11 g, Pb 6.0 mg, Rb 7.0 mg, Sr 36 g
TOTALS			12000	18000		

TABLE 3: Radiation on the Deck

CELL	LOCATION in DECK	DOSAGE at 30 cm (Rad/hr)	CURIES of Sr	CURIES of Cs
221 B				
7	West walkway	0.1	0.02	0.03
10	Next to pipe	3.7	0.6	0.9
13	3rd coverblock from north	0.3	0.05	0.07
14	West walkway	0.3	0.05	0.07
14	East walkway	0.5	0.08	0.1
15	3rd coverblock from north	0.2	0.04	0.06
17	4th coverblock from north	0.7	0.1	0.2
18	West walkway	0.3	0.04	0.06
19	West walkway	0.3	0.06	0.04
19	1st coverblock from north	0.2	0.03	0.05
20	4th coverblock from north	0.1	0.02	0.03
23	4th coverblock from north	0.1	0.02	0.03
32	Walkway	2.3	0.4	0.6
32	2nd coverblock from north	1.5	0.2	0.4
34	Walkway	52	8.4	12.6
34	On extra coverblock	34	5.5	8.2

CELL	LOCATION in DECK	DOSAGE at 30 cm (Rad/hr)	CURIES of Sr	CURIES of Cs
35	Walkway	35	5.6	8.4
36	3rd coverblock from north	1.6	0.2	0.4
37	3rd coverblock from north	4.0	0.6	1.0
37	South end	1.3	0.2	0.3
38	Northwest walkway	9.0	1.4	2.2
38	Walkway	2.2	0.4	0.5
39	East side	9.1	1.5	2.2
39	South end	1.5	0.2	0.4
39	1st coverblock from north	4.5	0.7	1.1
39	1st coverblock from north	2.3	0.4	0.6

TABLE 4: B Plant Canyon Lead Inventory

DESCRIPTION (Type and Dimension) (brick, blanket, etc.)	SPECIFIC LOCATION	QUANTITY		CATEGORY AND STATUS (hard, estimate, permanent installation, excess, notes, etc.)
		No. of Pieces	Total Weight	
221 B				
Lead Blankets 2' x 2 1/2'	221-B Canyon, various locations	262 @ 63 lbs.	16,506 lbs.	Future use as shielding, Necessary Hard Lead, located in a contamination zone.
Gilmont Shield	221-B Canyon	1	2,589 lbs.	In use as shielding, Necessary Hard Lead, located in contamination zone.
Lead counter balance weights on jumpers	221-B Canyon	186 @ 15 lbs.	3720 lbs.*	In use as counter balance weight, Necessary Hard Lead, located in contamination zone.
Lead sheets as part of a wall. Cut in various sizes. Mostly 1/4" sheets. Lead is bolted to wall.	221-B, Pipe Gallery, south and north wall, east end. From cell 8 to cell 11.	34 sheets, north wall, 41 sheets, south wall	1148 lbs.	In use as shielding, Necessary Estimated lead, possibly contaminated (lead has been painted)
Lead House	221-B Canyon	1	20,000 lbs.	In use as shielding, Necessary Estimated lead, located in a contamination zone.
Counter balance weights	221-B Canyon		5,200 lbs.*	In use as counter weights, Necessary Estimated lead, located in a contamination zone.
N74 sample pits and pit cover, enclosed in stainless steel	221-B Canyon	74 @ 600 lbs.	44,400 lbs.	In use as shielding, Necessary Hard lead, located in a contamination zone.
Shielding for pipe chase through floor. ¼" cover made of lead sheets.	221-B, Pipe Gallery between cells 8 to 16, north wall	7 @ 23.7 lbs 1 @ 22.4 lbs 1 @ 17 lbs	205.3 lbs.	In use as shielding, Necessary estimated lead, possible contamination, painted.
Lead brick wall	Hot pipe trench for cell 12		6000 lbs.	
Lead paint	Throughout		Unknown	

DESCRIPTION (Type and Dimension) (brick, blanket, etc.)	SPECIFIC LOCATION	QUANTITY		CATEGORY AND STATUS (hard, estimate, permanent installation, excess, notes, etc.)
		No. of Pieces	Total Weight	
WESF Waste Drum Cask	On hot pipe trench of cell 34		17500 lbs	Hot Pipe Trench at Cell 34
Total Lead			126000 lbs	

DISTRIBUTION SHEET

To Distribution	From Production Planning & Control	Page 1 of 1 Date: 12/06/96
Project Title/Work Order WHC-SD-WM-DP-213, Rev. 0, "B-Plant, TK-21-1, Analytical Results for the Final Report"		EDT NO.: EDT-620376 ECN NO.: N/A

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B-Plant/Waste Management/PPC/AS	Larry L. Fritts	N/A
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		Design Agent			
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B Plant, TK-21-1, Analytical Results for the Final Report

Larry L. Fritts
Rust Federal Services of Hanford, Inc., Richland, WA 99352
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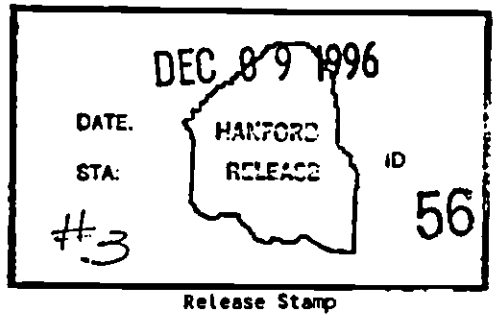

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ANALYTICAL SERVICES

B PLANT, TK-21-1, ANALYTICAL RESULTS FOR THE FINAL REPORT

Project Coordinator: Larry L. Fritts

Prepared for the U.S. Department of Energy
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by

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222-S ANALYTICAL SERVICES

B PLANT, Tk-21-1, ANALYTICAL RESULTS FOR THE FINAL REPORT

This document is the final laboratory report for B Plant Tk-21-1. A Resource Conservation and Recovery Act (RCRA) sample was taken from Tk-21-1 September 26, 1996. This sample was received at 222-S Analytical Laboratory on September 27, 1996. Analyses were performed in accordance with the accompanying Request for Sample Analysis (RSA) and Letter of Instruction *B PLANT RCRA SAMPLES TO 222S LABORATORY, LETTER OF INSTRUCTION (LOI) 2B-96-LOI-012-01* (LOI) (Westra, 1996). LOI was issued subsequent to RSA and replaces Letter of Instruction 2C-96-LOI-004-01 referenced in RSA.

Sample Appearance and Handling

This sample was assigned Laboratory Information Management System (LIMS) identification number S96B000454. The sample was clear and colorless with no apparent solids. No organic layer was noted.

An aliquot of this sample was taken and prepared for Selenium (Se) analysis by performing an acid digest of the liquid. This digest aliquot was assigned LIMS identification number S96B000534.

Analytical Results Summary

The sample data summary section compiles the analytical results that comply with RSA in tabular summary form. The raw data were presented in the sections following the sample data summary section.

Inorganic Analyses

pH

This sample was run in duplicate. No laboratory defined quality control (QC) parameters were exceeded for this analyte (Meznarich, et. al., 1995).

IC - Ion Chromatography

Only required analyte results (F^-, NO_3^{2-}, NO_2^{2-}, SO_4^{2-}, and PO_4^{3-}) as per RSA are considered in this report. Information regarding other IC analytes can be determined from the raw data.

This sample was run in duplicate. No laboratory defined QC parameters were exceeded for these analytes

Laboratory reagent blank shows nitrate at 1.51E-01 μg/mL. This concentration has no significant impact on the sample result of 2.84E+03 μg/mL.

ICP - Inductively Coupled Plasma Spectroscopy

Only required analyte results (Ba, Cr, Na, and Pb) as per RSA are considered in this report. Information regarding the other ICP analytes can be determined from the raw data.

This sample was run in duplicate with a spike sample and spike duplicate on an aliquot made by adding acid. No laboratory defined quality control (QC) parameters were exceeded for these analytes.

Procedure LA-505-151 was used to perform this analysis. LOI references procedure LA-505-161. These procedures are written for two different brands of ICP instrumentation but are equivalent.

TOC - Total Organic Carbon

This sample was ran in duplicate. A triplicate analysis of this sample was performed on a separate worklist. This analysis was performed by the persulfate method (LA-342-100). LOI references the furnace oxidation method (LA-344-105). Insufficient sample remained for a re-analysis by the furnace oxidation method.

The laboratory reagent blank shows 6.80E-00 μg/mL for the sample and duplicate, and 1.70E-00 μg/mL for the triplicate. These concentrations have no significant impact on the sample results of 9.60E+01 μg/mL, 8.30E+01 μg/mL, and 4.40E+01 μg/mL; respectively. These results are less than five times the detection limit, at this level instrument precision is compromised.

TIC - Total Inorganic Carbon

This result is not required by RSA but is generated with the TOC by persulfate analysis. More information regarding this analyte can be determined from the raw data.

Se - Selenium

This sample was run in duplicate with a spike sample on an acid digested aliquot. The procedure for this analysis does not allow for spike duplicates as required by LOI. With customer concurrence, the sample is being reported without this LOI requirement. No laboratory defined QC parameters were exceeded for these analytes.

Radiochemical Analyses

GEA - Gamma Energy Analysis

Only the required analyte result (^{137}Cs) as per RSA is considered in this report. Information regarding other GEA analytes can be determined from the raw data. No laboratory defined QC parameters were exceeded for this analyte.

^{90}Sr - Strontium-90

This sample was run in duplicate. No laboratory defined QC parameters were exceeded for this analyte.

Laboratory reagent blank shows ^{90}Sr at 7.09E-04 μCi/mL. This concentration has no significant impact on the sample result of 4.88E-01μCi/mL.

Procedures

Table 1 lists the analytical procedures used for performing the sample analyses. Abbreviations for analyses are defined in the table notes.

Table 1. Analytical Procedures

Analysis	Sample Portion	Preparation Procedure +	Analysis Procedure
pH	Liquid	N/A	LA-212-106 Rev. B-0
IC	Liquid	N/A	LA-533-105 Rev. D-1
ICP	Liquid	N/A	LA-505-151 Rev. D-3
TOC	Liquid	N/A	LA-342-100 Rev. E-0
TIC	Liquid	N/A	LA-342-100 Rev. E-0
Se	Liquid	LA-505-164 Rev. A-0	LA-365-131 Rev. D-0
GEA	Liquid	N/A	LA-548-121 Rev. E-0
^{90}Sr	Liquid	N/A	LA-220-101 Rev. D-1

Abbreviations:
N/A = not applicable (these are direct samples)
pH = pH
IC = ion chromatography
ICP = inductively coupled plasma
TOC = total organic carbon
TIC = total inorganic carbon
Se = selenium
GEA = gamma energy analysis
^{90}Sr = strontium-90

References

Meznarich, H. K., et. al., 1995, *Quality Assurance Plan for the 222-S Laboratories*, WHC-SD-CP-QAPP-016, Rev. 0, Westinghouse Hanford Company, Richland, WA 99352.

Westra, A. G., 1996, *B Plant RCRA Samples to 222S laboratory, Letter of Instruction (LOI) 2B-96-LOI-012-01*, 2B-96-LOI-012-01, B&W Hanford Company, Richland, WA 99352.

pH Direct

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result pH	Duplicate Result pH	Average Result pH	Duplicate Precision RPD %	Standard % Recovery	Blank pH	Spike Recovery %	Spike Duplicate RPD	Detection Limit pH	Counting Error %
Tank 21-1	S96B000454	1.86E+00	1.89E+00	1.88E+00	1.6	100.2	n/a	n/a	n/a	1.00E-02	n/a

TOC by Persulfate/Coulometry

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	9.60E+01	8.30E+01	8.95E+01	14.5	90.3	6.80E+00	n/a	n/a	4.00E+01	n/a

TOC by Persulfate/Coulometry(Triplicate Analysis)

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	4.40E+01	n/a	n/a	n/a	86.3	1.70E+00	n/a	n/a	4.00E+01	n/a

Strontium-89/90 High Level

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Duplicate Precision RPD %	Standard % Recovery	Blank uCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	4.88E-01	5.01E-01	4.94E-01	2.6	105.0	7.09E-04	n/a	n/a	1.00E-03	2.04E+00

Barium-ICP-Acid Dil.
Acid Digest

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	<1.00E+00	<1.00E+00	n/a	n/a	97.4	<5.00E-02	98.6	1.3	1.00E+00	n/a

Chromium-ICP-Acid Dil.
Acid Digest

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	7.68E-01	7 49E-01	7 58E-01	2 5	101.2	<1.00E-02	99.1	0.3	2.00E-01	n/a

Sodium-ICP-Acid Dil.
Acid Digest

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	1.42E+01	1.39E+01	1.41E+01	2.1	95.0	<1.00E-01	95.1	0.2	2.00E+00	n/a

Lead-ICP-Acid Dil.
Acid Digest

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	<2.00E+00	<2.00E+00	n/a	n/a	100.6	<1.00E-01	100.0	3.1	2.00E+00	n/a

Fluoride-IC-Dionex 4000/4500

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	<1.21E+00	<1.21E+00	n/a	n/a	92.7	<1.20E-02	n/a	n/a	1.21E+00	n/a

Nitrite-IC - Dionex 4000/4500

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	<1.09E+01	<1.09E+01	n/a	n/a	93.1	<1.08E-01	n/a	n/a	1.09E+01	n/a

Nitrate by IC-Dionex 4000/4500

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	2.84E+03	2.88E+03	2.86E+03	1.4	102.7	1.51E-01	n/a	n/a	1.40E+01	n/a

Phosphate-IC-Dionex 4000/4500

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	<1.21E+01	<1.21E+01	n/a	n/a	97.8	<1.20E-01	n/a	n/a	1.21E+01	n/a

Sulfate by IC-Dionex 4000/4500

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	1.65E+01	1.68E+01	1.67E+01	1.8	103.2	<1.38E-01	n/a	n/a	1.39E+01	n/a

Cesium-137 by GEA

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Duplicate Precision RPD %	Standard % Recovery	Blank uCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit uCi/mL	Counting Error %
Tank 21-1	S96B000454	1.90E+01	1.88E+01	1.89E+01	1.1	99.8	<6.18E-02	n/a	n/a	n/a	2.30E-01

Selenium by HYAA
Acid Digest

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000534	<2.50E-01	<2.50E-01	n/a	n/a	113.0	<2.50E-01	104.8	n/a	2.50E-01	n/a

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

BP-96-COC-002

Page 1 of ____

Data Turnaround: ☐ Priority ☑ Normal

Collector: WHC, Nuclear Process Operations	Company Contact: A. Westra	Telephone No.: 372-0482
Project Designation: N/A	Sampling Location: B Plant Canyon Cell 21	SAF No.: NA
Chest No.: N/A	Field Logbook No.: N/A	Method of Shipment: Pig/Overpack/Sample truck
Shipped To: 222-S Labs	Offsite Property No.: N/A	Bill of Lading/Air Bill No.: N/A
Possible Sample Hazards/Remarks: pH < 2; .06 Ci Cs/Sr	Preservative: N/A	
	Type of Container: Polypropylene	
	No. of Container(s): 1	
Special Handling and/or Storage	Volume: 35mL	

Cell #33

WHC-SD-WM-DP-213, REV. 0

16

SAMPLE ANALYSIS

Sample No.	Matrix*	Date Sampled	Time Sampled
S96B000454	L	9-26-96	9:15 PM

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
John Hanson	9-26-96 11:20	Janie L Hensley	11:20 9-26-96
Janie Hensley	0818 9-27-96	G. Wells	9/27/96 0095

SPECIAL INSTRUCTIONS

Matrix*: S = Soil; SE = Sediment; SO = Solid; SL = Sludge; W = Water; O = Oil; A = Air; DS = Drum Solids; DL = Drum Liquids; T = Tissue; WI = Wipe; L = Liquid; V = Vegetation; X = Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

DISTRIBUTION: Original - Sample Yellow - Sampler

HNF-3208, REV. 0, ATT A, Pg. 15

BC-6000-820 (12/92)

96001334

REQUEST FOR SAMPLE ANALYSIS (RSA)

RSA No.

1. Sample Origin	2. date Sampled	4. Requestor's Name	6. TPCN/Drg. Code
B Plant Tank 21-1	9/26/96	B Plant Shift Manager	KNT6A
	3. Submitted By F.M. SIMMONS	5. Requestor's Phone/MSIN/FAX 372-0023, FAX 372-0103	

7. Customer ID No.	8. Laboratory ID No.	9. Group ID No.	10. Volume of Sample	11. Matrix of Sample	12. Determination(s)	13. Expected Range
N/A	~~222-S~~ 396 8000 454 SW 9/27/96		35 ml total	LA	Chromium	2.5 mg/L
				LA	Lead	2.5 mg/L
				LA	Barium	<50.0 mg/L
				LA	Selenium	0.5 mg/L
				LA	Nitrate +	2.8E2 µg/ml
				LA	Nitrite +	2,600 µg/ml
				LA	Fluoride +	3.0 µg/ml
				LA	Phosphate +	60.0 µg/ml
				LA	Sulphate +	60.0 µg/ml
				LA	Na +	3.2E3 µg/ml
				LA	Cesium 137	6.0 µCi/ml
				LA	Strontium 90 +	2.0 µCi/ml
				LA	TOC +	
				LA	pH +	N/A
					@ AP/AR +	

14. QC Required
- [X] Per 222-S Laboratory Quality Assurance Plan (WHC-SD-CP-QAPP-016)
- Other (list reference document or attach) Per LOI 2C-96-LOI-004-01 Listed waste requirements only.

15. Chemical Constituents
- [X] Unknown

16. Special Storage Requirements
- [X] No
- [ ] Yes

17. Do samples contain listed waste?
- [ ] No
- [X] Yes (See LDI referenced in block 14)

18. Special Instructions (Reporting format, holding times, etc.)
This sample is for the Department of Ecology. pH needs to be done ASAP

19. Requested Turnaround Time
- [X] 2 Weeks
- [ ] 4 Weeks
- Other

20. Sample Received By:
[signature] 9/27/96 1015
Date Time

21. Chain of Custody
- [ ] No
- [X] Yes
Number: BP-96-COC-002

ATTACHMENT 2 - B PLANT RCRA SAMPLE IDENTIFICATION INFORMATION
(Page 1 of 1)

Name: Jim Pinkac	Date: 9/26/96	Time: 9:15 PM
Hanford Environmental Information System sample number: S96B000454		
Sample was collected; Date: 9/26/96		Time: 9:15 PM
Vessel from which sample was obtained: TK-21-1		
Request for special Analysis form shipped with sample [✓] Attached		
Comments: pH needs to be done ASAP.		

LABCORE Data Entry Template for Worklist# 13377

Analyst: JHW Instrument: NONE _____ Book # _____

Method: LA-519-151 Rev/Mod _____ HNF-3208, REV. 0, ATT A, Pg. 18

Worklist Comment: B PLANT TANK 21-1, 24-1 APPEARANCE tro

GROUP	PROJECT	S	TYPE	SAMPLE#	R	A	-------TEST------	MATRIX	ACTUAL	FOUND	DL	UNIT
96001333	TK 24-1	1	SAMPLE	S96B000453	0		@APPEAR3 COLOR-01	LIQUID	N/A	See below		
96001333	TK 24-1	1	SAMPLE	S96B000453	0		@APPEAR3 DOSERATE	LIQUID	N/A	15,000		mrad/hour
96001333	TK 24-1	1	SAMPLE	S96B000453	0		@APPEAR3 ORGVOL02	LIQUID	N/A	500 mL 10/5/96		mL
96001333	TK 24-1	1	SAMPLE	S96B000453	0		@APPEAR3 SAMPAMT2	LIQUID	N/A	50		mL
96001333	TK 24-1	1	SAMPLE	S96B000453	0		@APPEAR3 VXSLD-02	LIQUID	N/A	1		%
96001334	MISC B-PLANT	2	SAMPLE	S96B000454	0		@APPEAR3 COLOR-01	LIQUID	N/A	None		
96001334	MISC B-PLANT	2	SAMPLE	S96B000454	0		@APPEAR3 DOSERATE	LIQUID	N/A	250		mrad/hour
96001334	MISC B-PLANT	2	SAMPLE	S96B000454	0		@APPEAR3 ORGVOL02	LIQUID	N/A	500 mL 10/5/96		mL
96001334	MISC B-PLANT	2	SAMPLE	S96B000454	0		@APPEAR3 SAMPAMT2	LIQUID	N/A	50		mL
96001334	MISC B-PLANT	2	SAMPLE	S96B000454	0		@APPEAR3 VXSLD-02	LIQUID	N/A	< 2		%

Final page for worklist # 13377

Analyst Signature Date: 10-4-96

Analyst Signature Date: Susan Bee 10/04/96

S96B000453 Some fine solids on bottom, Clear, color a very light yell

S96B000454 No Solids, Clear, Colorless

Data Entry Comments:

Reviewed by RK Fuller 10/8/96

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

RE Data Entry Template for Worklist# 14962

Analyst: RKF **Instrument:** ACD01 **Book #** 48N11-I

Method: LA-505-164 Rev/Mod A-0

* Used 0.500 mls (500 µl) of 1.0 ppm As/Se to a final volume of 25 mls; For both the Std and SPIKE

Worklist Comment: B PLANT ACID DIGEST TK 24-1, 21-1 lad

GROUP	PROJECT	S TYPE	SAMPLE#	R	A	TEST	MATRIX	ACTUAL	FOUND	DL	UNIT	
Final volume was 25mls for all samples		1 BLNK-PREP				ACIDIG04	LIQUID	1	0.025	N/A	DF	
		2 STD-PREP				ACIDIG04	LIQUID	50	50	N/A	DF	
96001334	TANK 21-1	3 SAMPLE	S968000534	0	C	ACIDIG04	LIQUID	N/A	100		DF	
		0.250mls → 25mls										
96001334	TANK 21-1	4 SAMPLE	S968000534	0	C	DOSE-02	LIQUID	N/A	10		mrad/hour	
96001334	TANK 21-1	5 DUP	S968000534	0	C	ACIDIG04	LIQUID	100	100	N/A	DF	
		0.250mls → 25mls										
96001334	TANK 21-1	6 DUP	S968000534	0	C	DOSE-02	LIQUID	10	10	N/A	mrad/hour	
96001334	TANK 21-1	7 SPK	S968000534	0	C	ACIDIG04	LIQUID	NA	100	N/A	DF	* see note above
		0.250mls → 25mls										
96001334	TANK 21-1	8 SPK	S968000534	0	C	DOSE-02	LIQUID	N/A 10 RKF 11/19/96	10	N/A	mrad/hour	* see note above
96001333	TANK 24-1	9 SAMPLE	S968000535	0	C	ACIDIG04	LIQUID	N/A	50		DF	
		0.500mls → 25mls										
96001333	TANK 24-1	10 SAMPLE	S968000535	0	C	DOSE-02	LIQUID	N/A	250		mrad/hour	
96001333	TANK 24-1	11 DUP	S968000535	0	C	ACIDIG04	LIQUID	50	50	N/A	DF	
		0.500mls → 25mls										
96001333	TANK 24-1	12 DUP	S968000535	0	C	DOSE-02	LIQUID	250	250	N/A	mrad/hour	
96001333	TANK 24-1	13 SPK	S968000535	0	C	ACIDIG04	LIQUID	NA	50	N/A	DF	* see note above
		0.500mls → 25mls										
96001333	TANK 24-1	14 SPK	S968000535	0	C	DOSE-02	LIQUID	250 NA 11/19/96 RKF	250	N/A	mrad/hour	* see note above

RKF 12/4/96

Final page for worklist # 14962

Dan Bromley

Keith Fuller 11/15/96
Analyst Signature Date

Keith Fuller 11-16-96
Analyst Signature Date

596B000453 → 535
454 → 534

* QC below CL
Corrected QC problem RKF 11/19/96

Data Entry Comments:
Sample 596B000454 had less than 1.5 mls. Therefore we used only 0.250 mls for SAM, DUP, and SPIKE on 596B000534 SAMPLE WAS CLEAR AND COLORLESS. SAMPLE 596B000453 was clear and colorless; some solids present but did not pipette solids into beaker. RKFuller 11/15/96. HPT was Bill Bishop

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number. R = Replicate Number. A = Aliquot Code.

Validated 11/19/96 RK Fuller

worklistrpt Version 2.1 05/15/95
10/08/96 09:57

LABCORE Data Entry Template for Worklist# 13773

Analyst: [signature] **Instrument:** PH01 **Book #** 22N/19-B

Method: LA-212-106 Rev/Mod B-0 RJ 11/25/96

Worklist Comment: TK-24-1 PH. RCJ

GROUP	PROJECT	S TYPE	SAMPLE#	R	A	TEST	MATRIX	ACTUAL	FOUND	DL	UNIT
		1 STDPH				PH-01	LIQUID	6.00	6.01	N/A	pH
~~96001333~~	~~TK 24-1~~	~~2 SAMPLE~~	~~S968000455~~	~~0~~		~~PH-01~~	~~LIQUID~~	~~N/A~~	~~2.10~~		~~pH~~
~~96001333~~	~~TK 24-1~~	~~3 DUP~~	~~S968000453~~	~~0~~		~~PH-01~~	~~LIQUID~~	~~2.10~~	~~2.16~~	~~N/A~~	~~pH~~
96001334	TK 21-1	4 SAMPLE	S968000454	0		PH-01	LIQUID	N/A	1.86		pH
96001334	TK 21-1	5 DUP	S968000454	0		PH-01	LIQUID	1.86	1.89	N/A	pH

RJ 11/25/96

Final page for worklist # 13773

[signature] 10/24/96
Analyst Signature **Date**

[signature] 10-25-96
Analyst Signature **Date**

VALIDATED
[signature]
10/25/96

Data Entry Comments:

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

LABCORE Completed Worklist Report for Worklist# 15000

Analyst: vlm **Instrument:** HAA01 **Book#** 63111-C

Method: 1A 365-B/ Rev/Mod D-0

Worklist Comment: Se Liquid. S96B000534 DF=100 S96B000535 DF=50. nds

Seq	Type	Sample#	R	A	Test	Matrix	Actual	Found	DL or Yield	Unit
1	BLNK-PREP			0	SE-05	LIQUID	1	<0.250		Ratio
2	STD-PREP			0	SE-05	LIQUID	0.1	0.1037	103.700	% Recovery
3	BLNK			0	SE-05	LIQUID	1	<0.005		Ratio
4	STD			0	SE-05	LIQUID	0.1	0.113	113.000	% Recovery
5	SAMPLE	S96B000535	0	C	SE-05	LIQUID	N/A <	0.250	0.250	ug/mL
6	DUP	S96B000535	0	C	SE-05	LIQUID	<0.250	<0.250		RPD
7	SPK	S96B000535	0	C	SE-05	LIQUID	100.0	112.5	112.500	% Recovery
8	SAMPLE	S96B000534	0	C	SE-05	LIQUID	N/A <	0.250	0.250	ug/mL
9	SPK	S96B000534	0	C	SE-05	LIQUID	100.0	104.8	104.800	% Recovery
10	DUP	S96B000534	0	C	SE-05	LIQUID	<0.250	<0.250		RPD
11	STD			0	SE-05	LIQUID	0.1	0.1058	105.800	% Recovery

DRF 11/25/96

Final page for worklist# 15000

Analyst Signature Date

Analyst Signature Date

Reviewer Signature Date

Validated

Units shown for QC (BLK/BKG) may not reflect the actual units.

worklistrpt Version 2.1 05/15/95
11/22/96 15:52

WHC-SD-WM-DP-213, REV. 0

LABCORE Data Entry Template for Worklist# 15000

Analyst: VLM **Instrument:** HAA01 ✓ **Book #** 163N11-C

Method: LA-365-131 Rev/Mod D-0

Worklist Comment: Se Liquid. S96B000534 DF=100 S96B000535 DF=50. nds

GROUP	PROJECT	S	TYPE	SAMPLE#	R	A	TEST	MATRIX	ACTUAL	FOUND	DL	UNIT
		1	BLNK-PREP				SE-05	LIQUID	1	<0.250	N/A	ug/mL
		2	STD-PREP				SE-05	LIQUID	0.1	0.1037	N/A	ug/mL
		3	BLNK				SE-05	LIQUID	1	<0.105	N/A	ug/mL
		4	STD				SE-05	LIQUID	0.1	0.113	N/A	ug/mL
96001333	TANK 24-1	5	SAMPLE	S968000535	0	C	SE-05	LIQUID	N/A	<0.250	0.250	ug/mL
96001333	TANK 24-1	6	DUP	S968000535	0	C	SE-05	LIQUID	<0.250	<0.250	N/A	ug/mL
96001333	TANK 24-1	7	SPK	S968000535	0	C	SE-05	LIQUID	100.0	112.5	N/A	ug/mL
96001334	TANK 21-1	8	SAMPLE	S968000534	0	C	SE-05	LIQUID	N/A	<0.250	0.250	ug/mL
96001334	TANK 21-1	9	SPK	S968000534	0	C	SE-05	LIQUID	100.0	104.8	N/A	ug/mL
96001334	TANK 21-1	10	DUP	S968000534	0	C	SE-05	LIQUID	<0.250	<0.250	N/A	ug/mL
		11	STD				SE-05	LIQUID	0.1	0.1058	N/A	ug/mL

Final page for worklist # 15000

Joel Smith 11/27/96
Analyst Signature **Date**

Jr Helene Massie

Analyst Signature **Date**

Data Entry Comments:

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

Atomic Absorption Runlog: Se Hydride Analysis

Analyst: Valerie L Massard - Date: 11-22-96

Instrument: PE2280 Property #: WB27979

Worklist #: 15000 Start Time: 08:00 End Time: 14:50

Calibration Data: Intercept: 0.0308 absorbance units
Slope: 0.0274 abs. units/concentration
Correlation: 0.9991 (unitless)

Calibration Std conc. 0.100 ppm

Sample Name (Std. ID#)	Sample Point	Sam. Size, mL	D or A*	PKHT (Abs.)	ng result	% Rec.	Comments	CC**
Cal. Std. ID	N/A	0.000	D	+.001	0	N/A		
#: 6 N II H	"	0.050	D	.146	5	"		
"	"	0.100	D	.305	10	"		
"	"	0.200	D	.639	20	"		
"	"	0.300	D	.866	30	"		
"	"	0.600	D	1.677	60	"		
"	"	0.700	D	1.923	70	"		
ICV	63 N II C	0.250	D	.804	28.24	112.95		
ICB	Blank	1.0	A	1.377	49.16	→	very high	
Prep Std	48 N II I	2.0	A	1.166	41.46	103.65	Blank suspect	
Prep Blank	Blank	2.0	A	.018	+0.47	11-27-96	problem with	
Instrument Blank	Blank	1.0	D	+.006	-0.56	1.34	heater block	
596B000534	TK21-1	2.0	A	.013	+0.65		during digest /	
596B000534 Dup	TK21-1Dup	2.0	A	.012	-0.69		chemist notified	
596B000534spike	TK21-1Spike	2.0	A	1.178	41.90	104.74	↑	
596B000535	TK24-1	1.0	A	+.006	-1.34			
596B000535 Dup	TK24-1Dup	1.0	A	+.005	-1.31			
596B000535spike	TK24-1Spike	1.0	A	.647	22.50	112.52		
CCV	63 N II C	.250	D	.755	26.45	105.79		
CCB	Blank	1.0	D	1.399	49.93	→	another of	
							the high	
							Blanks. explained	
							above.	

* Sample prep. descriptors: D=direct, A=acid digest

**CC = control chart. Check off when control chart entries are made

-.005 -1.31ng 1.0ml 5968-000-535 dup

-.006 -1.34ng 1.0ml 5968-000-535

1.178 41.90ng 2.0ml 5968000534 + 48N11I spike

.012 -0.69ng 2.0ml 5968000534 Dup

.013 -0.65ng 2.0ml 5968000534

.014 -0.47ng 2.0ml Prep Blank -.006 -1.34ng 1.0ml Instr. Blank

.018 -0.47ng 2.0ml Prep Blank

1.166 41.46ng 2.0ml Prep Std 48N11I

1.377 49.16 1.0ml ICB ← high blk problems with heater blank see Run Log

.804 28.24ng .250ml 63N11C ICV

1.923 70ng .700ml 61N11H

1.677 60ng .600ml 61N11H

.866 30ng .300ml 61N11H

.639 20ng .200ml 61N11H

.305 10ng .100ml 61N11H

.146 5ng .050ml 61N11H

-.001 0ng

14:50 11-22-96 Se Valerie L Massie

Analyte: Se
Date: 11-22-96

Analyst: Valerie L Massie
Start Time: 8:00 End Time: 14:50

MHS 20 Data:

Signal: Concentration
Mode: PKHT
Recorder: TC3
Time: 30 sec.
Expansion: 10

Purge I: 36
Reaction: 10 sec.
Purge II: 50
Temperature: 975 C
EDL milliamps: 280

Chart Recorder Data:

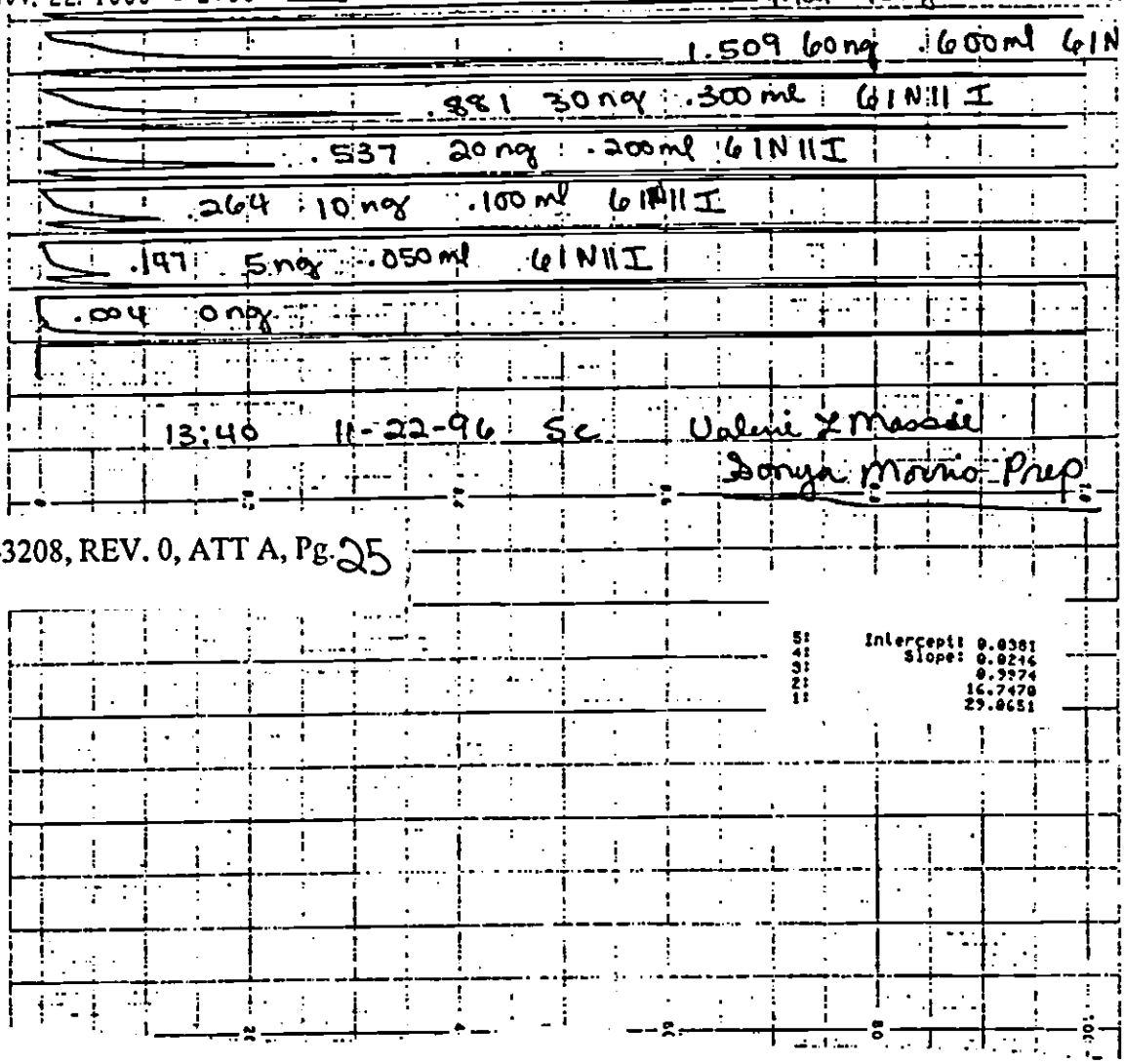
Chart speed: 5 mm/min Chart full scale: 20 mV

Calibration Data:

Intercept: 0.0308 absorbance units
Slope: 0.0274 abs. units / concentration
Correlation: 0.9991 (unitless)

16:	Intercept: 0.0308
15:	Slope: 0.0274
14:	0.9991
13:	28.2380
12:	49.1641
11:	41.4583
10:	-0.4670
9:	-1.3434
8:	-0.6496
7:	-0.6861
6:	41.8966
5:	-1.3434
4:	-1.3069
3:	22.5043
2:	26.4485
1:	49.9311

PERKIN ELMER



HNF-3208, REV. 0, ATT A, Pg. 25

365131_C - Se by AA

WHC-SD-WM-DP-213, REV. 0

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

Selenium : LA-365-131 (D-0) Se LIQUID-ACID DIGEST		BLANK	DUPLICATE
Type	Sample Size in mL SS	1.000	
BLANK	Se ng (Nanograms)	-0.47	
Work List	Acid Digest Dilution Factor DF	50.0	
15000	Conc Se µg/mL (or mg/L or PPM)	-0.024	N/A
Test Code	Conc Se µg/L (PPB)	-23.5	N/A
SE-05		N/A	
Matrix		N/A	
LIQUID		N/A	
Sample #	Conc Se µg/mL=(Se ng/SS)*(1µg/1000ng)*DF		
BLNK-PREP	Average Conc.=(Sample + Duplicate)/2		
Calibration Date	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
11/22/96	Detection Limit = (5 ng/SS)*(1µg/1000ng)*DF		
Instrument Code			
HAA01	Detection Limit (µg/mL)	0.250	
Analyst	Detection Limit (µg/L)	250.00	
VALERIE L MASSIE			
Date		BLANK	DUPLICATE
11/22/96	Conc Se (µg/mL)	<0.250	
Time		N/A	
02:50 PM		N/A	

The Result is < Detection Limit

Data Entry by:	V L Smith	Date:	11/22/96
Approved by:	V L Smith	Date:	11/22/96

Form 365131_3 Rev. 2.2

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

Selenium : LA-365-131 (D-0) Se LIQUID-ACID DIGEST		STANDARD	DUPLICATE
Type	Sample Size in mL SS	2.000	
STANDARD	Se ng (Nanograms)	41.46	
Work List	Acid Digest Dilution Factor DF	50.0	
15000	Conc Se µg/mL (or mg/L or PPM)	1.037	N/A
Test Code	Conc Se µg/L (PPB)	1036.5	N/A
SE-05		N/A	
Matrix		N/A	
LIQUID		N/A	
Sample #	Conc Se µg/mL=(Se ng/SS)*(1µg/1000ng)*DF		
STD-PREP	Average Conc.=(Sample + Duplicate)/2		
Calibration Date	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
11/22/96			
Instrument Code			
HAA01			
Analyst			
VALERIE L MASSIE			
Date		STANDARD	DUPLICATE
11/22/96	Conc Se (µg/mL)	1.04E+00	
Time		N/A	
02:50 PM		N/A	

Data Entry by:	V. Massie	Date:	11/22/96
Approved by:	[illegible]	Date:	11/22/96

Form 365131_3 Rev. 2.2

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

Selenium: LA-365-131 (D-0) Se LIQUIDS-DIRECT		BLANK	DUPLICATE
Type	Sample Size in mL SS	1.000	
BLANK	Se ng (Nanograms)	1.34	
Work List	Conc Se µg/mL (or mg/L or PPM)	0.001	N/A
15000	Conc Se µg/L (PPB)	1.3	N/A
Test Code		N/A	
SE-05		N/A	
Matrix		N/A	
LIQUID	Conc Se µg/mL=(Se ng/SS)*(1µg/1000ng)		
Sample #	Average Conc.=(Sample + Duplicate)/2		
ICB	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
Calibration Date	Detection Limit = (5 ng/SS)*(1µg/1000ng)		
11/22/96	Detection Limit is Corrected for Sample Prep/Dilution		
Instrument Code			
HAA01	Detection Limit (µg/mL) = 0.005		
Analyst	Detection Limit (µg/L) = 5.0		
VALERIE L MASSIE			
Date		BLANK	DUPLICATE
11/22/96	Conc Se µg/mL	<0.005	
Time		N/A	
02:50 PM		N/A	

The Result is < Detection Limit

Data Entry by:	T Smith	Date:	11/22/96
Approved by:	T Smith	Date:	11/22/96

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

Selenium: LA-365-131 (D-0) Se LIQUIDS-DIRECT		STANDARD	DUPLICATE
Type	Sample Size in mL SS	0.250	
STANDARD	Se ng (Nanograms)	28.24	
Work List	Conc Se µg/mL (or mg/L or PPM)	0.113	N/A
15000	Conc Se µg/L (PPB)	113.0	N/A
Test Code		N/A	
SE-05		N/A	
Matrix		N/A	
LIQUID	Conc Se µg/mL=(Se ng/SS)*(1µg/1000ng)		
Sample #	Average Conc.=(Sample + Duplicate)/2		
ICV	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
Calibration Date			
11/22/96			
Instrument Code			
HAA01			
Analyst			
VALERIE L MASSIE			
Date		STANDARD	DUPLICATE
11/22/96	Conc Se µg/mL	1.13E-01	
Time		N/A	
02:50 PM		N/A	

Data Entry by:	V. Smith	Date:	11/22/96
Approved by:	Neil Smith	Date:	11/22/96

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

Selenium : LA-365-131 (D-0) Se LIQUID-ACID DIGEST		SAMPLE	DUPLICATE
Type	Sample Size In mL SS	2.000	
SAMPLE	Se ng (Nanograms)	-0.65	
Work List	Acid Digest Dilution Factor DF	100.0	
15000	Conc Se µg/mL (or mg/L or PPM)	-0.033	N/A
Test Code	Conc Se µg/L (PPB)	-32.5	N/A
SE-05		N/A	
Matrix		N/A	
LIQUID		N/A	
Sample #	Conc Se µg/mL=(Se ng/SS)*(1µg/1000ng)*DF		
S96B000534	Average Conc.=(Sample + Duplicate)/2		
Calibration Date	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
11/22/96	Detection Limit = (5 ng/SS)*(1µg/1000ng)*DF		
Instrument Code			
HAA01	Detection Limit (µg/mL)	0.250	
Analyst	Detection Limit (µg/L)	250.00	
VALERIE L MASSIE			
Date		SAMPLE	DUPLICATE
11/22/96	Conc Se (µg/mL)	<0.250	
Time		N/A	
02:50 PM		N/A	

The Result is < Detection Limit

Data Entry by:	V. Smith	Date:	11/22/96
Approved by:	Val Smith	Date:	11/22/96

Form 365131_3 Rev. 2.2

365131_C - Se by AA

WHC-SD-WM-DP-213, REV. 0

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

Selenium: LA-365-131 (D-0) Se LIQUIDS-ACID DIGEST

Type		SAMPLE	SPIKE
SPIKE	Sample (mL)Vol. Acid Dig. Used SAVOL	2.00	N/A
Work List	Spike Std Volume (mL) SSVOL	N/A	0.500
15000	ng of Spike + Sample ngSSAM	N/A	41.90
Test Code	ng of Sample ngSAM	-0.65	N/A
SE-05	Final Acid Digest Vol. (mL) ADVOL	N/A	25.00
Matrix		N/A	N/A
LIQUID	Spike Std Dilution Factor SPDF	N/A	50.0
Sample #	Spike Std ID	N/A	48N11-I
S96B000534	Spike Std Value (ppm) SS VAL	N/A	1.000
Calibration Date	% Recovery	N/A	104.8%
11/22/96			
Instrument Code			
HAA01			
Analyst			
VALERIE L MASSIE			
Date			
11/22/96			
Time			
02:50 PM			

Sample result is < 5 ng, 0 ng of sample is used in the calculation for % recovery

Spike Std. Dilution Factor = ADVOL/SSVOL

% Recovery = {([((ngSSAM/SAVOL)*(1/1000))-((0/SAVOL)*(1/1000))]*SPDF)/SS VAL)*100

% Recovery = 104.8%

Data Entry by:	V L Smith	Date: 11/22/96
Approved by:	V L Smith	Date: 11/22/96

Form 365131_4 Rev. 1.1

365131_C - Se by AA

WHC-SD-WM-DP-213, REV. 0

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

Selenium : LA-365-131 (D-0) Se LIQUID-ACID DIGEST		SAMPLE	DUPLICATE
Type	Sample Size in mL SS	2.000	2.000
DUPLICATE	Se ng (Nanograms)	-0.65	-0.69
Work List	Acid Digest Dilution Factor DF	100.0	100.0
15000	Conc Se µg/mL (or mg/L or PPM)	-0.033	-0.035
Test Code	Conc Se µg/L (PPB)	-32.5	-34.5
SE-05	Average Conc (µg/mL)	N/A	N/A
Matrix	Average Conc (µg/L)	N/A	N/A
LIQUID	Relative % Difference	N/A	N/A
Sample #	Conc Se µg/mL=(Se ng/SS)*(1µg/1000ng)*DF		
S96B000534	Average Conc.=(Sample + Duplicate)/2		
Calibration Date	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
11/22/96	Detection Limit = (5 ng/SS)*(1µg/1000ng)*DF		
Instrument Code			
HAA01	Detection Limit (µg/mL)	0.250	
Analyst	Detection Limit (µg/L)	250.00	
VALERIE L MASSIE			
Date		SAMPLE	DUPLICATE
11/22/96	Conc Se (µg/mL)	<0.250	<0.250
Time	Average Conc (µg/mL)	N/A	N/A
02:50 PM	Relative % Difference	N/A	N/A
	Both Results are < Detection Limit		

Data Entry by:	V. Smith	Date:	11/22/96
Approved by:	Val Smith	Date:	11/22/96

Form 365131_3 Rev. 2.2

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

Selenium: LA-365-131 (D-0) Se LIQUIDS-DIRECT		STANDARD	DUPLICATE
Type	Sample Size in mL SS	0.250	
STANDARD	Se ng (Nanograms)	26.45	
Work List	Conc Se µg/mL (or mg/L or PPM)	0.106	N/A
15000	Conc Se µg/L (PPB)	105.8	N/A
Test Code		N/A	
SE-05		N/A	
Matrix		N/A	
LIQUID	Conc Se µg/mL=(Se ng/SS)*(1µg/1000ng)		
Sample #	Average Conc.=(Sample + Duplicate)/2		
CCV	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
Calibration Date			
11/22/96			
Instrument Code			
HAA01			
Analyst			
VALERIE L MASSIE			
		STANDARD	DUPLICATE
Date			
11/22/96	Conc Se µg/mL	1.06E-01	
Time		N/A	
02:50 PM		N/A	

Data Entry by:	V. L. Massie	Date:	11/22/96
Approved by:	[signature]	Date:	11/22/96

Form 365131_1 Rev. 1.1

worklistdata Version 1.0 05/15/96
10/30/96 11:25

WHC-SD-WM-DP-213, REV. 0

LABCORE Completed Worklist Report for Worklist# 13776

Analyst: dpb **Instrument:** IC01 **Book#** 14N201

Method: LA-533-105 Rev/Mod D-1

Worklist Comment: TK 24-1 IC. RCJ

Seq	Type	Sample#	R	A	Test	Matrix	Actual		Found	DL or Yield	Unit
1	CCB			0	@IC-QC F	QC	1		<1.20e-2		ug/mL
1	CCB			0	@IC-QC CL	QC	1		<1.70e-2		ug/mL
1	CCB			0	@IC-QC NO2	QC	1		<1.08e-1		ug/mL
1	CCB			0	@IC-QC BR	QC	1		<1.25e-1		ug/mL
1	CCB			0	@IC-QC NO3	QC	1		1.51e-01	0.151	ug/mL
1	CCB			0	@IC-QC PO4	QC	1		<1.20e-1		ug/mL
1	CCB			0	@IC-QC SO4	QC	1		<1.38e-1		ug/mL
1	CCB			0	@IC-QC OXALATE2	QC	1		<1.05e-1		ug/mL
2	CCV			0	@IC-QC F	QC	5.90e01		5.47e+01	92.712	% Recovery
2	CCV			0	@IC-QC CL	QC	7.90e01		7.42e+01	93.924	% Recovery
2	CCV			0	@IC-QC NO2	QC	5.38e02		5.01e+02	93.123	% Recovery
2	CCV			0	@IC-QC BR	QC	5.89e02		5.74e+02	97.453	% Recovery
2	CCV			0	@IC-QC NO3	QC	5.94e02		6.10e+02	102.694	% Recovery
2	CCV			0	@IC-QC PO4	QC	5.45e02		5.33e+02	97.798	% Recovery
2	CCV			0	@IC-QC SO4	QC	6.31e02		6.51e+02	103.170	% Recovery
2	CCV			0	@IC-QC OXALATE2	QC	5.25e02		5.37e+02	102.286	% Recovery
3	SAMPLE	S96B000453		0	@IC-01 F-02	LIQUID	N/A		3.256e+00	1.212	ug/mL
3	SAMPLE	S96B000453		0	@IC-01 CL-02	LIQUID	N/A		6.083e+00	1.717	ug/mL
3	SAMPLE	S96B000453		0	@IC-01 NO2-02	LIQUID	N/A	<	1.091e+01	10.910	ug/mL
3	SAMPLE	S96B000453		0	@IC-01 BR-02	LIQUID	N/A	<	1.262e+01	12.620	ug/mL
3	SAMPLE	S96B000453		0	@IC-01 NO3-02	LIQUID	N/A		3.835e+03	14.040	ug/mL
3	SAMPLE	S96B000453		0	@IC-01 PO4-02	LIQUID	N/A		2.200e+02	12.120	ug/mL
3	SAMPLE	S96B000453		0	@IC-01 SO4-02	LIQUID	N/A		4.184e+01	13.940	ug/mL
3	SAMPLE	S96B000453		0	@IC-01 OXALATE2	LIQUID	N/A		1.891e+01	10.610	ug/mL
4	DUP	S96B000453		0	@IC-01 F-02	LIQUID	3.26e+00		3.35e+00	2.723	RPD
4	DUP	S96B000453		0	@IC-01 CL-02	LIQUID	6.08e+00		6.74e+00	10.296	RPD
4	DUP	S96B000453		0	@IC-01 NO2-02	LIQUID	<1.09e1		<1.09e1		RPD
4	DUP	S96B000453		0	@IC-01 BR-02	LIQUID	<1.26e1		<1.26e1		RPD
4	DUP	S96B000453		0	@IC-01 NO3-02	LIQUID	3.84e+03		3.87e+03	0.778	RPD
4	DUP	S96B000453		0	@IC-01 PO4-02	LIQUID	2.20e+02		2.30e+02	4.444	RPD
4	DUP	S96B000453		0	@IC-01 SO4-02	LIQUID	4.12e+01		4.61e+01	11.226	RPD
4	DUP	S96B000453		0	@IC-01 OXALATE2	LIQUID	1.89e+01		1.47e+01	25.000	RPD
5	SPK	S96B000453		0	@IC-01 F-02	LIQUID	5.90e01		5.62e+01	95.254	% Recovery
5	SPK	S96B000453		0	@IC-01 CL-02	LIQUID	7.90e01		7.17e+01	90.759	% Recovery
5	SPK	S96B000453		0	@IC-01 NO2-02	LIQUID	5.38e02		4.96e+02	92.193	% Recovery
5	SPK	S96B000453		0	@IC-01 BR-02	LIQUID	5.89e02		5.29e+02	89.813	% Recovery
5	SPK	S96B000453		0	@IC-01 NO3-02	LIQUID	5.94e02		6.01e+02	101.178	% Recovery
5	SPK	S96B000453		0	@IC-01 PO4-02	LIQUID	5.45e02		5.45e+02	100.000	% Recovery
5	SPK	S96B000453		0	@IC-01 SO4-02	LIQUID	6.31e02		6.37e+02	100.951	% Recovery
5	SPK	S96B000453		0	@IC-01 OXALATE2	LIQUID	5.25e02		5.14e+02	97.905	% Recovery
6	SAMPLE	S96B000454		0	@IC-01 F-02	LIQUID	N/A	<	1.212e+00	1.212	ug/mL

RJ 11/25/96

Units shown for QC (BLK/BKG) may not reflect the actual units.

10/30/96 11:25

LABCORE Completed Worklist Report for Worklist# 13776

Seq	Type	Sample#	R	A	Test	Matrix	Actual		Found	DL or Yield	Unit
6	SAMPLE	S96B000454	0	@IC-01	CL-02	LIQUID	N/A		6.914e+01	1.717	ug/mL
6	SAMPLE	S96B000454	0	@IC-01	NO2-02	LIQUID	N/A	<	1.091e+01	10.910	ug/mL
6	SAMPLE	S96B000454	0	@IC-01	BR-02	LIQUID	N/A	<	1.262e+01	12.620	ug/mL
6	SAMPLE	S96B000454	0	@IC-01	NO3-02	LIQUID	N/A		2.841e+03	14.040	ug/mL
6	SAMPLE	S96B000454	0	@IC-01	PO4-02	LIQUID	N/A	<	1.212e+01	12.120	ug/mL
6	SAMPLE	S96B000454	0	@IC-01	SO4-02	LIQUID	N/A		1.654e+01	13.940	ug/mL
6	SAMPLE	S96B000454	0	@IC-01	OXALATE2	LIQUID	N/A	<	1.061e+01	10.610	ug/mL
7	DUP	S96B000454	0	@IC-01	F-02	LIQUID	<1.21e0		<1.21e0		RPD
7	DUP	S96B000454	0	@IC-01	CL-02	LIQUID	6.91e+01		6.98e+01	1.008	RPD
7	DUP	S96B000454	0	@IC-01	NO2-02	LIQUID	<1.09e1		<1.09e1		RPD
7	DUP	S96B000454	0	@IC-01	BR-02	LIQUID	<1.26e1		<1.26e1		RPD
7	DUP	S96B000454	0	@IC-01	NO3-02	LIQUID	2.84e+03		2.88e+03	1.399	RPD
7	DUP	S96B000454	0	@IC-01	PO4-02	LIQUID	<1.21e1		<1.21e1		RPD
7	DUP	S96B000454	0	@IC-01	SO4-02	LIQUID	1.65e+01		1.68e+01	1.802	RPD
7	DUP	S96B000454	0	@IC-01	OXALATE2	LIQUID	<1.06e1		<1.06e1		RPD

Final page for worklist# 13776

Analyst Signature Date

Analyst Signature Date

Reviewer Signature 10/30/96 Date

Units shown for QC (BLK/BKG) may not reflect the actual units.

LABCORE Data Entry Template for Worklist# 13776

Analyst: DPB **Instrument:** IC0 _____ **Book#** 14N20-D

Method: LA-533-105 **Rev/Mod** D-1

Worklist Comment: TK 24-1 IC. RCJ

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	CCB				@IC-QC	QC		
2	CCV				@IC-QC	QC		
3	SAMPLE	S96B000453	0		@IC-01	LIQUID	96001333	TK 24-1
		Analytes Requested: BR-02 , CL-02 , F-02 , NO2-02 , NO3-02 , OXALATE2, PO4-02 , SO4-02						
4	DUP	S96B000453	0		@IC-01	LIQUID		
5	SPK	S96B000453	0		@IC-01	LIQUID		
6	SAMPLE	S96B000454	0		@IC-01	LIQUID	96001334	TK 21-1
		Analytes Requested: BR-02 , CL-02 , F-02 , NO2-02 , NO3-02 , OXALATE2, PO4-02 , SO4-02						
7	DUP	S96B000454	0		@IC-01	LIQUID		

Final page for worklist # 13776

Daniel P. Bromley 10/25/96 0510
Analyst Signature Date

Analyst Signature Date

13776OC. CSV

Uploaded 10/30/96 JMLuye
Validated 10/30/96 JMLuye

Data Entry Comments: ~~EXPIRED STANDARD~~ Std did not expire till 10/31/96 JMF 12:54 on 10/25 JMF

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code

A-0010-IC DATA FILE/WORKLIST RESOLUTION 30-Oct-96

Worklist#: 13776

		Seq	Type	Sample #
-	=>	1	CCB	
	=>	2	CCV	
	=>	3	SAMPLE	S96B000453
	=>	4	DUP	S96B000453
	=>	5	SPK	S96B000453
	=>	6	SAMPLE	S96B000454
	=>	7	DUP	S96B000454
+				

Data File: 137760C.CSV

	Seq#	Data File	Sample Name	Dilution
-	1	96102321.d03	ELUENT BLANK	1.00
	2	96102321.d05	STD 14N20-D	101.00
	3	96102321.d14	S96B000453 SAM	101.00
	4	96102321.d15	S96B000453 DUP	101.00
	5	96102321.d16	S96B000453 SPK	101.00
	6	96102321.d17	S96B000454 SAM	101.00
	7	96102321.d19	S96B000454 DUP	101.00
+				

Save(F4) Abort(Shift-F3) ListFiles(Shift-F1) UploadFile(F8)

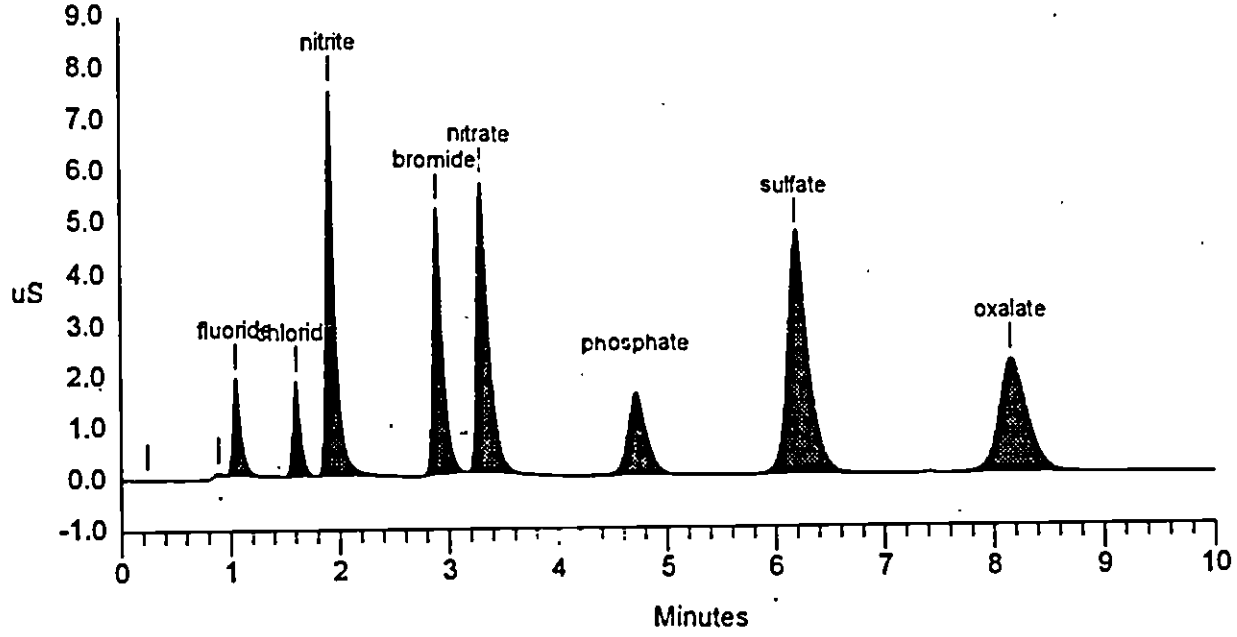
Sample Name: STD 14N20-D Date: 10/24/1996 22:46:45
Data File : C:\DX\DATA\96102321.D05
Method : C:\DX\METHOD\KIT.MET
ACI Address: 1 System: 1 Inject#: 5 Detector:CDM-1
Analyst : Column: AG4A/AS4A anion column

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area Reject
External	1	101	3000	5Hz	0.00	10.00	50

********** Peak Report: All Peaks **********

Pk. Num	Ret Time	Component Name	Concentration ug/ml	Height	Area	Bl. Code	%Delta
1	0.24		0.000	31	147	1	
2	0.89		0.000	49	201	2	
3	1.05	fluoride	54.696	1904	10771	2	3.27
4	1.61	chloride	74.248	1868	9834	1	-0.41
5	1.92	nitrite	501.423	7478	46234	1	-3.03
6	2.89	bromide	573.559	5172	35207	1	-2.91
7	3.30	nitrate	610.184	5632	46825	1	-3.23
8	4.72	phosphate	532.825	1642	21318	1	-4.26
9	6.19	sulfate	650.506	4672	66540	1	-5.69
10	8.16	oxalate	536.806	2224	42499	1	0.00
		Totals	3534.248	30672	279576		

File: 96102321.D05 Sample: STD 14N20-D



Daniel V. Bromley 10/25/96

SIGNATURE ~~BELOW~~ ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 43 TO 46.

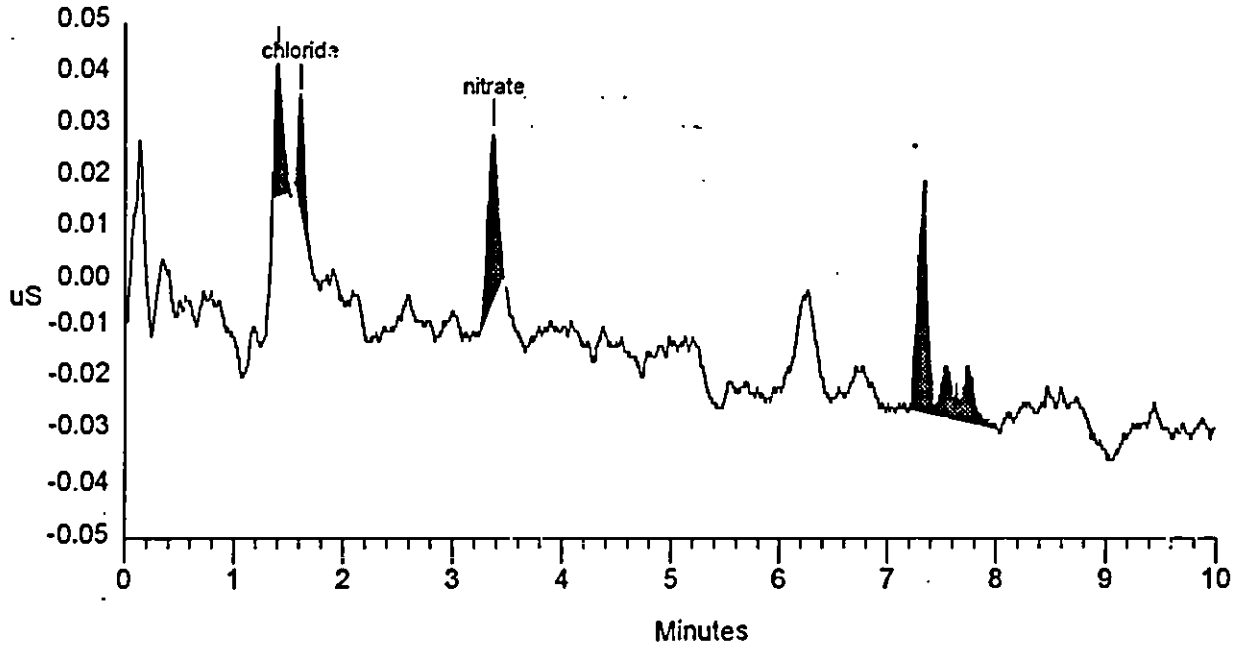
```
Sample Name: ELUENT BLANK                    Date: 10/24/1996 22:11:43
Data File  : C:\DX\DATA\96102321.D03
Method     : C:\DX\METHOD\KIT.MET
ACI Address: 1  System: 1  Inject#: 3                  Detector:CDM-1
Analyst    :               Column: AG4A/AS4A anion column
```

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area Reject
External	1	1	3000	5Hz	0.00	10.00	50

********** Peak Report: All Peaks **********

Pk. Num	Ret Time	Component Name	Concentration ug/ml	Height	Area	Bl. Code	%Delta
1	1.41		0.000	26	137	1	
2	1.61	chloride	0.005	22	96	1	0.00
3	3.38	nitrate	0.151	32	221	1	-0.88
4	7.36		0.000	38	456	1	
		Totals	0.156	117	911		

File: 96102321.D03 Sample: ELUENT BLANK



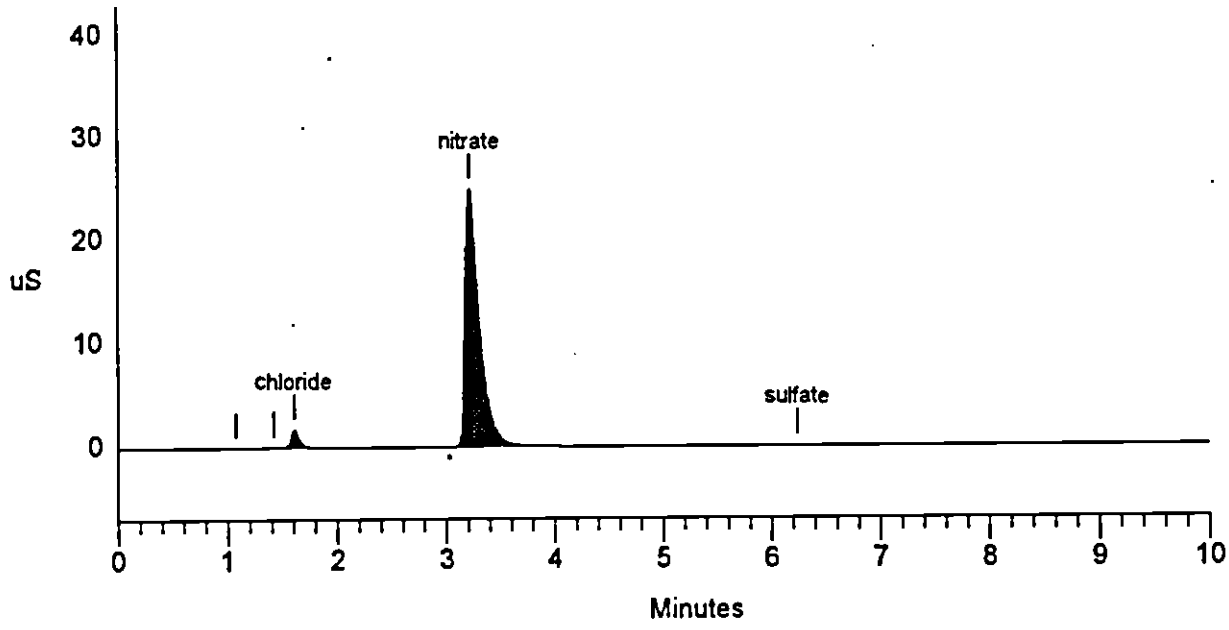
Sample Name: S96B000454 SAM Date: 10/25/1996 02:46:55
Data File : C:\DX\DATA\96102321.D17
Method : C:\DX\METHOD\KIT.MET
ACI Address: 1 System: 1 Inject#: 17 Detector:CDM-1
Analyst : Column: AG4A/AS4A anion column

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area Reject
External	1	101	3000	5Hz	0.00	10.00	50

********** Peak Report: All Peaks **********

Pk. Num	Ret Time	Component Name	Concentration ug/ml	Height	Area	Bl. Code	%Delta
2	1.42		0.000	56	341	1	
3	1.61	chloride	69.140	1721	9151	1	-0.41
4	3.22	nitrate	2840.512	24932	237230	1	-5.57
5	6.24	sulfate	16.541	72	1211	1	-4.88
		Totals	2926.193	26781	247934		

File: 96102321.D17 Sample: S96B000454 SAM



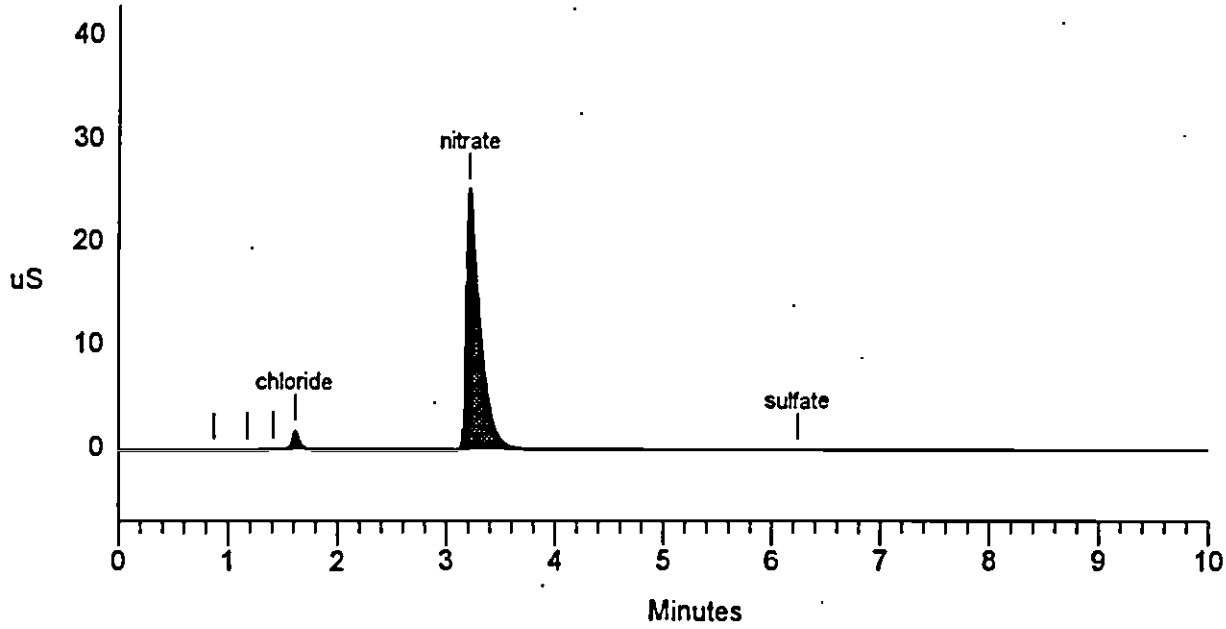
Sample Name: S96B000454 DUP Date: 10/25/1996 04:30:17
Data File : C:\DX\DATA\96102321.D19
Method : C:\DX\METHOD\KIT.MET
ACI Address: 1 System: 1 Inject#: 19 Detector:CDM-1
Analyst : Column: AG4A/AS4A anion column

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area Reject
External	1	101	3000	5Hz	0.00	10.00	50

********** Peak Report: All Peaks **********

Pk. Num	Ret Time	Component Name	Concentration ug/ml	Height	Area	Bl. Code	%Delta
1	0.87		0.000	14	51	1	
2	1.18		0.000	18	150	1	
3	1.41		0.000	107	637	1	
4	1.61	chloride	69.759	1801	9234	1	0.00
5	3.22	nitrate	2881.012	25301	240962	1	-5.57
6	6.24	sulfate	16.766	85	1234	1	-4.88
		Totals	2967.536	27326	252268		

File: 96102321.D19 Sample: S96B000454 DUP



10/09/96 06:39
A-0004-1

LABCORE Data Entry Template for Worklist# 13768

Analyst: J. WORRELL **Instrument:** ICP01 _____ **Book#** 61848

Method: LA-505-151/~~161~~ Rev/Mod D-3
JJ 10-9-96

Worklist Comment: ICP TK24-1

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	ICV				@ICP-QC	QC		
2	ICB				@ICP-QC	QC		
3	LLS				@ICP-QC	QC		
4	ICSA				@ICP-QC	QC		
5	ICSAB				@ICP-QC	QC		
6	SAMPLE	S96B000453	0	D	@ICP-D01	LIQUID	96001333	TK 24-1
	Analytes Requested:	AG-D-01 , AL-D-01 , AS-D-01 , B-D-01 , BA-D-01 , BE-D-01 , BI-D-01 , CA-D-01 , CD-D-01 , CE-D-01 , CO-D-01 , CR-D-01 , CU-D-01 , FE-D-01 , K-D-01 , LA-D-01 , LI-D-01 , MG-D-01 , MN-D-01 , MO-D-01 , NA-D-01 , ND-D-01 , NI-D-01 , P-D-01 , PB-D-01 , S-D-01 , SB-D-01 , SE-D-01 , SI-D-01 , SM-D-01 , SR-D-01 , TI-D-01 , TL-D-01 , U-D-01 , V-D-01 , ZN-D-01 , ZR-D-01			
7	DUP	S96B000453	0	D	@ICP-D01	LIQUID		
8	SPK	S96B000453	0	D	@ICP-D01	LIQUID		
9	SPK-DUP	S96B000453	0	D	@ICP-D01	LIQUID		
10	CCV				@ICP-QC	QC		
11	CCB				@ICP-QC	QC		
12	SAMPLE	S96B000454	0	D	@ICP-D01	LIQUID	96001334	TK 21-1
	Analytes Requested:	AG-D-01 , AL-D-01 , AS-D-01 , B-D-01 , BA-D-01 , BE-D-01 , BI-D-01 , CA-D-01 , CD-D-01 , CE-D-01 , CO-D-01 , CR-D-01 , CU-D-01 , FE-D-01 , K-D-01 , LA-D-01 , LI-D-01 , MG-D-01 , MN-D-01 , MO-D-01 , NA-D-01 , ND-D-01 , NI-D-01 , P-D-01 , PB-D-01 , S-D-01 , SB-D-01 , SE-D-01 , SI-D-01 , SM-D-01 , SR-D-01 , TI-D-01 , TL-D-01 , U-D-01 , V-D-01 , ZN-D-01 , ZR-D-01			

JJ 11/25/96

Data Entry Comments:

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

10/09/96 12:20 ☎509 372 2929 WESTINGHOUSE ←→ MO-924 200W 001

LABCORE Data Entry Template for Worklist# 13768

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
13	DUP	S96B000454	0	D	@ICP-D01	LIQUID		
14	SPK	S96B000454	0	D	@ICP-D01	LIQUID		
15	SPK-DUP	S96B000454	0	D	@ICP-D01	LIQUID		
16	ICSA				@ICP-QC	QC		
17	ICSAB				@ICP-QC	QC		
18	CCV				@ICP-QC	QC		
19	CCB				@ICP-QC	QC		

Final page for worklist # 13768

[signature] 10-9-96
Analyst Signature Date

Reviewed by: [signature] 10/9/96
Analyst Signature Date

		DF
S96B000453	SAM 0.5ml - 9.5ml	20
	DUP 0.5ml - 9.5ml	20
	P.SPK 0.5ml - 1.0 - 1.0 - 7.5ml	20
	DUP P.SPK 0.5ml - 1.0 - 1.0 - 7.5ml	20
S96B000454	SAM 0.5ml - 9.5ml	20
	DUP 0.5ml - 9.5ml	20
	P.SPK 0.5ml - 1.0 - 1.0 - 7.5ml	20
	DUP P.SPK 0.5ml - 1.0 - 1.0 - 7.5ml	20

SPIKES 1ml ea. WHC-1 & WHC-2

Data Entry Comments: Spike recovery calculation:

S96B000453 $C_r = \frac{\left(\frac{201.788}{20}\right) - \left(\frac{6.277}{20}\right)}{10} \times 100 = 97.8\%$

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

Spike true value is 10.0 ppm for all elements except for W = 20.0 ppm.

Sample #	Element	% Spk	% Spk Dup	% RPD
~~596000453~~	Cr	97.8	~~98.~~ 100.98	3.2
	Pb	96.7	100.3	3.65
	Ba	98.3	98.2	0.10
	Na	97.6	97.2	~~2.40~~
596B000454	Cr	99.1	100.4	1.30
	Pb	100.0	103.1	3.1
	Ba	98.6	98.3	0.30
	Na	95.1	94.9	0.21

RJG 11/25/96

Identity 1: ICV Identity 2: Quality Control 10:32 AM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	4.944	4.825	5.093	4.906	4.890	5.069	4.937	4.806
S.D.	0.006	0.004	0.010	0.011	0.011	0.009	0.004	0.005
% R.S.D.	0.129	0.076	0.201	0.221	0.225	0.170	0.081	0.112

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	5.150	4.998	4.991	5.062	4.835	5.063	5.164	9.610
S.D.	0.012	0.006	0.012	0.021	0.005	0.009	0.027	0.036
% R.S.D.	0.224	0.114	0.237	0.412	0.097	0.178	0.514	0.379

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	4.915	4.867	4.874	5.014	4.953	5.055	5.121	4.752
S.D.	0.008	0.006	0.004	0.044	0.032	0.007	0.013	0.003
% R.S.D.	0.159	0.132	0.089	0.875	0.656	0.137	0.262	0.056

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	5.047	5.157	4.997	5.033	4.870	5.054	5.075	4.988
S.D.	0.007	0.045	0.007	0.018	0.003	0.008	0.011	0.017
% R.S.D.	0.141	0.878	0.140	0.363	0.059	0.160	0.212	0.345

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	5.023	4.719	5.081	5.100	4.980
S.D.	0.008	0.035	0.011	0.006	0.014
% R.S.D.	0.166	0.741	0.220	0.113	0.288

SIGNATURE BELOW REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 50 TO 64.

JL Worrell
10-9-96

TK24-1
S96B000453, 454

0.5mL-7.5mL
FILE No: 961009B.DAT
SST-5 = 61B48B

SPIKE = Inlet WHC-1 & WHC-2

10/09/96 12:21 ☎509 372 2929 WESTINGHOUSE ←→ MO-924 200W 003

Identity 1: ICB Identity 2: Quality Control 10:37 AM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	0.001	0.000	0.003	-0.002	-0.005	0.005	-0.000	-0.000
S.D.	0.001	0.000	0.002	0.000	0.001	0.002	0.000	0.000
% R.S.D.	80.720	32.733	64.069	30.943	17.790	34.617	49.254	150.010

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ce (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	0.001	0.001	0.004	-0.006	0.000	0.001	-0.011	0.036
S.D.	0.000	0.000	0.002	0.002	0.000	0.001	0.002	0.021
% R.S.D.	16.683	11.955	54.275	35.406	100.000	61.406	14.205	57.991

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	-0.013	0.010	0.000	0.008	0.002	0.000	0.001	-0.001
S.D.	0.001	0.005	0.000	0.010	0.003	0.000	0.004	0.002
% R.S.D.	10.747	53.303	47.187	123.790	165.167	121717.965	262.802	299.866

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	0.001	0.001	-0.001	0.004	0.001	-0.002	0.005	0.075
S.D.	0.000	0.010	0.000	0.005	0.000	0.000	0.001	0.010
% R.S.D.	24.115	796.856	38.823	118.836	16.950	7.506	17.808	13.483

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Ti (ppm)
Mean	-0.001	-0.017	0.001	0.000	-0.027
S.D.	0.000	0.016	0.001	0.000	0.012
% R.S.D.	42.828	94.629	64.182	56.475	44.742

10/09/96 12:21 ☎509 372 2829 WESTINGHOUSE →→ MO-924 200W 004

Identity 1: LLS Identity 2: Quality Control 10:40 AM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	0.018	0.020	0.192	0.111	0.100	0.038	0.019	0.019
S.D.	0.000	0.000	0.011	0.001	0.001	0.003	0.000	0.000
% R.S.D.	2.361	0.184	5.625	1.248	1.115	7.515	1.411	0.601

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	0.022	0.042	0.105	0.099	0.198	0.020	0.177	0.362
S.D.	0.000	0.002	0.002	0.002	0.000	0.001	0.008	0.028
% R.S.D.	0.023	5.241	1.700	1.867	0.115	6.905	4.677	7.764

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	0.167	0.194	0.100	0.388	0.208	0.208	0.194	0.194
S.D.	0.008	0.003	0.000	0.006	0.004	0.000	0.005	0.001
% R.S.D.	4.572	1.474	0.089	1.490	1.899	0.176	2.640	0.693

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Ti (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	0.092	0.217	0.017	0.215	0.019	0.009	0.100	0.531
S.D.	0.001	0.011	0.000	0.011	0.000	0.000	0.001	0.005
% R.S.D.	0.701	4.978	2.694	5.136	0.680	0.014	1.217	0.954

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	0.019	0.102	0.098	0.010	0.366
S.D.	0.000	0.013	0.000	0.000	0.020
% R.S.D.	0.872	12.752	0.277	1.275	5.394

10/09/96 12:22 509 372 2929 WESTINGHOUSE →→ MO-824 200W 005

Identity 1: ICSA Identity 2: Quality Control 10:43 AM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	-0.003	0.003	-0.039	-0.015	195.549	0.002	0.001	0.001
S.D.	0.001	0.000	0.009	0.002	0.518	0.002	0.000	0.000
% R.S.D.	44.866	5.679	22.221	10.519	0.265	75.854	24.968	28.535

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	0.006	0.006	-0.000	93.201	99.319	-0.001	0.022	-0.179
S.D.	0.000	0.001	0.003	0.509	0.321	0.002	0.013	0.075
% R.S.D.	6.103	19.951	1604.148	0.546	0.323	164.531	57.309	42.034

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	0.032	0.027	0.003	0.027	-0.056	86.225	0.017	185.236
S.D.	0.012	0.012	0.000	0.009	0.010	0.533	0.004	0.985
% R.S.D.	38.916	45.975	10.430	35.438	17.063	0.618	23.603	0.532

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Ti (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	0.001	0.018	0.003	0.035	-0.001	-0.000	0.011	-0.101
S.D.	0.001	0.028	0.001	0.011	0.000	0.001	0.000	0.015
% R.S.D.	102.956	151.392	22.617	30.849	15.311	145.614	1.617	14.432

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	-0.002	-0.033	0.003	0.002	0.060
S.D.	0.001	0.021	0.001	0.000	0.039
% R.S.D.	33.890	63.738	35.650	11.039	65.197

10/09/96 12:22 509 372 2829 WESTINGHOUSE →→→ MO-824 200W 008

Identity 1: ICSAB Identity 2: Quality Control 10:47 AM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	-0.003	0.002	-0.026	-0.013	197.391	0.497	0.482	0.907
S.D.	0.001	0.000	0.006	0.003	0.323	0.005	0.001	0.005
% R.S.D.	20.947	1.767	22.577	21.956	0.164	0.961	0.280	0.556

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ce (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	1.003	0.975	0.001	96.432	101.334	0.494	0.022	-0.075
S.D.	0.001	0.003	0.002	0.130	0.074	0.001	0.008	0.039
% R.S.D.	0.075	0.354	167.308	0.135	0.073	0.218	37.930	52.153

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	-0.010	0.053	0.493	0.019	0.001	92.459	0.022	184.641
S.D.	0.007	0.007	0.001	0.006	0.009	0.169	0.009	0.863
% R.S.D.	72.143	13.240	0.230	30.558	930.626	0.183	40.091	0.467

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Ti (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	0.000	0.001	1.015	0.983	-0.000	0.987	0.017	0.104
S.D.	0.001	0.037	0.002	0.003	0.000	0.004	0.001	0.025
% R.S.D.	844.722	3900.744	0.164	0.321	94.876	0.371	4.648	23.842

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	0.492	-0.024	0.499	0.493	0.033
S.D.	0.000	0.016	0.001	0.001	0.020
% R.S.D.	0.049	67.445	0.182	0.142	60.358

10/09/96 12:23 509 372 2929 WESTINGHOUSE →→ MO-924 200W 007

Identity 1: CCV Identity 2: Quality Control 12:37 PM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	4.928	4.843	5.066	4.831	4.876	4.932	4.947	4.830
S.D.	0.009	0.007	0.026	0.018	0.013	0.022	0.002	0.018
% R.S.D.	0.186	0.139	0.511	0.377	0.275	0.436	0.034	0.371

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	5.016	4.903	4.980	5.020	4.816	4.904	5.301	9.689
S.D.	0.025	0.017	0.013	0.017	0.008	0.033	0.015	0.078
% R.S.D.	0.508	0.354	0.264	0.345	0.160	0.677	0.278	0.807

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	5.001	4.900	4.893	4.993	4.895	4.936	5.033	4.793
S.D.	0.027	0.010	0.006	0.046	0.043	0.019	0.018	0.011
% R.S.D.	0.543	0.212	0.129	0.921	0.884	0.379	0.350	0.222

	Mo (ppm)	Sn (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	4.916	5.155	4.904	4.931	4.774	4.948	5.037	4.932
S.D.	0.016	0.007	0.016	0.015	0.009	0.024	0.009	0.018
% R.S.D.	0.332	0.130	0.330	0.298	0.180	0.489	0.175	0.355

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	4.908	4.667	5.001	5.067	4.934
S.D.	0.023	0.024	0.015	0.012	0.055
% R.S.D.	0.471	0.516	0.292	0.246	1.117

10/09/96 12:26 ☎509 372 2929 WESTINGHOUSE →→ MO-924 200W 012

Identity 1: CCB Identity 2: Quality Control 12:40 PM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	0.001	0.001	0.005	-0.003	0.000	0.006	0.001	0.001
S.D.	0.001	0.000	0.007	0.003	0.003	0.004	0.000	0.001
% R.S.D.	101.043	20.904	142.473	91.645	651.577	76.804	43.771	42.500

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	0.002	0.003	-0.000	0.001	0.001	0.005	-0.008	-0.078
S.D.	0.000	0.001	0.002	0.002	0.000	0.001	0.006	0.039
% R.S.D.	4.008	47.393	6665.873	132.272	18.875	19.670	77.083	50.397

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	0.004	-0.004	0.001	0.004	0.004	0.001	0.000	0.006
S.D.	0.010	0.007	0.000	0.004	0.003	0.000	0.006	0.002
% R.S.D.	243.338	169.086	24.478	105.033	73.927	15.059	3128.271	37.504

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	0.002	-0.012	0.000	0.012	0.001	-0.001	0.008	0.174
S.D.	0.001	0.011	0.001	0.006	0.001	0.001	0.001	0.004
% R.S.D.	89.252	88.166	603.412	50.974	62.710	97.270	6.815	2.522

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Ti (ppm)
Mean	0.000	0.031	0.002	0.001	0.015
S.D.	0.000	0.002	0.001	0.000	0.021
% R.S.D.	58.012	6.243	52.955	15.381	137.316

10/09/96 12:26 ☎509 372 2929 WESTINGHOUSE +++ MO-924 200W ☑013

JW 10-9-96

9.5mL

Identity 1: S968000454 Identity 2: 0.5mL ~~7.5mL~~ 12:46 PM October 9, 1996

Task name : OPTIMA

Sample Weight : 1.0000 Solution Volume : 20.00

On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Si (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	0.046	0.039	-0.082	0.978	2.907	0.054	0.109	0.008
S.D.	0.009	0.001	0.062	0.018	0.086	0.032	0.006	0.000
% R.S.D.	19.162	1.903	75.509	1.837	2.971	59.934	5.590	0.002

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	0.610	0.745	0.039	6.789	2.055	0.768	0.061	-0.726
S.D.	0.002	0.043	0.047	0.103	0.002	0.013	0.063	0.403
% R.S.D.	0.358	5.738	118.395	1.514	0.098	1.726	103.492	55.595

	Ce (ppm)	Sm (ppm)	Be (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	0.092	0.225	0.575	0.089	3.134	0.929	0.013	14.217
S.D.	0.133	0.087	0.001	0.102	0.068	0.002	0.045	0.000
% R.S.D.	144.367	38.791	0.155	114.650	2.166	0.219	348.384	0.000

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Ti (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	0.007	0.429	0.215	0.189	0.013	0.003	0.033	1.300
S.D.	0.013	0.106	0.010	0.178	0.010	0.016	0.019	0.101
% R.S.D.	192.393	24.776	4.735	94.629	79.498	497.375	57.456	7.788

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	0.161	-2.876	0.019	-0.009	0.175
S.D.	0.003	0.037	0.004	0.003	0.321
% R.S.D.	2.088	1.288	18.610	27.622	182.952

10/09/96 12:27 ☎509 372 2829 WESTINGHOUSE →→ MO-824 200W 014

Identity 1: s968000454_0 Identity 2: 0.5ml-9.5ml 12:50 PM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 20.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	0.012	0.034	-0.344	0.991	2.635	-0.002	0.111	-0.012
S.D.	0.021	0.001	0.138	0.051	0.049	0.033	0.005	0.006
% R.S.D.	168.468	4.330	40.076	5.139	1.859	1358.156	4.099	47.305

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	0.782	0.801	0.086	6.865	3.449	0.749	-0.466	-0.317
S.D.	0.008	0.029	0.047	0.049	0.006	0.040	0.203	0.630
% R.S.D.	0.966	3.559	54.364	0.719	0.166	5.318	43.573	198.424

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	-0.941	0.110	0.570	0.598	3.435	0.986	0.071	13.922
S.D.	0.098	0.094	0.004	0.147	0.044	0.002	0.115	0.097
% R.S.D.	10.424	85.414	0.616	24.528	1.268	0.206	160.800	0.695

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	-0.014	0.036	0.081	0.222	0.008	-0.027	0.010	0.810
S.D.	0.016	0.240	0.008	0.210	0.005	0.016	0.015	0.228
% R.S.D.	111.583	661.036	10.410	94.528	59.716	59.987	151.581	28.168

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	0.164	0.602	-0.070	-0.023	-0.773
S.D.	0.003	0.433	0.015	0.003	0.386
% R.S.D.	2.035	72.018	20.749	11.495	49.936

10/09/96 12:27 ☎509 372 2929 WESTINGHOUSE →→→ MO-924 200W 015

Identity 1: S968000454_A Identity 2: 0.5ml-1ml-1ml-7.5ml 12:54 PM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 20.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	200.448	194.005	205.239	203.247	205.991	-0.225	0.122	191.056
S.D.	0.434	0.410	0.765	0.130	0.252	0.099	0.002	1.020
% R.S.D.	0.216	0.211	0.373	0.064	0.123	43.866	1.412	0.534

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	1.509	196.977	200.879	207.658	197.552	198.912	212.127	-14.369
S.D.	0.044	0.164	0.489	0.290	0.360	0.309	0.642	0.754
% R.S.D.	2.923	0.083	0.244	0.140	0.182	0.155	0.302	5.247

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	199.094	196.594	197.128	203.197	202.608	199.257	203.085	204.347
S.D.	0.529	0.238	0.473	1.580	1.373	0.438	0.761	1.312
% R.S.D.	0.266	0.121	0.240	0.777	0.678	0.220	0.375	0.642

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	193.272	206.361	200.114	199.971	178.146	199.417	199.694	196.725
S.D.	0.398	1.288	0.311	0.842	0.365	0.587	0.715	2.152
% R.S.D.	0.206	0.624	0.156	0.421	0.205	0.294	0.358	1.094

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	198.010	194.185	1.500	203.059	196.056
S.D.	0.464	0.251	0.004	0.294	0.466
% R.S.D.	0.234	0.129	0.287	0.145	0.238

10/09/96 12:28 509 372 2929 WESTINGHOUSE →→ MO-924 200W 016

Identity 1: S968000454_DupA Identity 2: 0.5ml-1ml-1ml-7.5ml 12:57 PM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 20.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	200.758	194.312	207.512	205.619	207.023	-0.339	0.153	190.165
S.D.	0.380	0.614	0.865	0.845	0.646	0.001	0.009	0.806
% R.S.D.	0.189	0.316	0.417	0.411	0.312	0.272	5.556	0.424

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	1.260	199.233	201.144	209.540	197.210	201.639	209.562	-12.600
S.D.	0.008	0.276	0.326	0.428	0.462	0.436	0.169	0.866
% R.S.D.	0.662	0.138	0.162	0.204	0.234	0.216	0.081	6.872

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	201.460	195.640	196.666	206.232	205.409	202.490	205.361	204.083
S.D.	0.891	0.545	0.904	2.651	2.081	0.595	0.242	0.880
% R.S.D.	0.442	0.279	0.460	1.285	1.013	0.294	0.118	0.431

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	196.038	209.957	202.233	201.633	178.699	201.563	199.798	198.195
S.D.	1.096	1.334	0.238	0.215	0.593	0.620	0.184	0.183
% R.S.D.	0.559	0.635	0.118	0.107	0.332	0.308	0.092	0.092

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Ti (ppm)
Mean	199.917	194.956	1.549	203.473	197.665
S.D.	0.245	1.094	0.007	0.359	0.286
% R.S.D.	0.123	0.561	0.456	0.176	0.145

10/09/96 12:28 509 372 2929 WESTINGHOUSE →→ MO-824 200W 017

Identity 1: ICSA Identity 2: Quality Control 1:01 PM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	0.003	0.003	-0.035	-0.007	199.471	0.004	-0.001	0.001
S.D.	0.002	0.000	0.010	0.004	0.791	0.002	0.001	0.001
% R.S.D.	66.360	8.826	28.908	53.564	0.397	36.094	65.079	46.208

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	0.005	0.009	0.006	95.008	100.500	-0.001	0.009	-0.022
S.D.	0.000	0.001	0.002	0.212	0.219	0.002	0.007	0.075
% R.S.D.	5.340	15.627	31.110	0.223	0.218	238.286	81.939	348.891

	Ce (ppm)	Sm (ppm)	Be (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	-0.018	0.079	0.003	0.025	-0.018	89.903	0.002	186.682
S.D.	0.022	0.015	0.000	0.008	0.013	0.215	0.006	0.950
% R.S.D.	121.522	19.123	14.440	31.100	70.742	0.239	333.839	0.509

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	-0.000	0.036	0.001	0.011	0.001	-0.001	0.021	0.004
S.D.	0.001	0.020	0.001	0.022	0.001	0.001	0.001	0.027
% R.S.D.	725830.108	55.592	120.183	189.979	86.819	121.563	2.433	636.091

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	-0.002	-0.009	-0.000	0.004	-0.016
S.D.	0.001	0.042	0.001	0.000	0.042
% R.S.D.	50.324	480.584	281.751	3.208	258.900

10/09/96 12:29 ☎509 372 2929 WESTINGHOUSE →→ MO-824 200W 018

Identity 1: ICSAB Identity 2: Quality Control 1:04 PM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	-0.001	0.002	-0.018	-0.005	195.878	0.476	0.488	0.914
S.D.	0.001	0.000	0.011	0.008	1.247	0.003	0.002	0.009
% R.S.D.	137.618	11.267	59.754	166.475	0.637	0.542	0.501	0.981

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	0.964	0.951	0.006	95.280	100.318	0.474	0.031	0.006
S.D.	0.001	0.003	0.003	0.198	0.265	0.002	0.008	0.078
% R.S.D.	0.063	0.308	47.042	0.208	0.264	0.423	27.524	1368.914

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	-0.024	0.085	0.499	0.020	-0.020	88.441	0.031	186.019
S.D.	0.026	0.017	0.002	0.007	0.008	0.082	0.009	1.939
% R.S.D.	106.787	20.258	0.433	35.169	40.533	0.092	28.631	1.042

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	0.003	0.052	0.992	0.959	0.000	0.958	0.016	-0.047
S.D.	0.001	0.027	0.003	0.005	0.001	0.006	0.001	0.029
% R.S.D.	28.784	50.553	0.302	0.522	206.335	0.630	6.698	62.396

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	0.477	0.003	0.487	0.490	0.019
S.D.	0.002	0.025	0.002	0.001	0.045
% R.S.D.	0.378	781.590	0.309	0.206	241.093

10/09/96 12:30 ☎509 372 2929 WESTINGHOUSE →→ MO-924 200W ☑019

Identity 1: CCV Identity 2: Quality Control 1:07 PM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	4.967	4.875	5.076	4.822	4.940	4.923	4.985	4.817
S.D.	0.011	0.009	0.028	0.009	0.043	0.014	0.014	0.018
% R.S.D.	0.218	0.183	0.543	0.178	0.874	0.282	0.277	0.372

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	4.994	4.887	5.034	5.092	4.889	4.907	5.410	9.760
S.D.	0.007	0.002	0.011	0.016	0.020	0.003	0.022	0.045
% R.S.D.	0.148	0.041	0.215	0.309	0.400	0.069	0.402	0.460

	Ce (ppm)	Sm (ppm)	Be (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	4.976	4.953	4.931	4.981	4.845	4.959	5.029	4.846
S.D.	0.012	0.014	0.010	0.005	0.009	0.024	0.017	0.035
% R.S.D.	0.237	0.274	0.204	0.105	0.196	0.479	0.340	0.722

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	4.882	5.112	4.910	4.923	4.778	4.945	5.060	4.904
S.D.	0.006	0.032	0.012	0.003	0.007	0.011	0.011	0.012
% R.S.D.	0.119	0.619	0.243	0.063	0.157	0.213	0.213	0.237

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	4.923	4.754	5.024	5.102	4.977
S.D.	0.003	0.037	0.009	0.011	0.002
% R.S.D.	0.059	0.778	0.170	0.213	0.041

10/09/96 12:30 509 372 2829 WESTINGHOUSE →→ MO-924 200W 020

Identity 1: CCB Identity 2: Quality Control 1:10 PM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	0.001	0.002	-0.002	-0.003	0.010	0.011	0.003	0.003
S.D.	0.001	0.000	0.013	0.002	0.005	0.003	0.000	0.001
% R.S.D.	63.568	21.153	741.003	87.777	47.145	28.934	15.032	23.845

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	0.002	0.006	0.002	0.009	0.005	0.008	-0.011	-0.039
S.D.	0.000	0.001	0.002	0.002	0.001	0.001	0.005	0.017
% R.S.D.	18.646	10.537	121.504	28.145	20.902	16.229	42.893	43.648

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	0.025	-0.000	0.002	0.010	0.003	0.006	0.004	0.016
S.D.	0.006	0.004	0.000	0.005	0.004	0.001	0.003	0.004
% R.S.D.	23.843	2029.007	19.832	50.210	118.103	19.871	78.192	21.823

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Ti (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	0.002	-0.013	0.001	0.030	0.002	-0.012	0.009	0.141
S.D.	0.000	0.014	0.001	0.007	0.000	0.001	0.000	0.007
% R.S.D.	8.645	103.735	97.714	22.379	20.619	7.616	4.174	4.754

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	0.001	0.031	0.002	0.002	0.044
S.D.	0.000	0.020	0.000	0.001	0.009
% R.S.D.	50.966	63.858	4.428	34.561	19.846

10/09/96 12:31 ☎509 372 2929 WESTINGHOUSE →→ MO-924 200W 021

worklistdata Version 1.0 05/15/96
10/25/96 05:16

LABCORE Completed Worklist Report for Worklist# 13774

Analyst: krm **Instrument:** CARB2 **Book#** _____

Method: _____ Rev/Mod _____

Worklist Comment: TK-24-1 TICTOC. RCJ

Seq	Type	Sample#	R	A	Test	Matrix	Actual		Found	DL or Yield	Unit
1	BLNK		0		@TICTOC1 TIC-02	LIQUID	1		2.10E+0	2.100	ug/mL
1	BLNK		0		@TICTOC1 TOC-02	LIQUID	1		6.80E+0	6.800	ug/mL
2	STD		0		@TICTOC1 TIC-02	LIQUID	6.02E+02		5.97E+2	99.169	% Recovery
2	STD		0		@TICTOC1 TOC-02	LIQUID	3.00E+03		2.71E+3	90.333	% Recovery
3	SAMPLE	S96B000453	0		@TICTOC1 TIC-02	LIQUID	N/A	<	5.00E+00	5.000	ug/mL
3	SAMPLE	S96B000453	0		@TICTOC1 TOC-02	LIQUID	N/A		7.42E+01	40.000	ug/mL
4	DUP	S96B000453	0		@TICTOC1 TIC-02	LIQUID	<5.00E+0		2.10E+1		RPD
4	DUP	S96B000453	0		@TICTOC1 TOC-02	LIQUID	7.42E+1		7.80E+1	4.993	RPD
5	SPK	S96B000453	0		@TICTOC1 TIC-02	LIQUID	1.00E+02		1.01E+02	101.000	% Recovery
5	SPK	S96B000453	0		@TICTOC1 TOC-02	LIQUID	1.00E+02		9.10E+01	91.000	% Recovery
6	SAMPLE	S96B000454	0		@TICTOC1 TIC-02	LIQUID	N/A	<	5.00E+00	5.000	ug/mL
6	SAMPLE	S96B000454	0		@TICTOC1 TOC-02	LIQUID	N/A		9.60E+01	40.000	ug/mL
7	DUP	S96B000454	0		@TICTOC1 TIC-02	LIQUID	<5.00E+0		<5.00E+0		RPD
7	DUP	S96B000454	0		@TICTOC1 TOC-02	LIQUID	9.60E+1		8.30E+1	14.525	RPD

RJS 11/25/96

Final page for worklist# 13774

Analyst Signature Date

Analyst Signature Date

Reviewer Signature Date

Results less than detection limit for TIC's, No RPD reported. RW Schroeder 10/29/96

Units shown for QC (BLK/BKG) may not reflect the actual units.

LABCORE Data Entry Template for Worklist# 13774

Analyst: KRM **Instrument:** CARB2 _____ **Book#** 12N126 24/0120

Method: LA-342-100 **Rev/Mod** E-0

Worklist Comment: TK-24-1 TICTOC. RCJ

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	BLNK				@TICTOC1	LIQUID		
2	STD				@TICTOC1	LIQUID		
3	SAMPLE	S96B000453	0		@TICTOC1	LIQUID	96001333	TK 24-1
	Analytes Requested: TIC-02 , TOC-02							
4	DUP	S96B000453	0		@TICTOC1	LIQUID		
5	SPK	S96B000453	0		@TICTOC1	LIQUID		
6	SAMPLE	S96B000454	0		@TICTOC1	LIQUID	96001334	TK 21-1
	Analytes Requested: TIC-02 , TOC-02							
7	DUP	S96B000454	0		@TICTOC1	LIQUID		

Final page for worklist # 13774

[signature] 10-24-96
Analyst Signature **Date**

[signature] 10-25-96
Analyst Signature **Date**

Data Entry Comments:

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

Oct. 25. 1996 4:12AM WHC 222S LAB ROOM 2F BACKSIDE No. 6212 P. 1/18

TIC/TOC: LA-342-100 (E-0)

WORKLIST #	ANALYST INITIALS	ANALYSIS DATE	ANALYSIS TIME	INSTRUMENT CODE
13774	KRM	10-24-96		

[X] BASELINE [ ] BLANK [ ] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] TRIPLICATE SAMPLE # = STD STD # = 12N12F 24N12D SAMPLE WEIGHT (g) / SPIKE/STANDARD VOLUME (mL) TIC: 1mL TOC: .2mL FINAL COULOMETER READING (u TIC: 606.8 TOC: 569.4	[ ] BASELINE [ ] BLANK [X] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] TRIPLICATE SAMPLE # = STD STD # = 12N12F 24N12D SAMPLE WEIGHT (g) / SPIKE/STANDARD VOLUME (mL) TIC: 1mL TOC: .2mL FINAL COULOMETER READING (u TIC: 606.8 TOC: 569.4
[ ] BASELINE [X] BLANK [ ] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] TRIPLICATE SAMPLE # = STD # = SAMPLE WEIGHT (g) / SPIKE/STANDARD VOLUME (mL) TIC: TOC: FINAL COULOMETER READING (u TIC: 11.8 TOC: 33.2	[ ] BASELINE [ ] BLANK [X] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] TRIPLICATE SAMPLE # = 596B 453 STD # = SAMPLE WEIGHT (g) .5mL / SPIKE/STANDARD VOLUME (mL) TIC: TOC: FINAL COULOMETER READING (u TIC: 10.9 TOC: 63.5
[ ] BASELINE [ ] BLANK [X] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] TRIPLICATE SAMPLE # = 596B 453 STD # = SAMPLE WEIGHT (g) .5mL / SPIKE/STANDARD VOLUME (mL) TIC: TOC: FINAL COULOMETER READING (u TIC: 20.2 TOC: 65.4	[ ] BASELINE [ ] BLANK [ ] SAMPLE [ ] DUPLICATE [X] SPIKE [ ] TRIPLICATE SAMPLE # = 596B 453 STD # = SAMPLE WEIGHT (g) .5mL / SPIKE/STANDARD VOLUME (mL) TIC: 5 TOC: FINAL COULOMETER READING (u TIC: 314.1 TOC: 336.5
[ ] BASELINE [ ] BLANK [X] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] TRIPLICATE SAMPLE # = 596B 454 STD # = SAMPLE WEIGHT (g) .1mL / SPIKE/STANDARD VOLUME (mL) TIC: TOC: FINAL COULOMETER READING (u TIC: 10.1 TOC: 36.0	[ ] BASELINE [ ] BLANK [ ] SAMPLE [X] DUPLICATE [ ] SPIKE [ ] TRIPLICATE SAMPLE # = 596B 454 STD # = SAMPLE WEIGHT (g) .1mL / SPIKE/STANDARD VOLUME (mL) TIC: TOC: FINAL COULOMETER READING (u TIC: 9.6 TOC: 34.7

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WORKBOOK PAGE: BLANK1

TIC/TOC : LA-342-100 (E-0) LIQUIDS

Type			TIC	TOC
BLNK	Sample Size in mL	(SS)	0.5000	0.5000
	Dilution Factor	(DF)	1	1
WorkList	µg of Carbon in Sample	(C1)	11.8	33.2
13774	µg of Carbon from Baseline	(C2)	9.7	26.4

Test Code
@TICTOC1

Matrix
LIQUID

Batch Number
96010295

Rerun
0

µg of Carbon = |C1-C2|

Sample Prep
N/A

Sample #

Instrument Code
CARB2

Prepared By
LCM

Chemist
RWS

Analyst
KRM

Date Complete
10/25/96

Analysis Date
10/24/96

Analysis Time		TIC	TOC
09:21 PM	Method Detection Limit in µg/mL	5	40
Sample Point	µg of Carbon	2.10E+00	6.80E+00
TK 24-1			

Data Entered By:	LCM	Date:	10/25/96
Signature of Chemist:	RWS Johnson	Date:	10/29/96

BLANK.WB1 REV 1.0 342100ML

WORKBOOK PAGE: STD2

TIC/TOC : LA-342-100 (E-0) LIQUIDS

Type		TIC	TOC
STD	Sample Size in mL (SS)	1.0000	0.2000
	Dilution Factor (DF)	1	1
Work List	Final Coulometer Reading in µg (C1)	606.8	569.4
13774	µg of Carbon from Baseline (C2)	9.7	26.4
Test Code	Standard Book Number	22N12F	24N12D
@TICTOC1	Standard Value (µg/ml)	602	3000

Matrix	
LIQUID	
Batch Number	
96010295	
Rerun	
0	QC Actual in µg/mL = Standard Value (µg/mL)
Sample Prep	QC Found in µg/mL = (C1 - C2) * DF / SS
N/A	QC Found in µg/mL for TIC = 5 If C1 < C2
Sample #	QC Found in µg/mL for TOC = 40 If C1 < C2
Instrument Code	% Recovery = QC Found / QC Actual * 100
CARB2	
Prepared By	
LCM	
Chemist	
RWS	
Analyst	
KRM	
Date Complete	
10/25/96	
Analysis Date	
10/24/96	
Analysis Time	
09:21 PM	
Sample Point	
TK 24-1	

	TIC	TOC
Method Detection Limit in µg/mL	5	40
QC Actual in µg/mL	6.02E+02	3.00E+03
QC Found in µg/mL	5.97E+02	2.71E+03
Percent Standard Recovery	99.2	90.5

Data Entered By: LCM Date: 10/25/96

Signature of Chemist: RW Schneider Date: 10/29/96

STANDARD.WB1 REV 1.0 342100ML

I:\342100\OUT\TT13774.WB1 10/25/96 05:19:13

WORKBOOK PAGE: SAM6

TIC/TOC : LA-342-100 (E-0) LIQUIDS

Type			TIC	TOC
SAMPLE	Sample Size in mL	(SS)	0.1000	0.1000
	Dilution Factor	(DF)	1	1
Work List	µg of Carbon in Sample	(C1)	10.1	36
13774	µg of Carbon from Baseline	(C2)	9.7	26.4
Test Code				
@TICTOC1				

Matrix	
LIQUID	
Batch Number	
96010295	
Rerun	µg of Carbon/mL = (C1-C2) * DF / SS
0	µg of Carbon/mL for TIC = 5 if C1 < C2
Sample Prep	µg of Carbon/mL for TOC = 40 if C1 < C2
N/A	
Sample #	
S96B000454	
Instrument Code	
CARB2	
Prepared By	
LCM	
Chemist	
RWS	
Analyst	
KRM	
Date Complete	
10/25/96	NOTE: FOR TIC: The Reported Result is < 5.
Analysis Date	
10/24/96	
Analysis Time	
09:21 PM	
Sample Point	
TK 24-1	

			TIC	TOC
Method Detection Limit in µg/mL			5	40
µg of Carbon/mL	Note:	<	4.00E+00	9.60E+01

Data Entered By:	LCM	Date:	10/25/96
Signature of Chemist:	RW Schroeder	Date:	10/29/96

SAMPLE.WB1 REV 1.0 342100ML

I:\342100\OUT\TT13774.WB1 10/25/96 05:20:17

WORKBOOK PAGE: DUP7

TIC/TOC : LA-342-100 (E-0) LIQUIDS

Type	Sample Size in mL (SS)	TIC	TOC
DUP	Dilution Factor (DF)	1	1
Work List	µg of Carbon in Sample (C1)	9.6	34.7
13774	µg of Carbon from Baseline (C2)	9.7	26.4
Test Code	Known µg of C from Original Sample	<4.00E-1	<9.60E+0
@TICTOC1			
Matrix			
LIQUID			
Batch Number			
96010295			
Rerun	µg of Carbon/mL = (C1-C2) * DF / SS		
0	µg of Carbon/mL for TIC = 5 If C1 < C2		
Sample Prep	µg of Carbon/mL for TOC = 40 If C1 < C2		
N/A			
Sample #			
S96B000454			
Instrument Code			
CARB2			
Prepared By			
LCM			
Chemist			
RWS			
Analyst			
KRM			
Date Complete			
10/25/96	NOTE: FOR TIC: The Reported Result is < 5.		
Analysis Date			
10/24/96		TIC	TOC
Analysis Time	Method Detection Limit in µg/mL	5	40
09:21 PM			
Sample Point	µg of Carbon/mL Note: <	5.00E+00	8.30E+01
TK 24-1			

Data Entered By:	LCM	Date:	10/25/96
Signature of Chemist:	R W Edwards	Date:	10/29/96

SAMPLE.WB1 REV 1.0 342100ML

I:\342100\OUT\TT13774.WB1 10/25/96 05:20:36

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0
<<< BLANK ANALYSIS >>>

Sample: BASE1 Date: 10/24/96 Time: 21:21:54

Sample Size = 1 uL
Dil Factor = 1
Blank ID # = BASE1
Blank Value = N/A

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	1.50	0.00
2	1.01	2.50	40.00
3	1.51	2.90	13.79
4	2.00	3.30	12.12
5	2.50	3.90	15.38
6	3.00	4.30	9.30
7	3.50	4.70	8.51
8	4.00	5.00	6.00
9	4.50	5.40	7.41
10	5.00	5.80	6.90
11	5.50	6.00	3.33
12	6.00	6.50	7.69
13	6.50	6.70	2.99
14	7.00	7.00	4.29
15	7.50	7.40	5.41
16	8.00	7.70	3.90
17	8.50	8.00	3.75
18	9.00	8.20	2.44
19	9.50	8.60	4.65
20	10.00	8.90	3.37
21	10.50	9.30	4.30
22	11.00	9.70	4.12

BLANK VALUE = 9.7 micrograms carbon
BLANK FACTOR = 9.7 / 10.99963 = +8.8E-01 ug/min Carbon

SIGNATURE BELOW REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 72 TO 81.

Sample Run By: [signature] 10-24-96
KR MONTEITH 00000

Oct. 25. 1996 4:13AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 3/18

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0
<<< BLANK ANALYSIS >>>

Sample: BASE1 Date: 10/24/96 Time: 21:34:35

Sample Size = 1 uL
Dil Factor = 1
Blank ID # = BASE1
Blank Value = N/A

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.40	0.00
2	1.01	1.00	60.00
3	1.50	3.40	70.59
4	2.00	7.60	55.26
5	2.50	12.60	39.68
6	3.00	16.00	21.25
7	3.50	18.10	11.60
8	4.00	19.40	6.70
9	4.50	20.20	3.96
10	5.00	21.10	4.27
11	5.50	21.70	2.76
12	6.00	22.20	2.25
13	6.50	22.70	2.20
14	7.00	23.20	2.16
15	7.50	23.60	1.69
16	8.00	24.10	2.07
17	8.50	24.40	1.23
18	9.00	24.90	2.01
19	9.50	25.20	1.19
20	10.00	25.70	1.95
21	10.50	26.00	1.15
22	11.00	26.40	1.52

BLANK VALUE = 26.4 micrograms carbon
BLANK FACTOR = 26.4 / 11.00061 = +2.40E+00 ug/min Carbon

<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!!>>>>

Sample Run By: _____
KR MONTEITH 00000

Oct. 25. 1996 4:13AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 4/18

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: BLK1 Date: 10/24/96 Time: 22:19:44

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = .88 ug/minute C

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	1.00	0.00
2	1.01	2.90	65.52
3	1.51	4.30	32.56
4	2.01	5.40	20.37
5	2.51	5.70	5.26
6	3.01	6.10	6.56
7	3.51	6.50	6.15
8	4.01	6.80	4.41
9	4.50	7.20	5.56
10	5.00	7.40	2.70
11	5.50	7.80	5.13
12	6.00	8.20	4.88
13	6.50	8.60	4.65
14	7.00	9.00	4.44
15	7.50	9.40	4.26
16	8.00	9.80	4.08
17	8.50	10.00	2.00
18	9.00	10.40	3.85
19	9.50	10.90	4.59
20	10.00	11.20	2.68
21	10.50	11.40	1.75
22	11.00	11.80	3.39

USER INPUT BLANK VALUE
BLANK VALUE = 9.680537 micrograms carbon
BLANK FACTOR = 9.680537 / 11.00061 = +8.8E-01 ug/min Carbon

SAMPLE RESULTS:
(11.8 - 9.679033)(1)/(1) = +2.12E+00 g/L Carbon
(11.8 - 9.679033)(1)/(1)(12) = +1.77E-01 Molar Carbon

Sample Run By: _____
KR MONTEITH 00000

Oct. 25. 1996 4:14AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 7/18

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: BLK1 Date: 10/24/96 Time: 22:45:00

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = 2.4 ug/minute C

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.30	0.00
2	1.01	2.60	88.46
3	1.50	10.90	76.15
4	2.00	17.90	39.11
5	2.50	21.30	15.96
6	3.00	23.90	10.88
7	3.50	25.30	5.53
8	4.00	26.50	4.53
9	4.50	27.50	3.64
10	5.00	28.40	3.17
11	5.50	29.30	3.07
12	6.00	29.60	1.01
13	6.50	30.10	1.66
14	7.00	30.70	1.95
15	7.50	31.00	0.97
16	8.00	31.40	1.27
17	8.50	31.60	0.63
18	9.00	32.00	1.25
19	9.50	32.30	0.93
20	10.00	32.60	0.92
21	10.50	33.00	1.21
22	11.00	33.20	0.60

USER INPUT BLANK VALUE
BLANK VALUE = 26.40147 micrograms carbon
BLANK FACTOR = 26.40147 / 11.00061 = +2.4E+00 ug/min Carbon

SAMPLE RESULTS:
(33.2 - 26.39707)(1)/(1) = +6.80E+00 g/L Carbon
(33.2 - 26.39707)(1)/(1)(12) = +5.67E-01 Molar Carbon
<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!!>>>>

Sample Run By: _____
KR MONTEITH 00000

Oct. 25. 1996 4:15AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 8/18

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: STD1 Date: 10/24/96 Time: 21:48:42

Sample Size = 1000 uL
Dil Factor = 1
Blank ID # =
Blank Value = .88 ug/minute C

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.70	0.00
2	1.01	23.80	97.06
3	1.51	163.60	85.45
4	2.01	301.90	45.81
5	2.51	407.00	25.82
6	3.01	479.20	15.07
7	3.51	529.90	9.57
8	4.01	562.70	5.83
9	4.50	582.20	3.35
10	5.00	593.00	1.82
11	5.50	598.50	0.92
12	6.01	601.20	0.45
13	6.51	602.80	0.27
14	7.00	603.60	0.13
15	7.50	604.20	0.10
16	8.00	604.70	0.08
17	8.50	605.00	0.05
18	9.00	605.40	0.07
19	9.50	605.70	0.05
20	10.00	606.10	0.07
21	10.50	606.40	0.05
22	11.00	606.80	0.07

USER INPUT BLANK VALUE
BLANK VALUE = 9.680537 micrograms carbon
BLANK FACTOR = 9.680537 / 11.00061 = +8.8E-01 ug/min Carbon

SAMPLE RESULTS:
(606.8 - 9.682148)(1)/(1000) = +5.971E-01 g/L Carbon
(606.8 - 9.682148)(1)/(1000)(12) = +4.976E-02 Molar Carbon

Sample Run By: _____
KR MONTEITH 00000

Oct. 25. 1996 4:14AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 5/18

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: STD1 Date: 10/24/96 Time: 22:04:52

Sample Size = 200 uL
Dil Factor = 1
Blank ID # =
Blank Value = 2.4 ug/minute C

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.30	0.00
2	1.01	1.30	76.92
3	1.50	7.40	82.43
4	2.00	17.30	57.23
5	2.50	28.20	38.65
6	3.00	41.90	32.70
7	3.50	64.90	35.44
8	4.00	167.70	61.30
9	4.50	331.40	49.40
10	5.00	428.80	22.71
11	5.50	484.70	11.53
12	6.00	515.40	5.96
13	6.50	530.70	2.88
14	7.00	538.20	1.39
15	7.50	542.40	0.77
16	8.00	544.80	0.44
17	8.50	546.30	0.27
18	9.00	548.00	0.31
19	9.50	555.30	1.31
20	10.00	560.90	1.00
21	10.50	565.20	0.76
22	11.00	569.40	0.74

USER INPUT BLANK VALUE
BLANK VALUE = 26.40147 micrograms carbon
BLANK FACTOR = 26.40147 / 11.00061 = +2.4E+00 ug/min Carbon

SAMPLE RESULTS:
(569.4 - 26.39707)(1)/(200) = +2.715E+00 g/L Carbon
(569.4 - 26.39707)(1)/(200)(12) = +2.263E-01 Molar Carbon
<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!!>>>>

Sample Run By: KR MONTEITH 00000

Oct. 25. 1996 4:14AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 6/18

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S96B454-1 Date: 10/24/96 Time: 22:58:54

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = .88 ug/minute C

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.40	0.00
2	1.00	1.40	71.43
3	1.50	3.50	60.00
4	2.00	4.80	27.08
5	2.50	5.10	5.88
6	3.00	5.60	8.93
7	3.50	6.00	6.67
8	4.00	6.30	4.76
9	4.50	6.60	4.55
10	5.00	6.90	4.35
11	5.50	7.20	4.17
12	6.00	7.50	4.00
13	6.50	7.60	1.32
14	7.00	7.90	3.80
15	7.50	8.20	3.66
16	8.00	8.50	3.53
17	8.50	8.70	2.30
18	9.00	9.00	3.33
19	9.50	9.20	2.17
20	10.00	9.50	3.16
21	10.50	9.90	4.04
22	11.00	10.10	1.98

USER INPUT BLANK VALUE
BLANK VALUE = 9.680537 micrograms carbon
BLANK FACTOR = 9.680537 / 11.00061 = +8.8E-01 ug/min Carbon

SAMPLE RESULTS:
(10.1 - 9.681289)(1)/(1) = +4.19E-01 g/L Carbon
(10.1 - 9.681289)(1)/(1)(12) = +3.49E-02 Molar Carbon

Sample Run By: _____
KR MONTEITH 00000

Oct. 25. 1996 4:18AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 15/18

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S96B454 Date: 10/24/96 Time: 23:21:16

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = 2.4 ug/minute C

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.30	0.00
2	1.01	4.40	93.18
3	1.51	15.80	72.15
4	2.01	22.00	28.18
5	2.51	24.90	11.65
6	3.01	27.00	7.78
7	3.50	28.60	5.59
8	4.00	29.50	3.05
9	4.50	30.30	2.64
10	5.00	31.10	2.57
11	5.50	31.80	2.20
12	6.00	32.50	2.15
13	6.50	32.90	1.22
14	7.00	33.40	1.50
15	7.50	33.80	1.18
16	8.00	34.20	1.17
17	8.50	34.60	1.16
18	9.00	34.80	0.57
19	9.50	35.20	1.14
20	10.00	35.40	0.56
21	10.50	35.60	0.56
22	11.00	36.00	1.11

USER INPUT BLANK VALUE
BLANK VALUE = 26.40147 micrograms carbon
BLANK FACTOR = 26.40147 / 11.00061 = +2.4E+00 ug/min Carbon

SAMPLE RESULTS:
(36 - 26.39736)(1)/(1) = +9.60E+00 g/L Carbon
(36 - 26.39736)(1)/(1)(12) = +8.00E-01 Molar Carbon
<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!!>>>>

Sample Run By: _____
KR MONTEITH 00000

Oct. 25. 1996 4:18AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 16/18

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S96B454DUP-1 Date: 10/24/96 Time: 23:45:25

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = .88 ug/minute C

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.10	0.00
2	1.01	1.20	91.67
3	1.51	3.40	64.71
4	2.01	4.30	20.93
5	2.50	4.90	12.24
6	3.00	5.20	5.77
7	3.50	5.50	5.45
8	4.00	5.80	5.17
9	4.50	6.10	4.92
10	5.00	6.40	4.69
11	5.50	6.70	4.48
12	6.00	6.90	2.90
13	6.50	7.20	4.17
14	7.00	7.60	5.26
15	7.50	7.90	3.80
16	8.00	8.00	1.25
17	8.50	8.30	3.61
18	9.00	8.50	2.35
19	9.50	8.80	3.41
20	10.00	9.10	3.30
21	10.50	9.40	3.19
22	11.00	9.60	2.08

USER INPUT BLANK VALUE
BLANK VALUE = 9.680537 micrograms carbon
BLANK FACTOR = 9.680537 / 11.00061 = +8.8E-01 ug/min Carbon

SAMPLE RESULTS:
(9.6 - 9.678926)(1)/(1) = < 5.00 E-3 g/L Carbon
(9.6 - 9.678926)(1)/(1)(12) = < 4.17 E-4 Molar Carbon

Sample Run By: _____
KR MONTEITH 00000

Oct. 25. 1996 4:19AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 17/18

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S96B454DUP-1 Date: 10/25/96 Time: 01:06:47

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = 2.4 ug/minute C

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.50	0.00
2	1.01	1.20	58.33
3	1.51	3.40	64.71
4	2.00	8.60	60.47
5	2.50	16.00	46.25
6	3.00	20.70	22.71
7	3.50	23.50	11.91
8	4.00	25.00	6.00
9	4.50	26.10	4.21
10	5.00	27.30	4.40
11	5.50	28.20	3.19
12	6.00	29.00	2.76
13	6.50	29.90	3.01
14	7.00	30.60	2.29
15	7.50	31.20	1.92
16	8.00	31.90	2.19
17	8.50	32.30	1.24
18	9.00	32.70	1.22
19	9.50	33.30	1.80
20	10.00	33.80	1.48
21	%-1429.50	34.40	1.74
22	%-1429.00	34.70	0.86

USER INPUT BLANK VALUE
BLANK VALUE = 0 micrograms carbon
BLANK FACTOR = 0 / 0 = +2.4E+00 ug/min Carbon

SAMPLE RESULTS:
(34.7 --3429.601)(1)/(1) = +3.46E+03 g/L Carbon
(34.7 --3429.601)(1)/(1)(12) = +2.89E+02 Molar Carbon
<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!!>>>>

Sample Run By: _____
KR MONTEITH 00000

Oct. 25. 1996 4:19AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 18/18

worklistrpt Version 2.1 05/15/95
12/04/96 08:56

LABCORE Data Entry Template for Worklist# 15372

Analyst: dgg **Instrument:** TOC01 _____ **Book #** _____

Method: LA-342-100 Rev/Mod E-0

Worklist Comment: 21-1TK TOC. RCJ

GROUP	PROJECT	S TYPE	SAMPLE#	R A	-------TEST------	MATRIX	ACTUAL	FOUND	DL	UNIT
		1 BLNK			TOC-02	LIQUID	1	1.70	N/A	ug/mL
		2 STD			TOC-02	LIQUID	3.00 e3	2.59 e3	N/A	ug/mL
96001334	TANK 21-1	3 SAMPLE	S96B000454	0	TOC-02	LIQUID	N/A	4.40 e1	40	ug/mL

Final page for worklist # 15372

Analyst Signature Date

[signature] 12-4-96
Analyst Signature Date

Approved RW Schwech 12/5/96

Data Entry Comments:

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

CARB #1

12/03/96 09:27
A-0004-1

LABCORE Data Entry Template for Worklist# 15372

Analyst: [illegible] **Instrument:** TOC01 _____ **Book#** TOC 22N12-F
TOC ~~22N~~ 1028 24N12-E

Method: LA-342-100 **Rev/Mod** _____

Worklist Comment: 21-1TK TOC. RCJ

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	BLNK				TOC-02	LIQUID		
2	STD				TOC-02	LIQUID		
3	SAMPLE	S96B000454	0		TOC-02	LIQUID	96001334	TANK 21-1

Analytes Requested: TOC-02

Final page for worklist # 15372

[illegible] 12-3-96
Analyst Signature **Date**

Analyst Signature **Date**

Very limited sample left (<.25mL). Run with largest sample size possible. [illegible] 12/3/96

Data Entry Comments: NO MORE SAMPLE, UIP.

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

Dec. 4. 1996 1:22AM WHC 2225 LAB ROOM 2F BACKSIDE No. 7574 P. 1/9

CARB #1

TIC/TOC: LA-342-100 (E-0)

WORKLIST #	ANALYST INITIALS	ANALYSIS DATE	ANALYSIS TIME	INSTRUMENT CODE
WL 15372	OSS	12-3-96	2400	

[X] BASELINE [ ] BLANK [ ] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] TRIPLICATE

SAMPLE # = STD # =

SAMPLE WEIGHT (g) / SPIKE/STANDARD VOLUME (mL) TIC: TOC:

FINAL COULOMETER READING (u TIC: 8.00 TOC: 30.90

[ ] BASELINE [ ] BLANK [ ] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] TRIPLICATE

SAMPLE # = STD # =

SAMPLE WEIGHT (g) / SPIKE/STANDARD VOLUME (mL) TIC: TOC:

FINAL COULOMETER READING (u TIC: TOC:

[ ] BASELINE [ ] BLANK [ ] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] TRIPLICATE

SAMPLE # = STD # = TIC 22N12-F TOC 2UN12-E

SAMPLE WEIGHT (g) / SPIKE/STANDARD VOLUME (mL) TIC: 1.00ml TOC: .200ml

FINAL COULOMETER READING (u TIC: 597.50 TOC: 548.00

[ ] BASELINE [ ] BLANK [ ] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] TRIPLICATE

SAMPLE # = STD # =

SAMPLE WEIGHT (g) / SPIKE/STANDARD VOLUME (mL) TIC: TOC:

FINAL COULOMETER READING (u TIC: TOC:

[ ] BASELINE [X] BLANK [ ] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] TRIPLICATE

SAMPLE # = STD # =

SAMPLE WEIGHT (g) / SPIKE/STANDARD VOLUME (mL) TIC: TOC:

FINAL COULOMETER READING (u TIC: 9.00 TOC: 32.60

[ ] BASELINE [ ] BLANK [ ] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] TRIPLICATE

SAMPLE # = STD # =

SAMPLE WEIGHT (g) / SPIKE/STANDARD VOLUME (mL) TIC: TOC:

FINAL COULOMETER READING (u TIC: TOC:

[ ] BASELINE [ ] BLANK [X] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] TRIPLICATE

SAMPLE # = 596B000454 STD # =

SAMPLE WEIGHT (g) / SPIKE/STANDARD VOLUME (mL) .250 ml 0.2462 g. TIC: — TOC: —

FINAL COULOMETER READING (u TIC: TOC: 41.90

[ ] BASELINE [ ] BLANK [ ] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] TRIPLICATE

SAMPLE # = STD # =

SAMPLE WEIGHT (g) / SPIKE/STANDARD VOLUME (mL) TIC: TOC:

FINAL COULOMETER READING (u TIC: TOC:

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0
<<< BLANK ANALYSIS >>>

Sample: BASELINE Date: 12/03/96 Time: 22:16:23

Sample Size = 1 uL
Dil Factor = 1
Blank ID # = BASELINE
Blank Value = N/A

Analyst : DG GRIFFIN
Min Readings = 22
Max Readings = 22
% Difference = 10

== Reading	==== Analysis Time	==== Coulometer	==== % Difference ==
1	0.51	0.30	0.00
2	1.01	2.00	85.00
3	1.50	8.80	77.27
4	2.00	16.20	45.68
5	2.50	20.40	20.59
6	3.00	22.40	8.93
7	3.50	23.60	5.08
8	4.00	24.70	4.45
9	4.50	25.60	3.52
10	5.00	26.30	2.66
11	5.50	26.90	2.23
12	6.00	27.40	1.82
13	6.50	27.80	1.44
14	7.00	28.20	1.42
15	7.50	28.60	1.40
16	8.00	28.90	1.04
17	8.50	29.20	1.03
18	9.00	29.60	1.35
19	9.50	29.90	1.00
20	10.00	30.30	1.32
21	10.50	30.50	0.66
22	11.00	30.90	1.29

BLANK VALUE = 30.9 micrograms carbon
BLANK FACTOR = 30.9 / 11.00061 = +2.81E+00 ug/min Carbon

<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!!>>>>

SIGNATURE BELOW REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 85 TO 88.

Sample Run By: Ralph W Schroeder for DG Griffin 12/06/96
DG GRIFFIN 00000

#1

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: STD 24N12-E Date: 12/03/96 Time: 22:47:39

Sample Size = 200 uL
Dil Factor = 1
Blank ID # =
Blank Value = 2.81 ug/minute C

Analyst : DG GRIFFIN
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.40	0.00
2	1.01	1.90	78.95
3	1.50	24.50	92.24
4	2.00	164.20	85.08
5	2.50	392.60	58.18
6	3.00	495.50	20.77
7	3.50	526.30	5.85
8	4.00	536.00	1.81
9	4.50	540.10	0.76
10	5.00	542.00	0.35
11	5.50	543.20	0.22
12	6.00	543.90	0.13
13	6.50	544.40	0.09
14	7.00	545.20	0.15
15	7.50	545.40	0.04
16	8.00	545.90	0.09
17	8.50	546.40	0.09
18	9.00	546.60	0.04
19	9.50	547.00	0.07
20	10.00	547.40	0.07
21	10.50	547.70	0.05
22	11.00	548.00	0.05

USER INPUT BLANK VALUE
BLANK VALUE = 30.91171 micrograms carbon
BLANK FACTOR = 30.91171 / 11.00061 = +2.8E+00 ug/min Carbon

SAMPLE RESULTS:
(548 - 30.90966)(1)/(200) = +2.585E+00 g/L Carbon
(548 - 30.90966)(1)/(200)(12) = +2.155E-01 Molar Carbon
<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!!>>>>

Sample Run By: _____
DG GRIFFIN 00000

Dec. 4. 1996 1:25AM WHC 222S LAB ROOM 2F BACKSIDE No. 7574 P. 6/9

#1

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: BLANK Date: 12/03/96 Time: 23:14:31

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = 2.81 ug/minute C

Analyst : DG GRIFFIN
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.30	0.00
2	1.01	1.90	84.21
3	1.51	9.00	78.89
4	2.01	18.00	50.00
5	2.51	23.00	21.74
6	3.00	25.30	9.09
7	3.50	26.50	4.53
8	4.00	27.50	3.64
9	4.50	28.30	2.83
10	5.00	28.80	1.74
11	5.50	29.30	1.71
12	6.00	29.70	1.35
13	6.50	30.00	1.00
14	7.00	30.40	1.32
15	7.50	30.70	0.98
16	8.00	31.00	0.97
17	8.50	31.20	0.64
18	9.00	31.50	0.95
19	9.50	31.80	0.94
20	10.00	32.00	0.63
21	10.50	32.30	0.93
22	11.00	32.60	0.92

USER INPUT BLANK VALUE
BLANK VALUE = 30.91171 micrograms carbon
BLANK FACTOR = 30.91171 / 11.00061 = +2.8E+00 ug/min Carbon

SAMPLE RESULTS:
(32.6 - 30.90966)(1)/(1) = +1.69E+00 g/L Carbon
(32.6 - 30.90966)(1)/(1)(12) = +1.41E-01 Molar Carbon
<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!!>>>>

Sample Run By: _____
DG GRIFFIN 00000

Dec. 4. 1996 1:24AM WHC 222S LAB ROOM 2F BACKSIDE No. 7574 P. 4/9

#1

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S96T000454 Date: 12/03/96 Time: 23:45:49

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = 2.81 ug/minute C

Analyst : DG GRIFFIN
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.30	0.00
2	1.01	1.20	75.00
3	1.50	7.70	84.42
4	2.00	18.90	59.26
5	2.50	28.50	33.68
6	3.00	32.90	13.37
7	3.50	34.80	5.46
8	4.00	36.10	3.60
9	4.50	37.00	2.43
10	5.00	37.80	2.12
11	5.50	38.50	1.82
12	6.00	38.90	1.03
13	6.50	39.30	1.02
14	7.00	39.70	1.01
15	7.50	40.00	0.75
16	8.00	40.30	0.74
17	8.50	40.60	0.74
18	9.00	41.00	0.98
19	9.50	41.20	0.49
20	10.00	41.40	0.48
21	10.50	41.70	0.72
22	11.00	41.90	0.48

USER INPUT BLANK VALUE
BLANK VALUE = 30.91171 micrograms carbon
BLANK FACTOR = 30.91171 / 11.00061 = +2.8E+00 ug/min Carbon

SAMPLE RESULTS:
(41.9 - 30.90931)(1)/(1) = +1.10E+01 g/L Carbon
(41.9 - 30.90931)(1)/(1)(12) = +9.16E-01 Molar Carbon
<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!!>>>>

Sample Run By: _____
DG GRIFFIN 00000

Dec. 4 1996 1:23AM WHC 222S LAB ROOM 2F BACKSIDE No. 7574 P. 3/9

TIC/TOC : LA-342-100 (E-0)	LIQUIDS		TIC	TOC
Type	Sample Size in mL	(SS)		0.0000
BLANK	Dilution Factor	(DF)		1
Work List	µg of Carbon in Sample	(C1)		32.6
15372	µg of Carbon from Baseline	(C2)		30.9
Test Code				
TOC-02				
Matrix				
LIQUID				
Batch Number				
Rerun	µg of Carbon = |C1-C2|			
Sample Prep				
Sample #				
BLNK				
Instrument Code				
TOC01				
Prepared By				
RTS				
Chemist				
RWS				
Analyst				
DGG				
Date Complete				
12/04/96				
Analysis Date				
12/03/96			TIC	TOC
Analysis Time	Method Detection Limit in µg/mL		5	40
Sample Point	µg of Carbon			1.70E+00
TANK-21-1				

Data Entered By:	RTS	Date:	12/04/96
Signature of Chemist:		Date:	12/5/96

BLANK.WB1 REV 1.0 342100ML

TIC/TOC : LA-342-100 (E-0) LIQUIDS

Type	Work List #	Test Code	Matrix	Batch Number	Rerun #	Sample Prep	Sample #	Instrument Code	Prepared By	Chemist	Analyst	Date Complete	Analysis Date	Analysis Time	Sample Point
STANDARD	15372	TOC-02	LIQUID				STD	TOC01	RTS	RWS	DGG	12/04/96	12/03/96		TANK 21-1

		TIC	TOC
Sample Size in mL	(SS)		0.2000
Dilution Factor	(DF)		1
Final Coulometer Reading in µg	(C1)		548
µg of Carbon from Baseline	(C2)		30.9
Standard Book Number			24N12E
Standard Value (µg/ml)			3000

QC Actual in µg/mL = Standard Value (µg/mL)
QC Found in µg/mL = (C1 - C2) * DF / SS
QC Found in µg/mL for TIC = 5 if C1 < C2
QC Found in µg/mL for TOC = 40 if C1 < C2

% Recovery = QC Found / QC Actual * 100

NOTE: FOR TIC: The Reported Result is < 5.

			TIC	TOC
Method Detection Limit in µg/mL			5	40
QC Actual in µg/mL				3.00E+03
QC Found in µg/mL	See Note:	<		2.59E+03
Percent Standard Recovery				86.2

Data Entered By:	RTS	Date:	12/04/96
Signature of Chemist:	[signature]	Date:	12/5/96

STANDARD WB1 REV 1.0 342100ML

TIC/TOC : LA-342-100 (E-0) LIQUIDS

Type	Sample Size In mL	(SS)	TIC	TOC
SAMPLE	Dilution Factor	(DF)	1	1
Work List	µg of Carbon In Sample	(C1)		41.9
15372	µg of Carbon from Baseline	(C2)		30.9
Test Code				
TOC-02				

Matrix
LIQUID
Batch Number
Rerun
Sample Prep
Sample #
S96B000454
Instrument Code
TOC01
Prepared By
RTS
Chemist
RWS
Analyst
DGG
Date Complete
12/04/96
Analysis Date
12/03/96
Analysis Time
Sample Point
TANK 21-1

µg of Carbon/mL = (C1-C2) * DF / SS
µg of Carbon/mL for TIC = 5 If C1 < C2
µg of Carbon/mL for TOC = 40 If C1 < C2

NOTE: FOR TIC: The Reported Result is < 5.

		TIC	TOC
Method Detection Limit in µg/mL		5	40
µg of Carbon/mL	Note: <		4.40E+01

Data Entered By:	RTS	Date:	12/04/96
Signature of Chemist:	[signature]	Date:	12/5/96

SAMPLE.WB1 REV 1 0 342100ML

worklistrad Version 1.0 05/09/96
10/28/96 03:07

LABCORE Completed RadChem Report for Worklist#: 13777

Analyst: krq **Instrument:** GEA03 **Book#** _____

Method: _____ **Rev/Mod** _____

Worklist Comment: Sample size is on traveler.Std:TINKFUS (1.0ml). new

Seq	Type	Sample#	R	A	Test	Matrix	Actual		Found	DL or Yield	Unit
1	STD		0		@GEA-02 CO60-02	LIQUID	7.955e-03		7.82e-03	98.303	% Recovery
1	STD		0		@GEA-02 CO60-02E	LIQUID	1		2.26	2.260	% Ct Error
1	STD		0		@GEA-02 CS13702	LIQUID	7.717e-03		7.70e-03	99.780	% Recovery
1	STD		0		@GEA-02 CS13702E	LIQUID	1		2.93	2.930	% Ct Error
2	BLNK		0		@GEA-02 CO60-02	LIQUID	1		<2.60e-2		uCi/mL
2	BLNK		0		@GEA-02 CS13702	LIQUID	1		<6.18e-2		uCi/mL
2	BLNK		0		@GEA-02 EU15402	LIQUID	1		<6.67e-2		uCi/mL
2	BLNK		0		@GEA-02 EU15502	LIQUID	1		<6.42e-2		uCi/mL
2	BLNK		0		@GEA-02 AM24102	LIQUID	1		<1.54e-1		uCi/mL
3	SAMPLE	S96B000453	0		@GEA-02 CO60-02	LIQUID	N/A	<	2.325e-02	230.0e-004	uCi/mL
3	SAMPLE	S96B000453	0		@GEA-02 CO60-02E	LIQUID	N/A		n/a	0.0e+000	% Ct. Error
3	SAMPLE	S96B000453	0		@GEA-02 CS13702	LIQUID	N/A		4.370e+01	0.0e+000	uCi/mL
3	SAMPLE	S96B000453	0		@GEA-02 CS13702E	LIQUID	N/A		1.04	0.0e+000	% Ct. Error
3	SAMPLE	S96B000453	0		@GEA-02 EU15402	LIQUID	N/A	<	9.317e-02	930.0e-004	uCi/mL
3	SAMPLE	S96B000453	0		@GEA-02 EU15402E	LIQUID	N/A		n/a	0.0e+000	% Ct. Error
3	SAMPLE	S96B000453	0		@GEA-02 EU15502	LIQUID	N/A	<	2.503e-01	250.0e-003	uCi/mL
3	SAMPLE	S96B000453	0		@GEA-02 EU15502E	LIQUID	N/A		n/a	0.0e+000	% Ct. Error
3	SAMPLE	S96B000453	0		@GEA-02 AM24102	LIQUID	N/A	<	6.492e-01	649.0e-003	uCi/mL
3	SAMPLE	S96B000453	0		@GEA-02 AM24102E	LIQUID	N/A		n/a	0.0e+000	% Ct. Error
4	DUP	S96B000453	0		@GEA-02 CO60-02	LIQUID	<2.32e-2		<2.66e-2		RPD
4	DUP	S96B000453	0		@GEA-02 CO60-02E	LIQUID	1		n/a		% Ct Error
4	DUP	S96B000453	0		@GEA-02 CS13702	LIQUID	4.37e+01		4.26e+01	2.549	RPD
4	DUP	S96B000453	0		@GEA-02 CS13702E	LIQUID	1		1.06	1.060	% Ct Error
4	DUP	S96B000453	0		@GEA-02 EU15402	LIQUID	<9.32e-2		<6.67e-2		RPD
4	DUP	S96B000453	0		@GEA-02 EU15402E	LIQUID	1		n/a		% Ct Error
4	DUP	S96B000453	0		@GEA-02 EU15502	LIQUID	<2.50e-1		<2.54e-1		RPD
4	DUP	S96B000453	0		@GEA-02 EU15502E	LIQUID	1		n/a		% Ct Error
4	DUP	S96B000453	0		@GEA-02 AM24102	LIQUID	<6.49e-1		<6.38e-1		RPD
4	DUP	S96B000453	0		@GEA-02 AM24102E	LIQUID	1		n/a		% Ct Error
5	SAMPLE	S96B000454	0		@GEA-02 CO60-02	LIQUID	N/A	<	6.088e-04	100.0e-005	uCi/mL
5	SAMPLE	S96B000454	0		@GEA-02 CO60-02E	LIQUID	N/A		n/a	0.0e+000	% Ct. Error
5	SAMPLE	S96B000454	0		@GEA-02 CS13702	LIQUID	N/A		1.900e+01	0.0e+000	uCi/mL
5	SAMPLE	S96B000454	0		@GEA-02 CS13702E	LIQUID	N/A		0.230	0.0e+000	% Ct. Error
5	SAMPLE	S96B000454	0		@GEA-02 EU15402	LIQUID	N/A	<	4.092e-03	400.0e-005	uCi/mL
5	SAMPLE	S96B000454	0		@GEA-02 EU15402E	LIQUID	N/A		n/a	0.0e+000	% Ct. Error
5	SAMPLE	S96B000454	0		@GEA-02 EU15502	LIQUID	N/A	<	2.108e-02	210.0e-004	uCi/mL
5	SAMPLE	S96B000454	0		@GEA-02 EU15502E	LIQUID	N/A		n/a	0.0e+000	% Ct. Error
5	SAMPLE	S96B000454	0		@GEA-02 AM24102	LIQUID	N/A	<	5.496e-02	550.0e-004	uCi/mL
5	SAMPLE	S96B000454	0		@GEA-02 AM24102E	LIQUID	N/A		n/a	0.0e+000	% Ct. Error
6	DUP	S96B000454	0		@GEA-02 CO60-02	LIQUID	<6.09e-4		<5.13e-4		RPD
6	DUP	S96B000454	0		@GEA-02 CO60-02E	LIQUID	1		n/a		% Ct Error

11/25/96

Units shown for QC (BLK/BKG) may not reflect the actual units.

LABCORE Completed RadChem Report for Worklist#: 13777

Seq	Type	Sample#	R	A	Test	Matrix	Actual	Found	DL or Yield	Unit
6	DUP	S96B000454	0	@GEA-02	CS13702	LIQUID	1.90e+01	1.88e+01	1.058	RPD
6	DUP	S96B000454	0	@GEA-02	CS13702E	LIQUID	1	0.230	0.230	% Ct Error
6	DUP	S96B000454	0	@GEA-02	EU15402	LIQUID	<4.09e-3	<3.73e-3		RPD
6	DUP	S96B000454	0	@GEA-02	EU15402E	LIQUID	1	n/a		% Ct Error
6	DUP	S96B000454	0	@GEA-02	EU15502	LIQUID	<2.11e-2	<2.10e-2		RPD
6	DUP	S96B000454	0	@GEA-02	EU15502E	LIQUID	1	n/a		% Ct Error
6	DUP	S96B000454	0	@GEA-02	AM24102	LIQUID	<5.50e-2	<5.45e-2		RPD
6	DUP	S96B000454	0	@GEA-02	AM24102E	LIQUID	1	n/a		% Ct Error

Comments Section:

Comments for sample# S96B000453 and test @GEA-02 .
DL=0 => n/a

Final page for worklist# 13777

Analyst Signature Date

Susan J Bu 10/28/96
Analyst Signature Date

Reviewer Signature Date

Tech Review: 10/28/96

Units shown for QC (BLK/BKG) may not reflect the actual units.

10/08/96 10:00
A-0004-1

LABCORE Data Entry Template for Worklist# 13777

Analyst: [illegible] Instrument: GEA00 _____ Book# E-2556

Method: LA-548-121 Rev/Mod E-0 223 11/25/96

Worklist Comment: Sample size is on traveler.Std:TINKFUS (1.0ml). new (G. Miller Samples)

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	STD				@GEA-02	LIQUID		
2	BLNK				@GEA-02	LIQUID		
3	SAMPLE	S96B000453	0		@GEA-02	LIQUID	96001333	TK 24-1
	Analytes Requested:	AM24102 , AM24102E, CO60-02 , CO60-02E, CS13702 , CS13702E, EU15402 , EU15402E, EU15502 , EU15502E						
4	DUP	S96B000453	0		@GEA-02	LIQUID		
5	SAMPLE	S96B000454	0		@GEA-02	LIQUID	96001334	TK 21-1
	Analytes Requested:	AM24102 , AM24102E, CO60-02 , CO60-02E, CS13702 , CS13702E, EU15402 , EU15402E, EU15502 , EU15502E						
6	DUP	S96B000454	0		@GEA-02	LIQUID		

Final page for worklist # 13777

[illegible] 10/21/96
Analyst Signature Date

[illegible]
Analyst Signature Date

Data Entry Comments:

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

* 222-S Laboratory, [illegible] Room 25-OCT-1996 03:35:08.01 *

>>>>>>>>>> SAMPLE INFORMATION <<<<<<<<<<

Worklist #:	13777
Sample ID:	WL13777-STD
Sample Size:	1.00000E-03 L
Dilution Factor:	1.00000E+00

Removed by: [signature]

>>>>>>>>>> COUNT INFORMATION <<<<<<<<<<

Detector ID:	GEA3
File Number:	dka300:[spec.GEA3]3g3789.cnf
Geometry:	42
Count Time:	0 00:50:00.00 sec
Real Time:	0 00:50:05.96 sec
Dead Time:	0.2%

Verified by: [signature] 10-27-96

WHC-SD-WM-DP-213, REV. 0

>>>>>>>>>> ANALYSIS INFORMATION <<<<<<<<<<

Sample Count Time:	25-OCT-1996 02:44:22.84
Decayed to:	25-OCT-1996 02:44:22.84
Standard Deviations:	2
Analysis Library:	ENVGEA
Analyst:	SLH2
Background Subtract:	DKA300:[SPEC.GEA3]3GBACK

>>>>>>>>>> CALIBRATION INFORMATION <<<<<<<<<<

Date of last energy calibration: 11-MAR-1994 11:47:01.11
Date of last efficiency calibration: 15-MAR-1994 10:28:40.20

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/L
0	86.37	188	1.77	173.25	169	9	85.2		NP-237	0.696
0	122.88	15903	1.24	246.24	240	11	1.9		EU-152	17.9
									CO-57	5.92
									EU-154	12.5
0	247.42	2092	1.40	495.22	487	15	9.7		EU-154	13.7
0	344.15	828	1.63	688.61	684	9	13.5		EU-152	1.77
0	443.98	162	1.97	888.20	885	8	53.9			
0	582.39*	124	1.68	1164.97	1161	9	61.3			
0	591.80	675	1.61	1183.79	1177	16	19.0			
0	661.57*	6813	1.56	1323.31	1316	16	2.9		CS-137	7.70
0	691.85	147	1.84	1383.86	1378	14	72.1		CO-57	91.1
0	723.20	2179	1.67	1446.57	1440	15	6.5		EU-154	11.3
0	756.73	598	1.79	1513.63	1508	13	17.0			
0	778.94	215	1.82	1558.04	1553	11	38.6		EU-152	1.83
0	873.12	1102	1.61	1746.41	1740	15	11.0		EU-154	11.1
0	963.90	193	1.55	1927.99	1922	12	47.4		EU-152	1.77
0	996.10	885	1.75	1992.39	1986	12	11.7		EU-154	11.7
0	1004.58	1625	1.85	2009.36	2004	12	7.0		EU-154	12.5
0	1085.24	189	2.03	2170.71	2165	11	37.1		EU-152	2.81
0	1112.22	175	2.01	2224.68	2219	13	47.5		EU-152	1.95
0	1173.02	5005	1.87	2346.30	2336	20	3.3		CO-60	7.89
0	1246.01	61	1.43	2492.33	2487	11	59.9			

Post-NID Peak Search Report (continued)
Sample ID : WL13777-STD Acquisition date : 25-OCT-1996 02:44:22

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/L
0	1274.21	2559	2.09	2548.75	2540	18	4.2		EU-154	12.6
0	1332.23	4426	2.01	2664.84	2655	19	3.1		CO-60	7.75
0	1397.03	52	1.51	2794.49	2785	18	51.2			
0	1407.79	202	2.35	2816.03	2806	18	16.5		EU-152	1.77
0	1493.75	49	0.66	2988.02	2983	12	34.9			
0	1596.22	137	2.24	3193.07	3186	16	19.4			

spectrum 26
Number of unidentified lines 6
Number of lines tentatively identified by NID 20 76.92%

Nuclide Type :

Nuclide	Hlife	Decay	Wtd Mean Uncorrected uCi/L	Wtd Mean Decay Corr uCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
~~CO-57~~	~~271.80D~~	~~1.000~~	~~9.107E+01~~	~~9.107E+01~~	~~6.568E+01~~	~~72.12~~	BK6
CO-60	5.27Y	1.000	7.816E+00	7.816E+00	0.177E+00	2.26	
CS-137	30.00Y	1.000	7.700E+00	7.700E+00	0.226E+00	2.93	
EU-152	13.54Y	1.000	1.806E+00	1.806E+00	0.169E+00	9.37	
EU-154	8.59Y	1.000	1.219E+01	1.219E+01	0.034E+01	2.81	
~~NP-237~~	~~2.14E+06Y~~	~~1.000~~	~~6.958E-01~~	~~6.958E-01~~	~~5.926E-01~~	~~85.17~~	BK6
Total Activity :			1.213E+02	1.213E+02			

RPJ 10-27-

Grand Total Activity : 1.213E+02 1.213E+02

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Minimum Detectable Activity Report
Sample ID : WL13777-STD

Acquisition [illegible]

Nuclide	Bckgnd Sum	Energy (keV)	MI (uCi/L)
BE-7	662.	477.59	8.4742E-01
NA-22	2580.	1274.53	3.9871E-01
NA-24	27.	1368.55	4.4080E-02
K-40	147.	1460.75	9.9150E-01
CR-51	672.	320.08	6.4284E-01
MN-54	350.	834.83	1.0222E-01
CO-56	438.	846.76	1.1592E-01
CO-58	383.	810.78	1.0492E-01
FE-59	319.	1099.25	2.1911E-01
SE-75	797.	264.66	1.0483E-01
SR-85	542.	514.01	8.7690E-02
Y-88	4.	1836.06	2.2209E-02
NB-94	1229.	871.09	1.9891E-01
ZRNB-95	2522.	724.18	5.5616E-01
RU-103	582.	497.08	9.3306E-02
RURH-106	404.	621.93	1.7233E+00
AG-108m	2569.	722.94	2.6970E-01
CD-109	1374.	88.03	2.1241E+00
AG-110M	515.	657.76	1.0688E-01
SN-113	674.	391.69	1.1800E-01
TE-123m	938.	159.00	5.4522E-02
SB-124	432.	602.73	8.8008E-02
SB-125	631.	427.89	2.6654E-01
TE-125m	1314.	109.27	2.0425E+01
I-131	681.	364.48	8.8728E-02
CS-134	429.	604.70	8.8022E-02
BA-140	455.	537.31	3.2837E-01
LA-140	142.	1596.21	1.1750E-01
CEPR-144	796.	133.51	7.3828E-01
EU-155	1382.	105.31	2.7976E-01
HG-203	794.	279.20	7.8032E-02
TL-208	743.	277.36	9.7012E-01
BI-212	401.	727.18	1.4619E+00
PB-212	935.	238.63	1.4123E-01
BI-214	461.	609.31	2.0018E-01
PB-214	663.	351.92	3.4460E-01
RA-224	898.	240.99	1.5368E+00
RA-226	957.	186.10	1.4486E+00
AC-228	421.	911.21	4.5452E-01
TH-228	1332.	84.37	6.4422E+00
TH-229	1339.	88.47	3.0391E-01
PA-233	701.	312.17	1.6818E-01
UTH-233	1378.	245.34	7.1354E+01
PA-234M	561.	1001.03	2.5655E-01
TH-234	765.	63.29	3.2879E+00
U-235	960.	185.71	8.8172E-02
NP-239	1426.	106.12	2.7000E-01
PU-239	856.	129.30	6.6647E+02
AM-241	806.	59.54	5.9563E-01
AM-243	958.	74.67	1.5258E-01

222-S Laboratory Counting Room 25-OCT-1996 05:37:00.64

>>>>>>>>>> INFORMATION <<<<<<<<<<

Worklist #: 13777
Sample ID: WL13777-BLK
Sample Size: 1.00000E-04 L
Dilution Factor: 1.01000E+02

Removed by:

>>>>>>>>>> COUNT INFORMATION <<<<<<<<<<

Detector ID: GEA3
File Number: NI3AC:1.cnf 3790
Geometry: 42
Count Time: 0 00:50:00.00 sec
Real Time: 0 00:50:00.44 sec
Dead Time: 0.0%

Verified by: 11-27-96

>>>>>>>>>> ANALYSIS INFORMATION <<<<<<<<<<

Sample Count Time: 25-OCT-1996 03:37:26.48
Decayed to: 25-OCT-1996 03:37:26.48
Standard Deviations: 2
Analysis Library: ENVGEA
Analyst: SLH2
Background Subtract: DKA300:[SPEC.GEA3]3GBACK

WHC-SD-WM-DP-213, REV. 0

>>>>>>>>>> CALIBRATION INFORMATION <<<<<<<<<<

Date of last energy calibration: 11-MAR-1994 11:47:01.11
Date of last efficiency calibration: 15-MAR-1994 10:28:40.20

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw %Err	Fit	Nuclides	Activity uCi/L
0	609.06*	21	1.59	1218.31	1211	14112.7			
0	828.04	15	1.41	1656.24	1650	11 66.7			
0	910.49*	14	2.18	1821.16	1815	11104.5			
0	1460.37*	24	2.36	2921.23	2911	18105.5		K-40	421.

Summary of Nuclide Activity
Sample ID : WL13777-BLK

Acquisition date : 25-OCT-1996 03:37:26

HNF-3208, REV. 0, ATT A, Pg. 95

Total number of lines in spectrum	4	
Number of unidentified lines	1	
Number of lines tentatively identified by NID	3	75.00%

Nuclide Type :

Nuclide	Hlife	Decay	Wtd Mean Uncorrected uCi/L	Wtd Mean Decay Corr uCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.28E+09Y	1.000	4.213E+02	4.213E+02	4.444E+02	105.50	BKG KJ 10.27.96
Total Activity :			4.213E+02	4.213E+02			
Grand Total Activity :			4.213E+02	4.213E+02			

Flags: "K" = Keyline not found
"E" = Manually edited
"M" = Manually accepted
"A" = Nuclide specific abn. limit

Minimum Detectable Activity Report
Sample ID : WL13777-BLK Acquisition date : 25-OCT-1996 03:37:26

Nuclide	Sum	Energy (keV)	MDA (uCi/L)
BE-7	36.	477.59	2.0075E+02
NA-22	8.	1274.53	2.2959E+01
NA-24	4.	1368.55	1.7105E+01
CR-51	45.	320.08	1.6753E+02
MN-54	17.	834.83	2.2769E+01
CO-56	12.	846.76	1.9313E+01
CO-57	69.	122.06	1.4521E+01
CO-58	17.	810.78	2.2577E+01
FE-59	10.	1099.25	3.8702E+01
CO-60	10.	1332.50	2.5993E+01
SE-75	57.	264.66	2.8367E+01
SR-85	37.	514.01	2.3024E+01
Y-88	3.	1836.06	1.8354E+01
NB-94	20.	871.09	2.5343E+01
ZRNB-95	21.	724.18	5.1745E+01
RU-103	33.	497.08	2.2573E+01
RURH-106	35.	621.93	5.1507E+02
AG-108m	20.	722.94	2.3768E+01
CD-109	66.	88.03	4.7040E+02
AG-110M	26.	657.76	2.4340E+01
SN-113	42.	391.69	2.9642E+01
TE-123m	91.	159.00	1.7152E+01
SB-124	20.	602.73	1.9104E+01
SB-125	48.	427.89	7.4304E+01
TE-125m	75.	109.27	4.9270E+03
I-131	38.	364.48	2.1286E+01
CS-134	19.	604.70	1.8653E+01
CS-137	136.	661.66	6.1837E+01
BA-140	26.	537.31	7.9641E+01
LA-140	4.	1596.21	1.8818E+01
CEPR-144	87.	133.51	2.4639E+02
EU-152	7.	1408.01	1.0868E+02
EU-154	8.	1274.51	6.6702E+01
EU-155	71.	105.31	6.4209E+01
HG-203	53.	279.20	2.0420E+01
TL-208	57.	277.36	2.7222E+02
BI-212	25.	727.18	3.6787E+02
PB-212	91.	238.63	4.4618E+01
BI-214	53.	609.31	6.8874E+01
PB-214	68.	351.92	1.1093E+02
RA-224	77.	240.99	4.5457E+02
RA-226	91.	186.10	4.5103E+02
AC-228	35.	911.21	1.3158E+02
TH-228	75.	84.37	1.5481E+03
TH-229	66.	88.47	6.8160E+01
PA-233	55.	312.17	4.7584E+01
UTH-233	51.	245.34	1.3841E+04
PA-234M	11.	1001.03	3.6394E+01
TH-234	53.	63.29	8.7605E+02
U-235	91.	185.71	2.7356E+01
NP-237	69.	86.48	1.4419E+02

Minimum Detectable Activity Report (continued) : 4
Sample ID : WL13777-BLK Acquisition date : 25-OCT-1996 03:37:26

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
NP-239	78.	106.12	6.3871E+01
PU-239	67.	129.30	1.8821E+05
AM-241	53.	59.54	1.5353E+02
AM-243	73.	74.67	4.2604E+01

********** Room 25-OCT-1996 07:44:18.12 **********

>>>>>>>>>> SAMPLE INFORMATION <<<<<<<<<<

Worklist #:	13777
Sample ID:	S96B000454-SAM
Sample Size:	1.00000E-03 L
Dilution Factor:	2.10000E+01

Removed by: G Hurson

>>>>>>>>>> COUNT INFORMATION <<<<<<<<<<

Detector ID:	GEA3
File Number:	dka300:[spec.GEA3]3g3793.cnf
Geometry:	42
Count Time:	0 00:50:00.00 sec
Real Time:	0 00:51:40.19 sec
Dead Time:	3.2%

Verified by: KJ Hurley 10-27-96

>>>>>>>>>> ANALYSIS INFORMATION <<<<<<<<<<

Sample Count Time:	25-OCT-1996 06:52:01.10
Decayed to:	25-OCT-1996 06:52:01.10
Standard Deviations:	2
Analysis Library:	ENVGEA
Analyst:	AKH
Background Subtract:	DKA300:[SPEC.GEA3]3GBACK

WHC-SD-WM-DP-213, REV. 0

>>>>>>>>>> CALIBRATION INFORMATION <<<<<<<<<<

Date of last energy calibration:	11-MAR-1994 11:47:01.11
Date of last efficiency calibration:	15-MAR-1994 10:28:40.20

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Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/L
0	661.54*	800751	1.59	1323.25	1315	17	0.2		CS-137	1.901E+04
0	1322.22	138	1.78	2644.81	2639	16	34.6			

Summary of Nuclide Activity
Sample ID : S96B000454-SAM
Acquisition date : 25-OCT-1996 06:52:01

HNF-3208, REV. 0, ATT A, Pg. 99

Total number of lines in spectrum	2	
Number of unidentified lines	1	
Number of lines tentatively identified by NID	1	50.00%

Nuclide Type :

Nuclide	Hlife	Decay	Wtd Mean Uncorrected uCi/L	Wtd Mean Decay Corr uCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CS-137	30.00Y	1.000	1.901E+04	1.901E+04	0.004E+04	0.23	
Total Activity :			1.901E+04	1.901E+04			
Grand Total Activity :			1.901E+04	1.901E+04			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

		Energy (keV)	MDA (uCi/L)
BE-7	24305.	477.59	1.0786E+02
NA-22	73.	1274.53	1.4094E+00
NA-24	8.	1368.55	5.0328E-01
K-40	136.	1460.75	2.0033E+01
CR-51	19191.	320.08	7.2124E+01
MN-54	358.	834.83	2.1713E+00
CO-56	361.	846.76	2.2083E+00
CO-57	19655.	122.06	5.0952E+00
CO-58	407.	810.78	2.2707E+00
FE-59	152.	1099.25	3.1726E+00
CO-60	13.	1332.50	6.0879E-01
SE-75	21081.	264.66	1.1325E+01
SR-85	11986.	514.01	8.6598E+00
Y-88	2.	1836.06	3.0982E-01
NB-94	304.	871.09	2.0773E+00
ZRNB-95	625.	724.18	5.8154E+00
RU-103	14845.	497.08	9.8979E+00
RURH-106	4275.	621.93	1.1766E+02
AG-108m	628.	722.94	2.7999E+00
CD-109	16833.	88.03	1.5614E+02
AG-110M	20172.	657.76	1.4050E+01
SN-113	20762.	391.69	1.3757E+01
TE-123m	20349.	159.00	5.3335E+00
SB-124	4571.	602.73	6.0091E+00
SB-125	24778.	427.89	3.5083E+01
TE-125m	18202.	109.27	1.5964E+03
I-131	19792.	364.48	1.0043E+01
CS-134	4577.	604.70	6.0409E+00
BA-140	8813.	537.31	3.0348E+01
LA-140	4.	1596.21	4.1454E-01
CEPR-144	20315.	133.51	7.8347E+01
EU-152	12.	1408.01	2.9068E+00
EU-154	73.	1274.51	4.0924E+00
EU-155	17801.	105.31	2.1084E+01
HG-203	20370.	279.20	8.3013E+00
TL-208	20518.	277.36	1.0703E+02
BI-212	609.	727.18	3.7830E+01
PB-212	23422.	238.63	1.4846E+01
BI-214	4643.	609.31	1.3341E+01
PB-214	19402.	351.92	3.9767E+01
RA-224	23256.	240.99	1.6426E+02
RA-226	27018.	186.10	1.6162E+02
AC-228	290.	911.21	7.9251E+00
TH-228	16947.	84.37	4.8248E+02
TH-229	16967.	88.47	2.2719E+01
PA-233	19006.	312.17	1.8387E+01
UTH-233	22697.	245.34	6.0823E+03
PA-234M	179.	1001.03	3.0424E+00
TH-234	15750.	63.29	3.1329E+02
U-235	26739.	185.71	9.7722E+00
NP-237	16819.	86.48	4.6875E+01

Minimum Detectable Activity Report (continued)
Sample ID : S96B000454-SAM Acquisition date : 25-OCT-1996 06:52:01

Nuclide	Bckgnd Sum	Energy (keV)	MI (uCi/L)
NP-239	17824.	106.12	2.0048E+01
PU-239	20017.	129.30	6.7681E+04
AM-241	15563.	59.54	5.4957E+01
AM-243	16339.	74.67	1.3235E+01

ng Room 25-OCT-1996 10:05:26.01

>>>>>>>>>> SAMPLE INFORMATION <<<<<<<<<<

Worklist #:	13777
Sample ID:	S96B000454-DUP
Sample Size:	1.00000E-03 L
Dilution Factor:	2.10000E+01

Removed by:

>>>>>>>>>> COUNT INFORMATION <<<<<<<<<<

Detector ID:	GEA3
File Number:	dka300:[spec.GEA3]3g3794.cnf
Geometry:	42
Count Time:	0 00:50:00.00 sec
Real Time:	0 00:51:39.21 sec
Dead Time:	3.2%

Verified by: 10-27-96

WHC-SD-WM-DP-213, REV. (

>>>>>>>>>> ANALYSIS INFORMATION <<<<<<<<<<

Sample Count Time:	25-OCT-1996 09:13:09.15
Decayed to:	25-OCT-1996 09:13:09.15
Standard Deviations:	2
Analysis Library:	ENVGEA
Analyst:	AKH
Background Subtract:	DKA300:[SPEC.GEA3]3GBACK

>>>>>>>>>> CALIBRATION INFORMATION <<<<<<<<<<

Date of last energy calibration:	11-MAR-1994 11:47:01.11
Date of last efficiency calibration:	15-MAR-1994 10:28:40.20

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/L
0	661.55*	792944	1.59	1323.27	1315	17	0.2		CS-137	1.882E+04
0	1322.00	145	4.42	2644.37	2638	16	35.3			

Summary of Nuclide Activity
Sample ID : S96B000454-DUP
Acquisition date : 25-OCT-1996 09:13:09

HNF-3208, REV. 0, ATT A, Pg. 103

Total number of lines in spectrum	2	
Number of unidentified lines	1	
Number of lines tentatively identified by NID	1	50.00%

Nuclide Type :

Nuclide	Hlife	Decay	Wtd Mean Uncorrected uCi/L	Wtd Mean Decay Corr uCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CS-137	30.00Y	1.000	1.882E+04	1.882E+04	0.004E+04	0.23	
Total Activity :			1.882E+04	1.882E+04			
Grand Total Activity :			1.882E+04	1.882E+04			

Flags: "K" = Keyline not found
"E" = Manually edited
"M" = Manually accepted
"A" = Nuclide specific abn. limit

Sample ID : S96B000454-DUP Acquisition date : 25-OCT-1996 09:13:09

HNF-3208, REV. 0, ATT A, Pg. 104

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
BE-7	23966.	477.59	1.0710E+02
NA-22	60.	1274.53	1.2810E+00
NA-24	6.	1368.55	4.3585E-01
K-40	135.	1460.75	1.9959E+01
CR-51	18691.	320.08	7.1180E+01
MN-54	374.	834.83	2.2212E+00
CO-56	366.	846.76	2.2233E+00
CO-57	19350.	122.06	5.0555E+00
CO-58	389.	810.78	2.2210E+00
FE-59	130.	1099.25	2.9403E+00
CO-60	9.	1332.50	5.1272E-01
SE-75	20892.	264.66	1.1274E+01
SR-85	12268.	514.01	8.7612E+00
Y-88	3.	1836.06	3.8163E-01
NB-94	296.	871.09	2.0507E+00
ZRNB-95	598.	724.18	5.6856E+00
RU-103	14871.	497.08	9.9064E+00
RURH-106	4386.	621.93	1.1917E+02
AG-108m	611.	722.94	2.7620E+00
CD-109	16759.	88.03	1.5579E+02
AG-110M	19110.	657.76	1.3675E+01
SN-113	20696.	391.69	1.3735E+01
TE-123m	20509.	159.00	5.3545E+00
SB-124	4471.	602.73	5.9429E+00
SB-125	24003.	427.89	3.4531E+01
TE-125m	18056.	109.27	1.5900E+03
I-131	19247.	364.48	9.9038E+00
CS-134	4475.	604.70	5.9735E+00
BA-140	8644.	537.31	3.0055E+01
LA-140	5.	1596.21	4.6347E-01
CEPR-144	20125.	133.51	7.7979E+01
EU-152	13.	1408.01	3.0399E+00
EU-154	61.	1274.51	3.7277E+00
EU-155	17642.	105.31	2.0990E+01
HG-203	20221.	279.20	8.2710E+00
TL-208	20102.	277.36	1.0594E+02
BI-212	606.	727.18	3.7741E+01
PB-212	23546.	238.63	1.4885E+01
BI-214	4565.	609.31	1.3229E+01
PB-214	19203.	351.92	3.9555E+01
RA-224	23106.	240.99	1.6373E+02
RA-226	26843.	186.10	1.6110E+02
AC-228	241.	911.21	7.2202E+00
TH-228	16731.	84.37	4.7940E+02
TH-229	16766.	88.47	2.2585E+01
PA-233	18980.	312.17	1.8375E+01
UTH-233	22416.	245.34	6.0446E+03
PA-234M	191.	1001.03	3.1464E+00
TH-234	15665.	63.29	3.1244E+02
U-235	26636.	185.71	9.7532E+00
NP-237	16672.	86.48	4.6669E+01

Minimum Detectable Activity Report (continued)
Sample ID : S96B000454-DUP Acquisition date : 25-OCT-1996 09:13:09

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
NP-239	17771.	106.12	2.0018E+01
PU-239	19903.	129.30	6.7486E+04
AM-241	15291.	59.54	5.4474E+01
AM-243	16400.	74.67	1.3260E+01

LABCORE Completed RadChem Report for Worklist#: 13772

Analyst: knt **Instrument:** AB12 **Book#** _____

Method: _____ **Rev/Mod** _____

Worklist Comment: Determine sample size using ludlum.Std:TINKFUS (1.0ml).new

Seq	Type	Sample#	R	A	Test	Matrix	Actual	Found	DL or Yield	Unit
1	STD		0		@SR90-01 SR90-01	LIQUID	1.40E-03	1.47E-3	105.000	% Recovery
1	STD		0		@SR90-01 SR90-01C	LIQUID	100	9.34E+01	93.400	% Recovery
1	STD		0		@SR90-01 SR90-01E	LIQUID	1.00	1.62E+00	1.620	% Ct. Erro
2	BLNK		0		@SR90-01 SR90-01	LIQUID	1	7.09E-4	70.900e-005	uCi/mL
2	BLNK		0		@SR90-01 SR90-01C	LIQUID	100	9.26E+01	92.600	% Recovery
2	BLNK		0		@SR90-01 SR90-01E	LIQUID	1.00	1.15E+02	115.000	uCi/mL
3	BLNK/BKG		0		@SR90-01 SR90-01	LIQUID	1	1.52E+00	1.520	BLNK/BKG
4	SAMPLE	S96B000453	0		@SR90-01 SR90-01	LIQUID	N/A	7.68E+01	217.0e-004	~~uCi/mL~~
4	SAMPLE	S96B000453	0		@SR90-01 SR90-01C	LIQUID	N/A	~~9.02E+01~~	0.0e+000	% Recovery
4	SAMPLE	S96B000453	0		@SR90-01 SR90-01E	LIQUID	N/A	7.24E-01	0.0e+000	% Ct. Error
5	DUP	S96B000453	0		~~@SR90-01~~ SR90-01	LIQUID	7.68E+1	7.33E+1	4.664	RPD
5	DUP	S96B000453	0		@SR90-01 SR90-01C	LIQUID	100	9.24E+01	92.400	% Recovery
5	DUP	S96B000453	0		@SR90-01 SR90-01E	LIQUID	1.00	7.32E-01	0.732	% Cnt Err
6	SAMPLE	S96B000454	0		@SR90-01 SR90-01	LIQUID	N/A	4.88E-01	109.0e-005	uCi/mL
6	SAMPLE	S96B000454	0		@SR90-01 SR90-01C	LIQUID	N/A	8.83E+01	0.0e+000	% Recovery
6	SAMPLE	S96B000454	0		@SR90-01 SR90-01E	LIQUID	N/A	2.04E+00	0.0e+000	% Ct. Error
7	DUP	S96B000454	0		@SR90-01 SR90-01	LIQUID	4.88E-1	5.01E-1	2.629	RPD
7	DUP	S96B000454	0		@SR90-01 SR90-01C	LIQUID	100	9.17E+01	91.700	% Recovery
7	DUP	S96B000454	0		@SR90-01 SR90-01E	LIQUID	1.00	1.98E+00	1.980	% Cnt Err

RJJ 11/25/96

Final page for worklist# 13772

Analyst Signature Date

Analyst Signature 10-22-96 Date

Reviewer Signature OCT 23 1996 Date

Units shown for QC (BLK/BKG) may not reflect the actual units.

10/08/96 09:56
A-0004-1

LABCORE Data Entry Template for Worklist# 13772

Analyst: KNT **Instrument:** AB00 12 **Book#** 62656

Method: LA-220-101 **Rev/Mod** 0-1

Worklist Comment: Determine sample size using ludlum.Std:TINKFUS (1.0ml).new

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	STD				@SR90-01	LIQUID		
2	BLNK				@SR90-01	LIQUID		
3	BLNK/BKG				@SR90-01	LIQUID		
4	SAMPLE	S96B000453	0		@SR90-01	LIQUID	96001333	TK 24-1
	Analytes Requested: SR90-01 , SR90-01C, SR90-01E							
5	DUP	S96B000453	0		@SR90-01	LIQUID		
6	SAMPLE	S96B000454	0		@SR90-01	LIQUID	96001334	TK 21-1
	Analytes Requested: SR90-01 , SR90-01C, SR90-01E							
7	DUP	S96B000454	0		@SR90-01	LIQUID		

Final page for worklist # 13772

Kn. Thomas 10-21-96
Analyst Signature Date

Analyst Signature Date

Data Entry Comments:

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code

WORKBOOK PAGE: STD1

Sr-89/90 : LA-220-101 (D-1), 102 (E-3), 104 (D-1) LIQUIDS

Type	DETECTOR NUMBER		12	CARRIER ADDED in mL	(CVA)	STANDARD 1.000
STD	TOTAL COUNTS	(TC)	14764	GROSS WEIGHT	(W2)	7.9274
Work List	COUNT TIME in MINUTES	(CT)	10	TARE WEIGHT	(W1)	7.8340
13772	BACKGROUND in cpm	(BKG)	2.7	NET WEIGHT	(W3)	0.0934
Test Code	SAMPLE VOLUME in mL	(SS)	1.000	DELTA TIME (HOURS)	(DT)	13.80
@SR90-01	DILUTION FACTOR	(DF)	1			
Matrix	DIGEST DILUTION FACTOR	DDF	1			
LIQUID	SAMPLE COUNT RATE	(Rs)	1473.70	SR-90 EFFICIENCY FACTO	(C1)	0.4180
Batch Number	CRITICAL LEVEL	(Lc)	0.99	Y-90 EFFICIENCY FACTOR	(C2)	0.4660
96010293	TIME OF SEPARATION	(ST)	12:40	Rmax		N/A
Rerun	DATE OF SEPARATION	(SD)	10/21/96	DETECTION LIMIT	(Ld)	2.07
0	TIME OF COUNT	(TOC)	02:28	Sr-89/90 CONC. in µCi/L		1.4730E+00
Sample Prep	DATE OF COUNT	(DOC)	10/22/96			
N/A	STANDARD BOOK #		62B56			
Sample #	STANDARD VALUE in µCi/mL		1.3994E-03			
STANDARD						

Instrument Code
AB00
Prepared By
RCJ
Chemist
SLF
Analyst
KNT
Date Complete
10/22/96
Analysis Date
10/21/96
Analysis Time
12:40 PM
Sample Point
TK24-1,21-1

Sample Count Rate (Rs) = (Total Counts (TC) / Count Time (CT)) - Background in cpm (BKG)

Sr-89/90 CONC in µCi/mL REPLACE RS WITH RMAX IF RS<=LcAND RS>=0 OR REPLACE RS WITH Lc IF RS<0

RS*DF*DDF*1000/((C1+C2*(1-e to the power of ((-natural log 2)/64.2*DT)))*SS*REC*2220000)

NOTE: 64.2 = Half Life for Y-90 and Rec. = Fractional Carrier Recovery ((W2-W1) / (CVA * 0.1000))

Relative Counting Error = The Square Root of ((TC + BKG * CT) / (TC - BKG * CT)*1.96)

Percent Carrier Recovery = (Net Weight / Expected weight) * 100

NOTE: Expected weight = CVA * 0.1

Detection Levels and Less Than Values are determined from Procedure LA-508-002.

Delta Time (hours) = ((DOC - SD) * 24) + (TOC - ST) / 100

Sr-89/90 CONCENTRATION	1.47E-03	µCi/mL	DETECTION LEVEL
RELATIVE COUNTING ERROR	1.6%		2.07E-06 µCi/L
PERCENT CARRIER RECOVERY	93.4%		

Analyst:	KNT	Date:	22-Oct-96
Signature of Chemist:	SLF	Date:	OCT 23 1996

STANDARD.WB1 REV 2.0 22010NML

WORKBOOK PAGE: BLANK2

LA-220-101 / D-1 Sr-89/90 : LA-220-101 (D-1), 102 (E-3), 104 (D-1)

Type	DETECTOR NUMBER		12	CARRIER ADDED In mL	(CVA)	BLNK 1.000
BLNK	TOTAL COUNTS	(TC)	41	GROSS WEIGHT	(W2)	7.9139
Work List	COUNT TIME In MINUTES	(CT)	10	TARE WEIGHT	(W1)	7.8213
13772	BACKGROUND In cpm	(BKG)	2.7	NET WEIGHT	(W3)	0.0926
Test Code	SAMPLE VOLUME In mL	(SS)	0.200	DELTA TIME (HOURS)	(DT)	14.42
@SR90-01	DILUTION FACTOR	DF	101			
Matrix	DIGEST DILUTION FACTOR	(DDF)	1			
LIQUID	SAMPLE COUNT RATE	(Rs)	1.40	SR-90 EFFICIENCY FACTOR	(C1)	0.4180
Batch Number	CRITICAL LEVEL	(Lc)	0.99	Y-90 EFFICIENCY FACTOR	(C2)	0.4660
96010293	TIME OF SEPARATION	(ST)	12:40	Rmax		N/A
Rerun	DATE OF SEPARATION	(SD)	10/21/96	DETECTION LIMIT	(Ld)	2.07
0	TIME OF COUNT	(TOC)	03:05	Sr-89/90 CONC In µCi/L		7.0886E-01
Sample Prep	DATE OF COUNT	(DOC)	10/22/96			
N/A						
Sample #						
BLANK						

Instrument Code	Sample Count Rate (Rs) = (Total Counts (TC) / Count Time (CT)) - Background in cpm (BKG)
AB00	Sr-89/90 CONC In µCi/L Replace RS with RMAX If RS<=Lc and RS>=0 or Replace RS with Lc if RS<0
Prepared By	RS*DF*DDF/((C1+C2*(1-e to the power of ((-natural log 2)/64.2*DT)))*SS*REC*2220000)
RCJ	NOTE: 64.2 = Half Life for Y-90 and Rec. = Fractional Carrier Recovery ((W2-W1) / (CVA * 0.1000))
Chemist	Relative Counting Error = (The Square Root of (TC + BKG * CT) / (TC - BKG * CT))*1.96
SLF	Percent Carrier Recovery = (Net Weight / Expected weight) * 100
Analyst	NOTE: Expected weight = CVA * 0.1
KNT	Detection Levels and Less Than Values are determined from Procedure LA-508-002.
Date Complete	Delta Time (hours) = ((DOC - SD) * 24) + (TOC - ST) / 100
10/22/96	

Analysis Date				DETECTION LEVEL
10/21/96	Sr-89/90 CONCENTRATION	7.09E-04	µCi/mL	
Analysis Time				
12:40 PM	RELATIVE COUNTING ERROR	115.4%		1.05E-03 µCi/mL
Sample Point				
TK24-1.21-1	PERCENT CARRIER RECOVERY	92.6%		

Analyst:	KNT	Date:	22-Oct-96
Signature of Chemist:	SLF	Date:	OCT 23 1996

BLANK.WB1 REV 2.0 22010NML

WORKBOOK PAGE: SAM6

Sr-89/90 : LA-220-101 (D-1), 102 (E-3), 104 (D-1)

Type	DETECTOR NUMBER		12	CARRIER ADDED in mL	(CVA)	SAMPLE 1.000
SAMPLE	TOTAL COUNTS	(TC)	9282	GROSS WEIGHT	(W2)	7.9415
WorkList	COUNT TIME in MINUTES	(CT)	10	TARE WEIGHT	(W1)	7.8532
13772	BACKGROUND in cpm	(BKG)	2.7	NET WEIGHT	(W3)	0.0883
Test Code	SAMPLE VOLUME in mL	(SS)	0.200	DELTA TIME (HOURS)	(DT)	15.20
@SR90-01	DILUTION FACTOR	DF	101			
Matrix	DIGEST DILUTION FACTOR	(DDF)	1			
LIQUID	SAMPLE COUNT RATE	(Rs)	925.50	SR-90 EFFICIENCY FACTOR	(C1)	0.4180
Batch Number	CRITICAL LEVEL	(Lc)	0.99	Y-90 EFFICIENCY FACTOR	(C2)	0.4660
96010293	TIME OF SEPARATION	(ST)	12:40	Rmax		N/A
Rerun	DATE OF SEPARATION	(SD)	10/21/96	DETECTION LIMIT	(Ld)	2.07
0	TIME OF COUNT	(TOC)	03:52	Sr-89/90 CONC in µCi/L		4.8805E+02
Sample Prep	DATE OF COUNT	(DOC)	10/22/96			
N/A						
Sample #						
S96B000454						

Instrument Code	Sample Count Rate (Rs) = (Total Counts (TC) / Count Time (CT)) - Background in cpm (BKG)
AB00	Sr-89/90 CONC in µCi/L Replace RS with RMAX if RS<=Lc and RS>=0 or Replace RS with Lc if RS<0
Prepared By	RS*DF*DDF/((C1+C2*(1-e to the power of ((-natural log 2)/64.2*DT)))*SS*REC*2220000)
RCJ	NOTE: 64.2 = Half Life for Y-90 and Rec. = Fractional Carrier Recovery ((W2-W1) / (CVA * 0.1000))
Chemist	Relative Counting Error = (The Square Root of (TC + BKG * CT) / (TC - BKG * CT))*1.96
SLF	Percent Carrier Recovery = (Net Weight / Expected weight) * 100
Analyst	NOTE: Expected weight = CVA * 0.1
KNT	Detection Levels and Less Than Values are determined from Procedure LA-508-002.
Date Complete	Delta Time (hours) = ((DOC - SD) * 24) + (TOC - ST) / 100
10/22/96	

Analysis Date				DETECTION LEVEL
10/21/96	Sr-89/90 CONCENTRATION	4.88E-01	µCi/mL	
Analysis Time				
12:40 PM	RELATIVE COUNTING ERROR	2.0%		1.09E-03 µCi/mL
Sample Point				
TK24-1,21-1	PERCENT CARRIER RECOVERY	88.3%		

Analyst:	KNT	Date:	22-Oct-96
Signature of Chemist:	SLF	Date:	OCT 2 3 1996

SAMPLE.WB1 REV 2.0 22010NML

I:\22010N\OUT\SR13772.WB1 10/22/96 14:10:41

WORKBOOK PAGE: DUP7

Sr-89/90 : LA-220-101 (D-1), 102 (E-3), 104 (D-1)

Type	DETECTOR NUMBER		12	CARRIER ADDED In mL	(CVA)	DUP 1.000
DUP	TOTAL COUNTS	(TC)	9913	GROSS WEIGHT	(W2)	7.9328
Work List	COUNT TIME In MINUTES	(CT)	10	TARE WEIGHT	(W1)	7.8411
13772	BACKGROUND In cpm	(BKG)	2.7	NET WEIGHT	(W3)	0.0917
Test Code1	SAMPLE VOLUME In mL	(SS)	0.200	DELTA TIME (HOURS)	(DT)	15.42
@SR90-01	DILUTION FACTOR	DF	101			
Matrix	DIGEST DILUTION FACTOR	(DDF)	1			
LIQUID	SAMPLE COUNT RATE	(Rs)	988.60	SR-90 EFFICIENCY FACTOR	(C1)	0.4180
Batch Number	CRITICAL LEVEL	(Lc)	0.99	Y-90 EFFICIENCY FACTOR	(C2)	0.4660
96010293	TIME OF SEPARATION	(ST)	12:40	Rmax		N/A
Rerun	DATE OF SEPARATION	(SD)	10/21/96	DETECTION LIMIT	(Ld)	2.07
0	TIME OF COUNT	(TOC)	04:05	Sr-89/90 CONC In µCi/L		5.0105E+02
Sample Prep	DATE OF COUNT	(DOC)	10/22/96			
N/A						
Sample #						
S96B000454						

Instrument Code	Sample Count Rate (Rs) = (Total Counts (TC) / Count Time (CT)) - Background in cpm (BKG)
AB00	Sr-89/90 CONC In µCi/L Replace RS with RMAX if RS<=Lc and RS>=0 or Replace RS with Lc if RS<0
Prepared By	RS*DF*DDF/((C1+C2*(1-e to the power of ((-natural log 2)/64.2*DT)))*SS*REC*2220000)
RCJ	NOTE: 64.2 = Half Life for Y-90 and Rec. = Fractional Carrier Recovery ((W2-W1) / (CVA * 0.1000))
Chemist	Relative Counting Error = (The Square Root of (TC + BKG * CT) / (TC - BKG * CT))*1.96
SLF	Percent Carrier Recovery = (Net Weight / Expected weight) * 100
Analyst	NOTE: Expected weight = CVA * 0.1
KNT	Detection Levels and Less Than Values are determined from Procedure LA-508-002.
Date Complete	Delta Time (hours) = ((DOC - SD) * 24) + (TOC - ST) / 100
10/22/96	

Analysis Date				DETECTION LEVEL
10/21/96	Sr-89/90 CONCENTRATION	5.01E-01	µCi/mL	
Analysis Time				
12:40 PM	RELATIVE COUNTING ERROR	2.0%		1.05E-03 µCi/mL
Sample Point				
TK24-1,21-1	PERCENT CARRIER RECOVERY	91.7%		

Analyst:		KNT	Date:	22-Oct-96
Signature of Chemist:		SLF	Date:	OCT 23

SAMPLE.WB1 REV 2.0 22010NML

DISTRIBUTION SHEET

To Distribution	From Production Planning & Control	Page 1 of 1
		Date: 12/04/96
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		ECN NO.: N/A

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Sht #3

Page 1 of 1

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(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	WHC-SD-WM-DP-212	N/A	0	B Plant, TK-24-1, Analytical Results for the Final Report	Q	2	1	1

16. KEY

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		Design Authority									
		Design Agent									
2	1	Cog.Eng. L. L. Fritts	L L Fritts	4 Dec 96							
2	1	Cog. Mgr. A. D. Rice	A D Rice	12-4-96							
2	1	QA D. A. Sebelien	D A Sebelien	12/4/96							
		Safety									
		Env.									

18.	19.	20.	21. DOE APPROVAL (if required)
M. J. Ellsworth M J Ellsworth 12-4-96	N/A	A. D. Rice A D Rice 12-4-96	Ctrl. No. [ ] Approved [ ] Approved w/comments [ ] Disapproved w/comments
Signature of EDT Originator Date	Authorized Representative for Receiving Organization Date	Design Authority/ Cognizant Manager Date	

BD-7400-172-2 (05/96) GEF097

B Plant, TK-24-1, Analytical Results for the Final Report

Larry L. Fritts
Rust Federal Services of Hanford, Inc., Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-87RL10930

EDT/ECN: EDT-618404 UC: 2070
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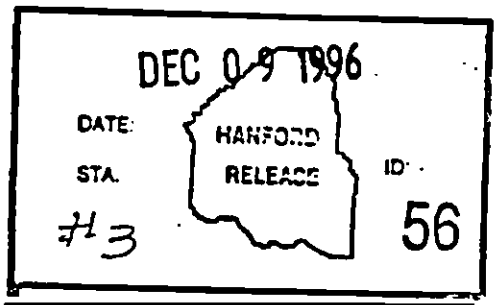

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ANALYTICAL SERVICES

B PLANT, TK-24-1, ANALYTICAL RESULTS FOR THE FINAL REPORT

Project Coordinator: Larry L. Fritts

Prepared for the U.S. Department of Energy
Office of Environmental Restoration
and Waste Management

by

222-S Laboratory
Rust Federal Services of Hanford Inc.
P.O. Box 700
Richland, Washington

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A-8002-032 (09/94)

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WHC-SD-WM-DP-212, REV. 0

222-S ANALYTICAL SERVICES

B PLANT, Tk-24-1, ANALYTICAL RESULTS FOR THE FINAL REPORT

This document is the final laboratory report for B Plant Tk-24-1. A Resource Conservation and Recovery Act (RCRA) sample was taken from Tk-24-1 September 26, 1996. This sample was received at 222-S Analytical Laboratory on September 27, 1996. Analyses were performed in accordance with the accompanying Request for Sample Analysis (RSA) and Letter of Instruction *B PLANT RCRA SAMPLES TO 222S LABORATORY, LETTER OF INSTRUCTION (LOI) 2B-96-LOI-012-01* (LOI) (Westra, 1996). LOI was issued subsequent to RSA and replaces Letter of Instruction 2C-96-LOI-004-01 referenced in RSA.

Sample Appearance and Handling

This sample was assigned Laboratory Information Management System (LIMS) identification number S96B000453. The sample was clear and very light yellow with less than 2% solids on the bottom of the container. No organic layer was noted.

An aliquot of this sample was taken and prepared for Selenium (Se) analysis by performing an acid digest of the liquid. This digest aliquot was assigned a LIMS identification number S96B000535.

Analytical Results Summary

The sample data summary section compiles the analytical results that comply with RSA in tabular summary form. The raw data were presented in the sections following the sample data summary section.

Inorganic Analyses

pH

This sample was run in duplicate. No laboratory defined quality control (QC) parameters were exceeded for this analyte (Meznarich, et. al., 1995).

IC - Ion Chromatography

Only required analyte results (F^-, NO_3^{2-}, NO_2^{2-}, SO_4^{2-}, and PO_4^{3-}) as per RSA are considered in this report. Information regarding other IC analytes can be determined from the raw data.

This sample was run in duplicate and with a spike sample. No laboratory defined QC parameters

were exceeded for these analytes

Laboratory reagent blank shows nitrate at 1.51E-01 μg/mL. This concentration has no significant impact on the sample result of 3.84E+03 μg/mL.

ICP - Inductively Coupled Plasma Spectroscopy

Only required analyte results (Ba, Cr, Na, and Pb) as per RSA are considered in this report. Information regarding the other ICP analytes can be determined from the raw data.

This sample was run in duplicate with a spike sample and spike duplicate on an aliquot made by adding acid. No laboratory defined quality control (QC) parameters were exceeded for these analytes.

Procedure LA-505-151 was used to perform this analysis. LOI references procedure LA-505-161. These procedures are written for two different brands of ICP instrumentation but are equivalent.

TOC - Total Organic Carbon

This sample was run in duplicate by the persulfate method (LA-342-101). A triplicate analysis of this sample was performed on a separate worklist using the furnace oxidation method (LA-344-105) with a result approximately 2.5 times greater than the persulfate result average.

The furnace oxidation method is viewed as more accurate by the chemist since this method employs a closed system reaction. Further, results from the persulfate method that are less than five times the detection limit are less accurate. Lack of sample prevents a rerun analysis by the furnace oxidation method.

The laboratory reagent blank shows 6.80E-00 μg/mL by the persulfate method and 9.00E-01 μg/mL by the furnace oxidation method. These concentrations have no significant impact on the sample results of 7.42E+01 μg/mL and 1.87E+02 μg/mL, respectively.

TIC - Total Inorganic Carbon

This result is not required by RSA but is generated with the TOC by persulfate analysis. More information regarding this analyte can be determined from the raw data.

Se - Selenium

This sample was run in duplicate with a spike sample on an acid digested aliquot. The procedure for this analysis does not allow for spike duplicates as required by LOI. With customer concurrence, the sample is being reported without this LOI requirement. No laboratory defined QC parameters were exceeded for these analytes.

Radiochemical Analyses

GEA - Gamma Energy Analysis

Only the required analyte result (^{137}Cs) as per RSA is considered in this report. Information regarding other GEA analytes can be determined from the raw data. No laboratory defined QC parameters were exceeded for this analyte.

^{90}Sr - Strontium-90

This sample was run in duplicate. No laboratory defined QC parameters were exceeded for this analyte.

Laboratory reagent blank shows ^{90}Sr at 7.09E-04 μCi/mL. This concentration has no significant impact on the sample result of 7.68E+01μCi/mL.

Procedures

Table 1 lists the analytical procedures used for performing the sample analyses. Abbreviations for analyses are defined in the table notes.

Table 1. Analytical Procedures

Analysis	Sample Portion	Preparation Procedure +	Analysis Procedure
pH	Liquid	N/A	LA-212-106 Rev. B-0
IC	Liquid	N/A	LA-533-105 Rev. D-1
ICP	Liquid	N/A	LA-505-151 Rev. D-3
TOC	Liquid	N/A	LA-342-100 Rev. E-0 LA-344-105 Rev. D-1
TIC	Liquid	N/A	LA-342-100 Rev. E-0
Se	Liquid	LA-505-164 Rev. A-0	LA-365-131 Rev. D-0
GEA	Liquid	N/A	LA-548-121 Rev. E-0
^{90}Sr	Liquid	N/A	LA-220-101 Rev. D-1

Abbreviations:
N/A = not applicable (these are direct samples)
pH = pH
IC = ion chromatography
ICP = inductively coupled plasma
TOC = total organic carbon
TIC = total inorganic carbon
Se = selenium
GEA = gamma energy analysis
^{90}Sr = strontium-90

References

Meznarich, H. K., et. al., 1995, *Quality Assurance Plan for the 222-S Laboratories*, WHC-SD-CP-QAPP-016, Rev. 0, Westinghouse Hanford Company, Richland, WA 99352.

Westra, A. G., 1996, *B Plant RCRA Samples to 222S laboratory, Letter of Instruction (LOI) 2B-96-LOI-012-01*, 2B-96-LOI-012-01, B&W Hanford Company, Richland, WA 99352.

pH Direct

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result pH	Duplicate Result pH	Average Result pH	Duplicate Precision RPD %	Standard % Recovery	Blank pH	Spike Recovery %	Spike Duplicate RPD	Detection Limit pH	Counting Error %
Tank 24-1	S96B000453	2.10	2.05	2.08	2.41	100.2	n/a	n/a	n/a	1.00E-02	n/a

TOC by Persulfate/Coulometry

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	7.42E+01	7.80E+01	7.61E+01	5.0	90.3	6.80E+00	91.0	n/a	4.00E+01	n/a

Tot. Organic Carbon by Coul. (Triplicate Analysis by Furnace Oxidation)

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	1.87E+02	n/a	n/a	n/a	90.7	9.00E-01	n/a	n/a	5.50E+01	n/a

Strontium-89/90 High Level

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Duplicate Precision RPD %	Standard % Recovery	Blank uCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	7.68E+01	7.33E+01	7.51E+01	4.7	105.0	7.09E-04	n/a	n/a	2.17E-02	7.24E-01

Barium-ICP-Acid Dil.
Acid Digest

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	1.15E+01	1.19E+01	1.17E+01	3.4	97.4	<5.00E-02	98.3	0.1	1.00E+00	n/a

Chromium-ICP-Acid Dil.
Acid Digest

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	6.28E+00	6.13E+00	6.21E+00	2.4	101.2	<1.00E-02	97.8	3.2	2.00E-01	n/a

Sodium-ICP-Acid Dil.
Acid Digest

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	5.43E+02	5.60E+02	5.52E+02	3.1	95.0	<1.00E-01	97.6	0.4	2.00E+00	n/a

Lead-ICP-Acid Dil.
Acid Digest

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	3.92E+01	3.87E+01	3.90E+01	1.28	100.6	<1.00E-01	96.7	3.7	2.00E+00	n/a

Fluoride-IC-Dionex 4000/4500

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	3.26E+00	3.35E+00	3.30E+00	2.7	92.7	<1.20E-02	95.3	n/a	1.21E+00	n/a

Nitrite-IC - Dionex 4000/4500

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	<1.09E+01	<1.09E+01	n/a	n/a	93.1	<1.08E-01	92.2	n/a	1.09E+01	n/a

Nitrate by IC-Dionex 4000/4500

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	3.84E+03	3.87E+03	3.85E+03	0.8	102.7	1.51E-01	101.2	n/a	1.40E+01	n/a

Phosphate-IC-Dionex 4000/4500

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	2.20E+02	2.30E+02	2.25E+02	4.4	97.8	<1.20E-01	100.0	n/a	1.21E+01	n/a

Sulfate by IC-Dionex 4000/4500

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	4.12E+01	4.61E+01	4.37E+01	11.2	103.2	<1.38E-01	101.0	n/a	1.39E+01	n/a

Cesium-137 by GEA

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Duplicate Precision RPD %	Standard % Recovery	Blank uCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit uCi/mL	Counting Error %
Tank 24-1	S96B000453	4.37E+01	4.26E+01	4.32E+01	2.6	99.8	<6.18E-02	n/a	n/a	n/a	1.0

Selenium by HYAA
Acid Digest

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000535	<2.50E-01	<2.50E-01	n/a	n/a	103.7	<5.00E-03	112.5	n/a	2.50E-01	n/a

Westinghouse Hanford Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

BP- 96 - COC - 001

Page 1 of

Data Turnaround: ☐ Priority ☑ Normal

Sector: WHC, Nuclear Fuels Operations	Company Contact: A. Hestir	Telephone No.: 372-0482
Project Designation: N/A	Sampling Location: 271-E Canyon Cell 24	SAF No.: N/A
Chest No.: N/A	Field Logbook No.: N/A	Method of Shipment: Pig in overpack via truck
Shipped To: 222-S Lab	Offsite Property No.: N/A	Bill of Lading/Air Bill No.: N/A
Possible Sample Hazards/Remarks: pH < 2 .06 Ci Cs,Sr	Preservative: N/A	
	Type of Container: Polypropylene	
	No. of Container(s): 1	
Special Handling and/or Storage:	Volume: 35mL	

SAMPLE ANALYSIS

151

Sample No.	Matrix*	Date Sampled	Time Sampled
96B000453	L	9/26/96	1015 A

Col #33

WHC-SD-WM-ADP-214, REV 0

HNF-3208, REV. 0, ATT A, Pg. 126

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By: [signature]	Date/Time: 9-26-96 / 11:20	Received By: Janice L Henley	Date/Time: 1128 9-26-96
Relinquished By: Janice Henley	Date/Time: 0810 9-27-96	Received By: A Walley C Walley	Date/Time: 9/27/96 2015
Relinquished By:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:

SPECIAL INSTRUCTIONS

Matrix*
- S = Soil
- SE = Sediment
- SO = Solid
- SL = Sludge
- W = Water
- O = Oil
- A = Air
- DS = Drum Solids
- DL = Drum Liquids
- T = Tissue
- WI = Wipe
- L = Liquid
- V = Vegetation
- X = Other

LABORATORY SECTION: Received By: Title: Date/Time:

FINAL SAMPLE DISPOSITION: Disposal Method: Disposed By: Date/Time:

DISTRIBUTION: Original - Sample Yellow - Sampler

EDT 4 1990 10:30AM WHC 7777 AND AVON CT RICHLAND

UC-6000-820 (12/

REQUEST FOR SAMPLE ANALYSIS (RSA)

RSA No.

1. Sample Origin	2. date Sampled	4. Requestor's Name	6. TPCN/Org. Code
B Plant Tank 24-1	9/26/96	B Plant Shift Manager	KNT6A
	3. Submitted By F.M. SIMMONS	5. Requestor's Phone/MSIN/FAX 372-0023, FAX 372-0103	

7. Customer ID No.	8. Laboratory ID No.	9. Group ID No.	10. Volume of Sample	11. Matrix of Sample	12. Determination(s)	13. Expected Range
N/A	9600045 3 222-S		35 ml total	LA	Chromium	2.5 mg/L
				LA	Lead	2.5 mg/L
				LA	Barium	<50.0 mg/L
				LA	Selenium	0.5 mg/L
				LA	Nitrate +	2.8E2 µg/ml
				LA	Nitrite +	2,600 µg/ml
				LA	Fluoride +	3.0 µg/ml
				LA	Phosphate +	60.0 µg/ml
				LA	Sulphate +	60.0 µg/ml
				LA	Na	3.2E3 µg/ml
				LA	Cesium 137 +	6.0 µCi/ml
				LA	Strontium 90 +	2.0 µCi/ml
				LA	TOC +	
				LA	pH +	N/A
					@ APEAR +	

14. QC Required

☒ Per 222-S Laboratory Quality Assurance Plan (WHC-SD-CP-QAPP-016)

Other (list reference document or attach) Per LOI 2C-96-LOI-004-01 Listed waste requirements only.

15. Chemical Constituents

☒ Unknown

16. Special Storage Requirements

☒ No

☐ Yes

17. Do samples contain listed waste?

☐ No

☒ Yes (See LOI referenced in block 14)

18. Special Instructions (Reporting format, holding times, etc.)

This sample is for the Department of Ecology. pH needs to be done ASAP

19. Requested Turnaround Time

☒ 2 Weeks

☐ 4 Weeks

Other

20. Sample Received By:

G. Walley — Date: 9/27/96 — Time: 0015

21. Chain of Custody

☐ No

☒ Yes

Number: BP-96-COC-001

ATTACHMENT 2 - B PLANT RCRA SAMPLE IDENTIFICATION INFORMATION
(Page 1 of 1)

Name: Jim Pincus	Date: 9-26-96	Time: 10:15
Hanford Environmental Information System sample number: S96B000453		
Sample was collected; Date: 9/26/96		Time: 10:15 PM
Vessel from which sample was obtained: TK-24-1		
Request for special Analysis form shipped with sample [✓] Attached		
Comments: pH needs to be done ASAP.		

LABCORE Data Entry Template for Worklist# 13377

Analyst: JHW **Instrument:** NONE _____ **Book #** _____

Method: LA-519-151 Rev/Mod _____

Worklist Comment: B PLANT TANK 21-1, 24-1 APPEARANCE tro

GROUP	PROJECT	S	TYPE	SAMPLE#	R	A	-------TEST------	MATRIX	ACTUAL	FOUND	DL	UNIT
96001333	TK 24-1	1	SAMPLE	S96B000453	0		@APPEAR3 COLOR-01	LIQUID	N/A	See below		
96001333	TK 24-1	1	SAMPLE	S96B000453	0		@APPEAR3 DOSERATE	LIQUID	N/A	15,000		mrad/hour
96001333	TK 24-1	1	SAMPLE	S96B000453	0		@APPEAR3 ORGVOL02	LIQUID	N/A	~~50~~ 0 MJL 10/5/96		mL
96001333	TK 24-1	1	SAMPLE	S96B000453	0		@APPEAR3 SAMPAMT2	LIQUID	N/A	50		mL
96001333	TK 24-1	1	SAMPLE	S96B000453	0		@APPEAR3 V%SLD-02	LIQUID	N/A	1		%
~~96001334~~	~~MISC B-PLANT~~	~~2~~	~~SAMPLE~~	~~S96B000454~~	~~0~~		~~@APPEAR3 COLOR-01~~	~~LIQUID~~	~~N/A~~	~~None~~		
~~96001334~~	~~MISC B-PLANT~~	~~2~~	~~SAMPLE~~	~~S96B000454~~	~~0~~		~~@APPEAR3 DOSERATE~~	~~LIQUID~~	~~N/A~~	~~250~~		~~mrad/hour~~
~~96001334~~	~~MISC B-PLANT~~	~~2~~	~~SAMPLE~~	~~S96B000454~~	~~0~~		~~@APPEAR3 ORGVOL02~~	~~LIQUID~~	~~N/A~~	~~500~~ 0 MJL 10/5/96		~~mL~~
~~96001334~~	~~MISC B-PLANT~~	~~2~~	~~SAMPLE~~	~~S96B000454~~	~~0~~		~~@APPEAR3 SAMPAMT2~~	~~LIQUID~~	~~N/A~~	~~50~~		~~mL~~
~~96001334~~	~~MISC B-PLANT~~	~~2~~	~~SAMPLE~~	~~S96B000454~~	~~0~~		~~@APPEAR3 V%SLD-02~~	~~LIQUID~~	~~N/A~~	~~< 2~~		~~%~~

JJJ 11/25/96

Final page for worklist # 13377

[signature] 10-4-96
Analyst Signature Date

Susan Bee 10/04/96
Analyst Signature Date

S96B000453 Some fine solids on bottom, Clear, color = very light yellow

S96B000454 No Solids, Clear, Colorless

Data Entry Comments:

Reviewed by RK Fuller 10/8/96

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

LABCORE Data Entry Template for Worklist# 14962

HNF-3208, REV. 0, ATT A, Pg. 130

Analyst: RKF **Instrument:** ACD01 **Book #** 48N11-I

Method: LA-505-164 Rev/Mod A-0

* Used 0.500mls (500µl) of 1.0 ppm As/Se to a final volume of 25mls; For both the Std and SPIKE

Worklist Comment: B PLANT ACID DIGEST TK 24-1, 21-1 lad

GROUP	PROJECT	S	TYPE	SAMPLE#	R	A	TEST	MATRIX	ACTUAL	FOUND	DL	UNIT
Final Volume was 25mls for all samples		1	BLNK-PREP				ACIDIG04	LIQUID	1	0.025	N/A	DF
		2	STD-PREP				ACIDIG04	LIQUID	50	50	N/A	DF
96001334	TANK 21-1	3	SAMPLE	S9680005340	C		ACIDIG04	LIQUID	N/A	100		DF
			0.250mls → 25mls									
96001334	TANK 21-1	4	SAMPLE	S9680005340	C		DOSE-02	LIQUID	N/A	10		mrad/hour
												RKF 12/4/96
96001334	TANK 21-1	5	DUP	S9680005340	C		ACIDIG04	LIQUID	100	100	N/A	DF
			0.250mls → 25mls									
96001334	TANK 21-1	6	DUP	S9680005340	C		DOSE-02	LIQUID	10	10	N/A	mrad/hour
96001334	TANK 21-1	7	SPK	S9680005340	C		ACIDIG04	LIQUID	NA	100	N/A	DF * see note above
			0.250mls → 25mls									
96001334	TANK 21-1	8	SPK	S9680005340	C		DOSE-02	LIQUID	NA 10 RKF 11/19/96	10	N/A	mrad/hour * see note above
96001333	TANK 24-1	9	SAMPLE	S9680005350	C		ACIDIG04	LIQUID	N/A	50		DF
			0.500mls → 25mls									
96001333	TANK 24-1	10	SAMPLE	S9680005350	C		DOSE-02	LIQUID	N/A	250		mrad/hour
96001333	TANK 24-1	11	DUP	S9680005350	C		ACIDIG04	LIQUID	50	50	N/A	DF
			0.500mls → 25mls									
96001333	TANK 24-1	12	DUP	S9680005350	C		DOSE-02	LIQUID	250	250	N/A	mrad/hour
96001333	TANK 24-1	13	SPK	S9680005350	C		ACIDIG04	LIQUID	NA	50	N/A	DF * see note above
			0.500mls → 25mls									
96001333	TANK 24-1	14	SPK	S9680005350	C		DOSE-02	LIQUID	NA 250 11/19/96 RKF	250	N/A	mrad/hour * see note above

Final page for worklist # 14962

Dan Bromley

Keith Fuller 11/15/96
Analyst Signature Date

Keith Fuller 11-16-96
Analyst Signature Date

⊛ QC below CL Corrected QC problem RKF 11/19/96

596B000453 → 535
454 → 534

Data Entry Comments:
Sample 596B000454 had less than 1.5mls. Therefore we used only 0.250mls for SAM, DUP, and SPIKE on 596B000534 SAMPLE WAS CLEAR AND COLORLESS SAMPLE 596B000453 was clear and colorless; some solids present but did not Pipette solids into beaker. RK Fuller 11/15/96. HPT was Bill Bishop

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

Validated 11/19/96 RK Fuller

LABCORE Data Entry Template for Worklist# 13773

Analyst: KRO **Instrument:** PH01 _____ **Book #** 22N19-B

Method: LA-212-106 Rev/Mod _____

Worklist Comment: TK-24-1 PH. RCJ

GROUP	PROJECT	S TYPE	SAMPLE#	R	A	-------TEST------	MATRIX	ACTUAL	FOUND	DL	UNIT
		1 STDPH				PH-01	LIQUID	6.00	6.01	N/A	pH
96001333	TK 24-1	2 SAMPLE	S968000453	0		PH-01	LIQUID	N/A	2.10		pH
96001333	TK 24-1	3 DUP	S968000453	0		PH-01	LIQUID	2.10	2.05	N/A	pH
~~96001334~~	~~TK 24-1~~	~~4 SAMPLE~~	~~S968000454~~	~~0~~		~~PH-01~~	~~LIQUID~~	~~N/A~~	~~1.86~~		~~pH~~
~~96001334~~	~~TK 24-1~~	~~5 DUP~~	~~S968000454~~	~~0~~		~~PH-01~~	~~LIQUID~~	~~1.86~~	~~1.89~~	~~N/A~~	~~pH~~

KRO 11/25/96

Final page for worklist # 13773

KRO 10/24/96
Analyst Signature Date

Linda Mack 10-25-96
Analyst Signature Date

VALIDATED
10/25/96

Data Entry Comments:

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

HNF-3208, REV. 0, ATT A, Pg. 132

d Worklist Report for Worklist# 15000

Analyst: vlm **Instrument:** HAA01 **Book#** 63N11C

Method: 1A 365-B1 Rev/Mod D-0

Worklist Comment: Se Liquid. S96B000534 DF=100 S96B000535 DF=50. nds

Seq	Type	Sample#	R	A	Test	Matrix	Actual	Found	DL or Yield	Unit
1	BLNK-PREP			0	SE-05	LIQUID	1	<0.250		Ratio
2	STD-PREP			0	SE-05	LIQUID	0.1	0.1037	103.700	% Recovery
3	BLNK			0	SE-05	LIQUID	1	<0.005		Ratio
4	STD			0	SE-05	LIQUID	0.1	0.113	113.000	% Recovery
5	SAMPLE	S96B000535	0	C	SE-05	LIQUID	N/A <	0.250	0.250	ug/mL
6	DUP	S96B000535	0	C	SE-05	LIQUID	<0.250	<0.250		RPD
7	SPK	S96B000535	0	C	SE-05	LIQUID	100.0	112.5	112.500	% Recovery
~~8~~	~~SAMPLE~~	~~S96B000534~~	~~0~~	~~C~~	~~SE-05~~	~~LIQUID~~	~~N/A <~~	~~0.250~~	~~0.250~~	~~ug/mL~~
~~9~~	~~SPK~~	~~S96B000534~~	~~0~~	~~C~~	~~SE-05~~	~~LIQUID~~	~~100.0~~	~~104.8~~	~~104.800~~	~~% Recovery~~
~~10~~	~~DUP~~	~~S96B000534~~	~~0~~	~~C~~	~~SE-05~~	~~LIQUID~~	~~<0.250~~	~~<0.250~~		~~RPD~~
11	STD			0	SE-05	LIQUID	0.1	0.1058	105.800	% Recovery

JJD 11/25/96

Final page for worklist# 15000

Analyst Signature Date

Analyst Signature Date

Noel Smith 11/22/96

Reviewer Signature Date

Validated

Units shown for QC (BLK/BKG) may not reflect the actual units.

LABCORE Data Entry Template for Worklist# 15000

Analyst: VLM **Instrument:** HAA01 ✓ **Book #** 63N11-C

Method: LA-365-131 Rev/Mod D-0

Worklist Comment: Se Liquid. S96B000534 DF=100 S96B000535 DF=50. nds

GROUP	PROJECT	S	TYPE	SAMPLE#	R	A	TEST	MATRIX	ACTUAL	FOUND	DL	UNIT
		1	BLNK-PREP				SE-05	LIQUID	1	<0.250	N/A	ug/mL
		2	STD-PREP				SE-05	LIQUID	0.1	0.1037	N/A	ug/mL
		3	BLNK				SE-05	LIQUID	1	<0.105	N/A	ug/mL
		4	STD				SE-05	LIQUID	0.1	0.113	N/A	ug/mL
96001333	TANK 24-1	5	SAMPLE	S968000535	0	C	SE-05	LIQUID	N/A	<0.250	0.250	ug/mL
96001333	TANK 24-1	6	DUP	S968000535	0	C	SE-05	LIQUID	<0.250	<0.250	N/A	ug/mL
96001333	TANK 24-1	7	SPK	S968000535	0	C	SE-05	LIQUID	100.0	112.5	N/A	ug/mL
96001334	TANK 21-1	8	SAMPLE	S968000534	0	C	SE-05	LIQUID	N/A	<0.250	0.250	ug/mL
96001334	TANK 21-1	9	SPK	S968000534	0	C	SE-05	LIQUID	100.0	104.8	N/A	ug/mL
96001334	TANK 21-1	10	DUP	S968000534	0	C	SE-05	LIQUID	<0.250	<0.250	N/A	ug/mL
		11	STD				SE-05	LIQUID	0.1	0.1058	N/A	ug/mL

Final page for worklist # 15000

Joel Smith 11/22/96
Analyst Signature **Date**
for Helene Massie

Analyst Signature **Date**

Data Entry Comments:

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

Atomic Absorption Runlog: Se Hydride Analysis

Analyst: Valerie L Masard Date: 11-22-96

Instrument: PE2280 Property #: WB27979

Worklist #: 15000 Start Time: 08:00 End Time: 14:50

Calibration Data: Intercept: 0.0308 absorbance units
Slope: 0.0274 abs. units/concentration
Correlation: 0.9991 (unitless)

Calibration Std conc. 0.100 ppm

Sample Name (Std. ID#)	Sample Point	Sam. Size, mL	D or A*	PKHT (Abs.)	ng result	% Rec.	Comments	CC**
Cal. Std. ID	N/A	0.000	D	-.001	0	N/A		
#: 6NIH	"	0.050	D	.146	5	"		
"	"	0.100	D	.305	10	"		
"	"	0.200	D	.639	20	"		
"	"	0.300	D	.866	30	"		
"	"	0.600	D	1.677	60	"		
"	"	0.700	D	1.923	70	"		
ICV	63NIC	0.250	D	.804	28.24	112.95		
ICB	Blank	1.0	A	1.377	49.16	→	very high	
Prep Std	48NILI	2.0	A	1.166	41.46	103.65	Blank suspect	
Prep Blank	Blank	2.0	A	.018	-0.47		problem with	
Instrument Blank	Blank	1.0	D	-.006	-0.56	1.34	heater block	
596B000534	TK21-1	2.0	A	.013	-0.15		during digest	
596B000534 Dup	TK21-1Dup	2.0	A	.012	-0.69		chemist notified	
596B000534spike	TK21-1Spike	2.0	A	1.178	41.90	104.74	↑	
596B000535	TK21-1	1.0	A	-.006	-1.84			
596B000535 Dup	TK21-1Dup	1.0	A	-.005	-1.31			
596B000535spike	TK21-1Spike	1.0	A	.647	22.50	112.52		
CCV	63NIC	.250	D	.765	26.45	105.79		
CCB	Blank	1.0	D	1.399	49.93	→	another of	
							the high	
							Blanks. explained	
							above.	

* Sample prep. descriptors: D=direct, A=acid digest

**CC = control chart. Check off when control chart entries are made

NOV. 22. 1996 2:57PM WHC 2225 LAB ROOM 2F BACKSIDE 48N11I spike

-.005 -1.31 ng 1.0 ml 5968 000 585 dup
-.006 -1.34 ng 1.0 ml 5968 000 535
1.178 41.90 ng 2.0 ml 5968000 534 + 48N11I spike
.012 -0.69 ng 2.0 ml 5968000 534 Dup
.013 -0.65 ng 2.0 ml 5968000 534
.012 -0.47 ng 2.0 ml Prep blank -.006 -1.34 ng 1.0 ml Instr. Blank
.018 -0.47 ng 2.0 ml Prep Blank
1.166 41.44 ng 2.0 ml Prep std 48N11I
1.877 49.16 1.0 ml ICB < high blk problems with heater [illegible] see Run Log
.804 28.24 ng .250 ml 63N11C ICV
1.923 70 ng .700 ml 61N11H
1.677 60 ng .600 ml 61N11H
.866 30 ng .300 ml 61N11H
.639 20 ng .200 ml 61N11H
.305 10 ng .100 ml 61N11H
.146 5 ng .050 ml 61N11H
-.001 0 ng

14:50 11-22-96 Se Valerie L Massie

Analyte: Se
Date: 11-22-96
Analyst: Valerie L Massie
Start Time: 8:00 End Time: 14:50

MHS 20 Data:

Signal: Concentration
Mode: PKHT
Recorder: TC3
Time: 30 sec.
Expansion: 10

Purge I: 36
Reaction: 10 sec.
Purge II: 50
Temperature: 975 C
EDL milliamps: 280

Chart Recorder Data:

Chart speed: 5 mm/min Chart full scale: 20 mV

Calibration Data:

Intercept: 0.0308 absorbance units
Slope 0.0274 abs. units / concentration
Correlation 0.9991 (unitless)

16:	Intercept: 0.0308
15:	Slope: 0.0274
14:	0.9991
13:	28.2380
12:	49.1641
11:	41.4583
10:	-0.4670
9:	-1.3434
8:	-0.6496
7:	-0.6861
6:	41.8966
5:	-1.3434
4:	-1.3069
3:	22.5043
2:	26.4485
1:	49.9311

PERKI

.721 70ng .700ml
1.509 60ng .600ml 61NIII
.881 30ng .300ml 61NIII
.537 20ng .200ml 61NIII
.264 10ng .100ml 61NIII
.147 5ng .050ml 61NIII
.084 0ng
13:40 11-22-96 Sc Valeri & Masaki
Sonya Morris Prep
Intercept: 0.0381
Slope: 0.0246
0.9974
16.7479
29.8651

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

Selenium : LA-365-131 (D-0) Se LIQUID-ACID DIGEST		BLANK	DUPLICATE
Type	Sample Size in mL SS	1.000	
BLANK	Se ng (Nanograms)	-0.47	
Work List	Acid Digest Dilution Factor DF	50.0	
15000	Conc Se µg/mL (or mg/L or PPM)	-0.024	N/A
Test Code	Conc Se µg/L (PPB)	-23.5	N/A
SE-05		N/A	
Matrix		N/A	
LIQUID		N/A	
Sample #	Conc Se µg/mL=(Se ng/SS)*(1µg/1000ng)*DF		
BLNK-PREP	Average Conc.=(Sample + Duplicate)/2		
Calibration Date	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
11/22/96	Detection Limit = (5 ng/SS)*(1µg/1000ng)*DF		
Instrument Code			
HAA01	Detection Limit (µg/mL)	0.250	
Analyst	Detection Limit (µg/L)	250.00	
VALERIE L MASSIE			
Date		BLANK	DUPLICATE
11/22/96	Conc Se (µg/mL)	<0.250	
Time		N/A	
02:50 PM		N/A	

The Result is < Detection Limit

Data Entry by:		Date: 11/22/96
Approved by:		Date: 11/22/96

365131_C - Se by AA

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

Selenium : LA-365-131 (D-0) Se LIQUID-ACID DIGEST

		STANDARD	DUPLICATE
Type	Sample Size in mL SS	2.000	
STANDARD	Se ng (Nanograms)	41.46	
Work List	Acid Digest Dilution Factor DF	50.0	
15000	Conc Se µg/mL (or mg/L or PPM)	1.037	N/A
Test Code	Conc Se µg/L (PPB)	1036.5	N/A
SE-05		N/A	
Matrix		N/A	
LIQUID		N/A	
Sample #	Conc Se µg/mL=(Se ng/SS)*(1µg/1000ng)*DF		
STD-PREP	Average Conc.=(Sample + Duplicate)/2		
Calibration Date	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
11/22/96			
Instrument Code			
HAA01			
Analyst			
VALERIE L MASSIE			

		STANDARD	DUPLICATE
Date			
11/22/96	Conc Se (µg/mL)	1.04E+00	
Time		N/A	
02:50 PM		N/A	

Data Entry by: [signature] Date: 11/22/96

Approved by: [signature] Date: 11/22/96

Form 365131_3 Rev. 2.2

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

Selenium: LA-365-131 (D-0) Se LIQUIDS-DIRECT

Type	Sample Size in mL SS	BLANK	DUPLICATE
BLANK	Se ng (Nanograms)	1.34	
Work List	Conc Se µg/mL (or mg/L or PPM)	0.001	N/A
15000	Conc Se µg/L (PPB)	1.3	N/A
Test Code		N/A	
SE-05		N/A	
Matrix		N/A	
LIQUID			
Sample #			
ICB			
Calibration Date			
11/22/96			
Instrument Code			
HAA01			
Analyst			
VALERIE L MASSIE			
Date		BLANK	DUPLICATE
11/22/96	Conc Se µg/mL	<0.005	
Time		N/A	
02:50 PM		N/A	

Conc Se µg/mL=(Se ng/SS)*(1µg/1000ng)

Average Conc.=(Sample + Duplicate)/2

Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100

Detection Limit = (5 ng/SS)*(1µg/1000ng)

Detection Limit is Corrected for Sample Prep/Dilution

Detection Limit (µg/mL) =	0.005
Detection Limit (µg/L) =	5.0

The Result is < Detection Limit

Data Entry by:	[signature]	Date:	11/22/96
Approved by:	[signature]	Date:	11/22/96

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

Selenium: LA-365-131 (D-0) Se LIQUIDS-DIRECT		STANDARD	DUPLICATE
Type	Sample Size in mL SS	0.250	
STANDARD	Se ng (Nanograms)	28.24	
Work List	Conc Se µg/mL (or mg/L or PPM)	0.113	N/A
15000	Conc Se µg/L (PPB)	113.0	N/A
Test Code		N/A	
SE-05		N/A	
Matrix		N/A	
LIQUID	Conc Se µg/mL=(Se ng/SS)*(1µg/1000ng)		
Sample #	Average Conc.=(Sample + Duplicate)/2		
ICV	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
Calibration Date			
11/22/96			
Instrument Code			
HAA01			
Analyst			
VALERIE L MASSIE			
Date		STANDARD	DUPLICATE
11/22/96	Conc Se µg/mL	1.13E-01	
Time		N/A	
02:50 PM		N/A	

Data Entry by:	M. Smith	Date:	11/22/96
Approved by:	Noel Davis	Date:	11/22/96

Form 365131_1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

Selenium : LA-365-131 (D-0) Se LIQUID-ACID DIGEST		SAMPLE	DUPLICATE
Type	Sample Size in mL SS	1.000	
SAMPLE	Se ng (Nanograms)	-1.34	
Work List	Acid Digest Dilution Factor DF	50.0	
15000	Conc Se µg/mL (or mg/L or PPM)	-0.067	N/A
Test Code	Conc Se µg/L (PPB)	-67.0	N/A
SE-05		N/A	
Matrix		N/A	
LIQUID		N/A	
Sample #	Conc Se µg/mL=(Se ng/SS)*(1µg/1000ng)*DF		
S96B000535	Average Conc.=(Sample + Duplicate)/2		
Calibration Date	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
11/22/96	Detection Limit = (5 ng/SS)*(1µg/1000ng)*DF		
Instrument Code			
HAA01	Detection Limit (µg/mL)	0.250	
Analyst	Detection Limit (µg/L)	250.00	
VALERIE L MASSIE			
Date		SAMPLE	DUPLICATE
11/22/96	Conc Se (µg/mL)	<0.250	
Time		N/A	
02:50 PM		N/A	

The Result is < Detection Limit

Data Entry by:		Date:	11/22/96
Approved by:		Date:	11/22/96

Form 365131_3 Rev. 2.2

365131_C - Se by AA

WHC-SD-WM-DP-212, REV. 0

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

Selenium : LA-365-131 (D-0) Se LIQUID-ACID DIGEST

Type		SAMPLE	DUPLICATE
DUPLICATE	Sample Size in mL SS	1.000	1.000
	Se ng (Nanograms)	-1.34	-1.31
Work List	Acid Digest Dilution Factor DF	50.0	50.0
15000	Conc Se µg/mL (or mg/L or PPM)	-0.067	-0.066
Test Code	Conc Se µg/L (PPB)	-67.0	-65.5
SE-05	Average Conc (µg/mL)	N/A	N/A
Matrix	Average Conc (µg/L)	N/A	N/A
LIQUID	Relative % Difference	N/A	N/A
Sample #	Conc Se µg/mL=(Se ng/SS)*(1µg/1000ng)*DF		
S96B000535	Average Conc.=(Sample + Duplicate)/2		
Calibration Date	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
11/22/96	Detection Limit = (5 ng/SS)*(1µg/1000ng)*DF		
Instrument Code			
HAA01	Detection Limit (µg/mL)	0.250	
Analyst	Detection Limit (µg/L)	250.00	
VALERIE L MASSIE			
Date		SAMPLE	DUPLICATE
11/22/96	Conc Se (µg/mL)	<0.250	<0.250
Time	Average Conc (µg/mL)	N/A	N/A
02:50 PM	Relative % Difference	N/A	N/A
	Both Results are < Detection Limit		

Data Entry by:		Date: 11/22/96
Approved by:		Date: 11/22/96

Form 365131_3 Rev. 2.2

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

Selenium: LA-365-131 (D-0) Se LIQUIDS-ACID DIGEST

Type	Work List	Test Code	Matrix	Sample #	Calibration Date	Instrument Code	Analyst	Date	Time
SPIKE	15000	SE-05	LIQUID	S96B000535	11/22/96	HAA01	VALERIE L MASSIE	11/22/96	02:50 PM

	SAMPLE	SPIKE
Sample (mL)Vol. Acid Dig. Used SAVOL	1.00	N/A
Spike Std Volume (mL) SSVOL	N/A	0.500
ng of Spike + Sample ngSSAM	N/A	22.50
ng of Sample ngSAM	-1.34	N/A
Final Acid Digest Vol. (mL) ADVOL	N/A	25.00
	N/A	N/A
Spike Std Dilution Factor SPDF	N/A	50.0
Spike Std ID	N/A	48N11-I
Spike Std Value (ppm) SS VAL	N/A	1.000
% Recovery	N/A	112.5%

Sample result is < 5 ng, 0 ng of sample is used in the calculation for % recovery

Spike Std. Dilution Factor = ADVOL/SSVOL

% Recovery = {([[((ngSSAM/SAVOL)*(1/1000))-((0/SAVOL)*(1/1000))]*SPDF)/SS VAL)*100

% Recovery = 112.5%

Data Entry by: [signature] Date: 11/22/96

Approved by: [signature] Date: 11/22/96

365131_C - Se by AA

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

Selenium: LA-365-131 (D-0) Se LIQUIDS-DIRECT

		STANDARD	DUPLICATE
Type	Sample Size in mL SS	0.250	
STANDARD	Se ng (Nanograms)	26.45	
Work List	Conc Se µg/mL (or mg/L or PPM)	0.106	N/A
15000	Conc Se µg/L (PPB)	105.8	N/A
Test Code		N/A	
SE-05		N/A	
Matrix		N/A	
LIQUID	Conc Se µg/mL=(Se ng/SS)*(1µg/1000ng)		
Sample #	Average Conc.=(Sample + Duplicate)/2		
CCV	Relative % Difference=((ABS(Sam.-Dup.))/Average Conc.)*100		
Calibration Date			
11/22/96			
Instrument Code			
HAA01			
Analyst			
VALERIE L MASSIE			
Date		STANDARD	DUPLICATE
11/22/96	Conc Se µg/mL	1.06E-01	
Time		N/A	
02:50 PM		N/A	

Data Entry by:	[signature]	Date:	11/22/96
Approved by:	[signature]	Date:	11/22/96

Form 365131_1 Rev. 1.1

Page 1 of 1

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22-Nov-96 03:25:47 PM

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LABCORE Completed Worklist Report for Worklist# 13776

Analyst: dpb **Instrument:** IC01 **Book#** 14N20

Method: LA-533-105 Rev/Mod D-1

Worklist Comment: TK 24-1 IC. RCJ

Seq	Type	Sample#	R	A	Test	Matrix	Actual		Found	DL or Yield	Unit
1	CCB			0	@IC-QC F	QC		1	<1.20e-2		ug/mL
1	CCB			0	@IC-QC CL	QC		1	<1.70e-2		ug/mL
1	CCB			0	@IC-QC NO2	QC		1	<1.08e-1		ug/mL
1	CCB			0	@IC-QC BR	QC		1	<1.25e-1		ug/mL
1	CCB			0	@IC-QC NO3	QC		1	1.51e-01	0.151	ug/mL
1	CCB			0	@IC-QC PO4	QC		1	<1.20e-1		ug/mL
1	CCB			0	@IC-QC SO4	QC		1	<1.38e-1		ug/mL
1	CCB			0	@IC-QC OXALATE2	QC		1	<1.05e-1		ug/mL
2	CCV			0	@IC-QC F	QC	5.90e01		5.47e+01	92.712	% Recovery
2	CCV			0	@IC-QC CL	QC	7.90e01		7.42e+01	93.924	% Recovery
2	CCV			0	@IC-QC NO2	QC	5.38e02		5.01e+02	93.123	% Recovery
2	CCV			0	@IC-QC BR	QC	5.89e02		5.74e+02	97.453	% Recovery
2	CCV			0	@IC-QC NO3	QC	5.94e02		6.10e+02	102.694	% Recovery
2	CCV			0	@IC-QC PO4	QC	5.45e02		5.33e+02	97.798	% Recovery
2	CCV			0	@IC-QC SO4	QC	6.31e02		6.51e+02	103.170	% Recovery
2	CCV			0	@IC-QC OXALATE2	QC	5.25e02		5.37e+02	102.286	% Recovery
3	SAMPLE	S96B000453		0	@IC-01 F-02	LIQUID	N/A		3.256e+00	1.212	ug/mL
3	SAMPLE	S96B000453		0	@IC-01 CL-02	LIQUID	N/A		6.083e+00	1.717	ug/mL
3	SAMPLE	S96B000453		0	@IC-01 NO2-02	LIQUID	N/A	<	1.091e+01	10.910	ug/mL
3	SAMPLE	S96B000453		0	@IC-01 BR-02	LIQUID	N/A	<	1.262e+01	12.620	ug/mL
3	SAMPLE	S96B000453		0	@IC-01 NO3-02	LIQUID	N/A		3.835e+03	14.060	ug/mL
3	SAMPLE	S96B000453		0	@IC-01 PO4-02	LIQUID	N/A		2.200e+02	12.120	ug/mL
3	SAMPLE	S96B000453		0	@IC-01 SO4-02	LIQUID	N/A		4.124e+01	13.940	ug/mL
3	SAMPLE	S96B000453		0	@IC-01 OXALATE2	LIQUID	N/A		1.891e+01	10.610	ug/mL
4	DUP	S96B000453		0	@IC-01 F-02	LIQUID	3.26e+00		3.35e+00	2.723	RPD
4	DUP	S96B000453		0	@IC-01 CL-02	LIQUID	6.08e+00		6.74e+00	10.296	RPD
4	DUP	S96B000453		0	@IC-01 NO2-02	LIQUID	<1.09e1		<1.09e1		RPD
4	DUP	S96B000453		0	@IC-01 BR-02	LIQUID	<1.26e1		<1.26e1		RPD
4	DUP	S96B000453		0	@IC-01 NO3-02	LIQUID	3.84e+03		3.87e+03	0.778	RPD
4	DUP	S96B000453		0	@IC-01 PO4-02	LIQUID	2.20e+02		2.30e+02	4.444	RPD
4	DUP	S96B000453		0	@IC-01 SO4-02	LIQUID	4.12e+01		4.61e+01	11.226	RPD
4	DUP	S96B000453		0	@IC-01 OXALATE2	LIQUID	1.89e+01		1.47e+01	25.000	RPD
5	SPK	S96B000453		0	@IC-01 F-02	LIQUID	5.90e01		5.62e+01	95.254	% Recovery
5	SPK	S96B000453		0	@IC-01 CL-02	LIQUID	7.90e01		7.17e+01	90.759	% Recovery
5	SPK	S96B000453		0	@IC-01 NO2-02	LIQUID	5.38e02		4.96e+02	92.193	% Recovery
5	SPK	S96B000453		0	@IC-01 BR-02	LIQUID	5.89e02		5.29e+02	89.813	% Recovery
5	SPK	S96B000453		0	@IC-01 NO3-02	LIQUID	5.94e02		6.01e+02	101.178	% Recovery
5	SPK	S96B000453		0	@IC-01 PO4-02	LIQUID	5.45e02		5.45e+02	100.000	% Recovery
5	SPK	S96B000453		0	@IC-01 SO4-02	LIQUID	6.31e02		6.37e+02	100.951	% Recovery
5	SPK	S96B000453		0	@IC-01 OXALATE2	LIQUID	5.25e02		5.14e+02	97.905	% Recovery
6	SAMPLE	S96B000464		0	@IC-01 F-02	LIQUID	N/A	<	1.212e+00	1.212	ug/mL

RJJ 11/25/96

Units shown for QC (BLK/BKG) may not reflect the actual units.

worklistdata Version 1.0 05/15/96
10/30/96 11:25

LABCORE Completed Worklist Report for Worklist# 13776

Seq	Type	Sample#	R	A	Test		Matrix	Actual	Found	DL or Yield	Unit
6	SAMPLE	S96B000454	0	@IC-01	CL-02	LIQUID	N/A	6.914e+01	1.717	ug/mL	
6	SAMPLE	S96B000454	0	@IC-01	NO2-02	LIQUID	N/A <	1.091e+01	10.910	ug/mL	
6	SAMPLE	S96B000454	0	@IC-01	BR-02	LIQUID	N/A <	1.262e+01	12.620	ug/mL	
6	SAMPLE	S96B000454	0	@IC-01	NO3-02	LIQUID	N/A	2.841e+03	14.040	ug/mL	
6	SAMPLE	S96B000454	0	@IC-01	PO4-02	LIQUID	N/A <	1.212e+01	12.120	ug/mL	
6	SAMPLE	S96B000454	0	@IC-01	SO4-02	LIQUID	N/A	1.654e+01	13.940	ug/mL	
6	SAMPLE	S96B000454	0	@IC-01	OXALATE2	LIQUID	N/A <	1.061e+01	10.610	ug/mL	
7	DUP	S96B000454	0	@IC-01	F-02	LIQUID	<1.21e0	<1.21e0		RPD	
7	DUP	S96B000454	0	@IC-01	CL-02	LIQUID	6.91e+01	6.98e+01	1.008	RPD	
7	DUP	S96B000454	0	@IC-01	NO2-02	LIQUID	<1.09e1	<1.09e1		RPD	
7	DUP	S96B000454	0	@IC-01	BR-02	LIQUID	<1.26e1	<1.26e1		RPD	
7	DUP	S96B000454	0	@IC-01	NO3-02	LIQUID	2.84e+03	2.88e+03	1.399	RPD	
7	DUP	S96B000454	0	@IC-01	PO4-02	LIQUID	<1.21e1	<1.21e1		RPD	
7	DUP	S96B000454	0	@IC-01	SO4-02	LIQUID	1.65e+01	1.68e+01	1.802	RPD	
7	DUP	S96B000454	0	@IC-01	OXALATE2	LIQUID	<1.06e1	<1.06e1		RPD	

JJJ 11/25/96

Final page for worklist# 13776

Analyst Signature Date

Analyst Signature Date

Jann Fuye 10/30/96
Reviewer Signature Date

Units shown for QC (BLK/BKG) may not reflect the actual units.

LABCORE Data Entry Template for Worklist# 13776

Analyst: DPB **Instrument:** IC0 _____ **Book#** 14N20-D

Method: LA-533-105 **Rev/Mod** D-1

Worklist Comment: TK 24-1 IC. RCJ

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	CCB				@IC-QC	QC		
2	CCV				@IC-QC	QC		
3	SAMPLE	S96B000453	0		@IC-01	LIQUID	96001333	TK 24-1
	Analytes Requested:				BR-02 , CL-02 , F-02 , NO2-02 , NO3-02 , OXALATE2, PO4-02 , SO4-02			
4	DUP	S96B000453	0		@IC-01	LIQUID		
5	SPK	S96B000453	0		@IC-01	LIQUID		
6	SAMPLE	S96B000454	0		@IC-01	LIQUID	96001334	TK 21-1
	Analytes Requested:				BR-02 , CL-02 , F-02 , NO2-02 , NO3-02 , OXALATE2, PO4-02 , SO4-02			
7	DUP	S96B000454	0		@IC-01	LIQUID		

Final page for worklist # 13776

Daniel P. Bromley 10/25/96 0510
Analyst Signature Date

Analyst Signature Date

13776OC.CSV

Uploaded 10/30/96 JMLuye
Validated 10/30/96 JMLuye

Data Entry Comments: ~~EXPIRED STANDARD~~ Std did not expire till 10/3/96 JMF 12:59 on 10/25 JMF

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

TA FILE/WORKLIST RESOLUTION 30-Oct-96

Worklist#: 13776

	Seq	Type	Sample #
=>	1	CCB	
=>	2	CCV	
=>	3	SAMPLE	S96B000453
=>	4	DUP	S96B000453
=>	5	SPK	S96B000453
=>	6	SAMPLE	S96B000454
=>	7	DUP	S96B000454

Data File: 137760C.CSV

Seq#	Data File	Sample Name	Dilution
1	96102321.d03	ELUENT BLANK	1.00
2	96102321.d05	STD 14N20-D	101.00
3	96102321.d14	S96B000453 SAM	101.00
4	96102321.d15	S96B000453 DUP	101.00
5	96102321.d16	S96B000453 SPK	101.00
6	96102321.d17	S96B000454 SAM	101.00
7	96102321.d19	S96B000454 DUP	101.00

Save(F4) Abort(Shift-F3) ListFiles(Shift-F1) UploadFile(F8)

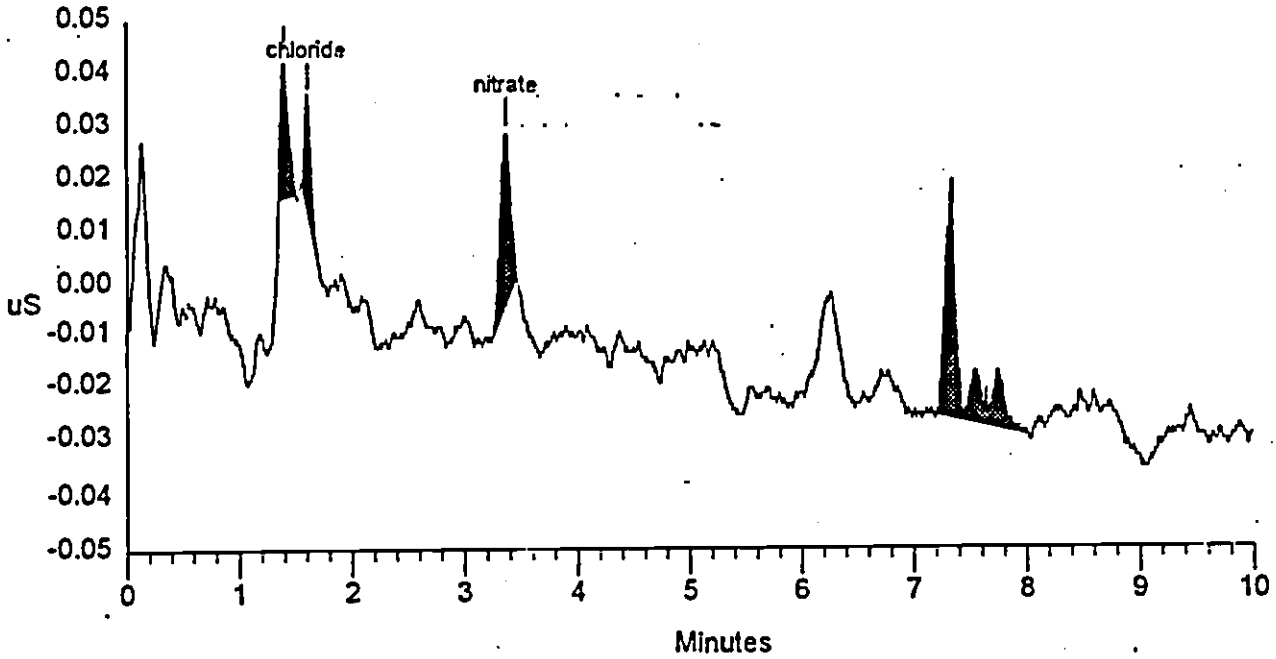
Sample Name: ELUENT BLANK Date: 10/24/1996 22:11:43
Data File : C:\DX\DATA\96102321.D03
Method : C:\DX\METHOD\KIT.MET
ACI Address: 1 System: 1 Inject#: 3 Detector:CDM-1
Analyst : [signature] for DPB 12/4/96 Column: AG4A/AS4A anion column

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area Reject
External	1	1	3000	5Hz	0.00	10.00	50

********** Peak Report: All Peaks **********

Pk. Num	Ret Time	Component Name	Concentration ug/ml	Height	Area	Bl. Code	%Delta
1	1.41		0.000	26	137	1	
2	1.61	chloride	0.005	22	96	1	0.00
3	3.38	nitrate	0.151	32	221	1	-0.88
4	7.36		0.000	38	456	1	
		Totals	0.156	117	911		

File: 96102321.D03 Sample: ELUENT BLANK



SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 44 TO 48.

Processed on 10/24/1996 23:05:32

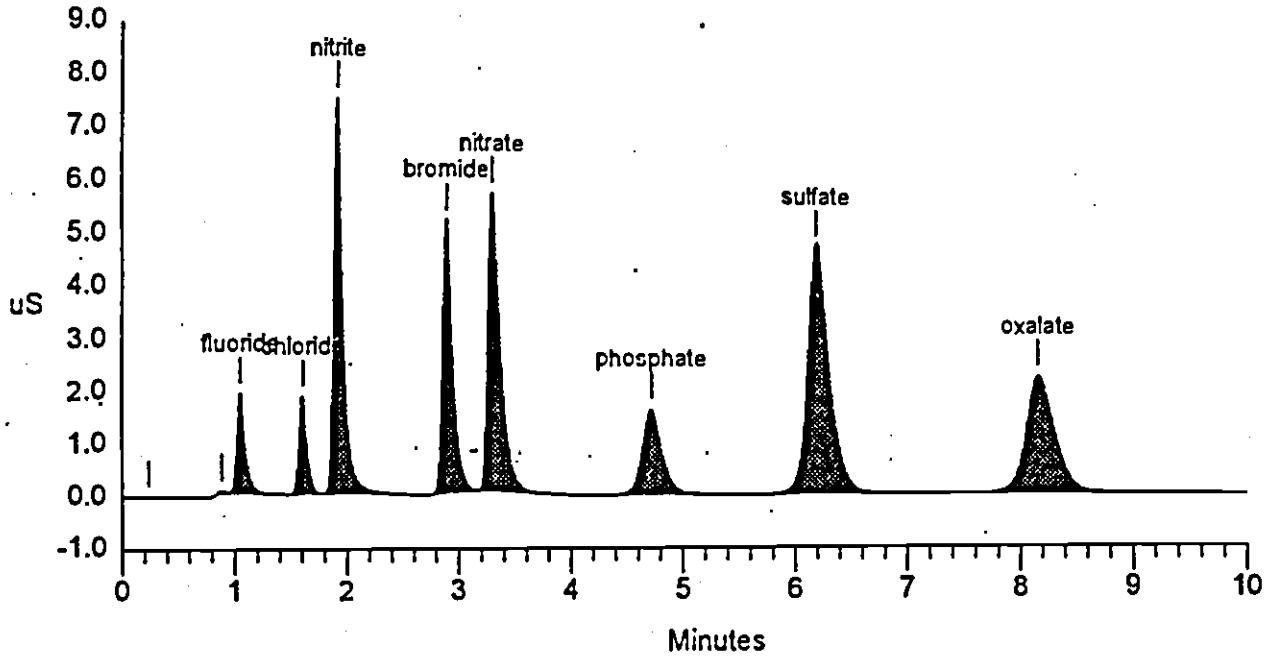
Sample Name: STD 14N20-D Date: 10/24/1996 22:46:45
Data File : C:\DX\DATA\96102321.D05
Method : C:\DX\METHOD\KIT.MET
ACI Address: 1 System: 1 Inject#: 5 Detector:CDM-1
Analyst : Column: AG4A/AS4A anion column

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area Reject
External	1	101	3000	5Hz	0.00	10.00	50

********** Peak Report: All Peaks **********

Pk. Num	Ret Time	Component Name	Concentration ug/ml	Height	Area	Bl. Code	%Delta
1	0.24		0.000	31	147	1	
2	0.89		0.000	49	201	2	
3	1.05	fluoride	54.696	1904	10771	2	3.27
4	1.61	chloride	74.248	1868	9834	1	-0.41
5	1.92	nitrite	501.423	7478	46234	1	-3.03
6	2.89	bromide	573.559	5172	35207	1	-2.91
7	3.30	nitrate	610.184	5632	46825	1	-3.23
8	4.72	phosphate	532.825	1642	21318	1	-4.26
9	6.19	sulfate	650.506	4672	66540	1	-5.69
10	8.16	oxalate	536.806	2224	42499	1	0.00
		Totals	3534.248	30672	279576		

File: 96102321.D05 Sample: STD 14N20-D



Donald V. Bromley 10/25/96

Data Reprocessed On 10/30/1996 10:45

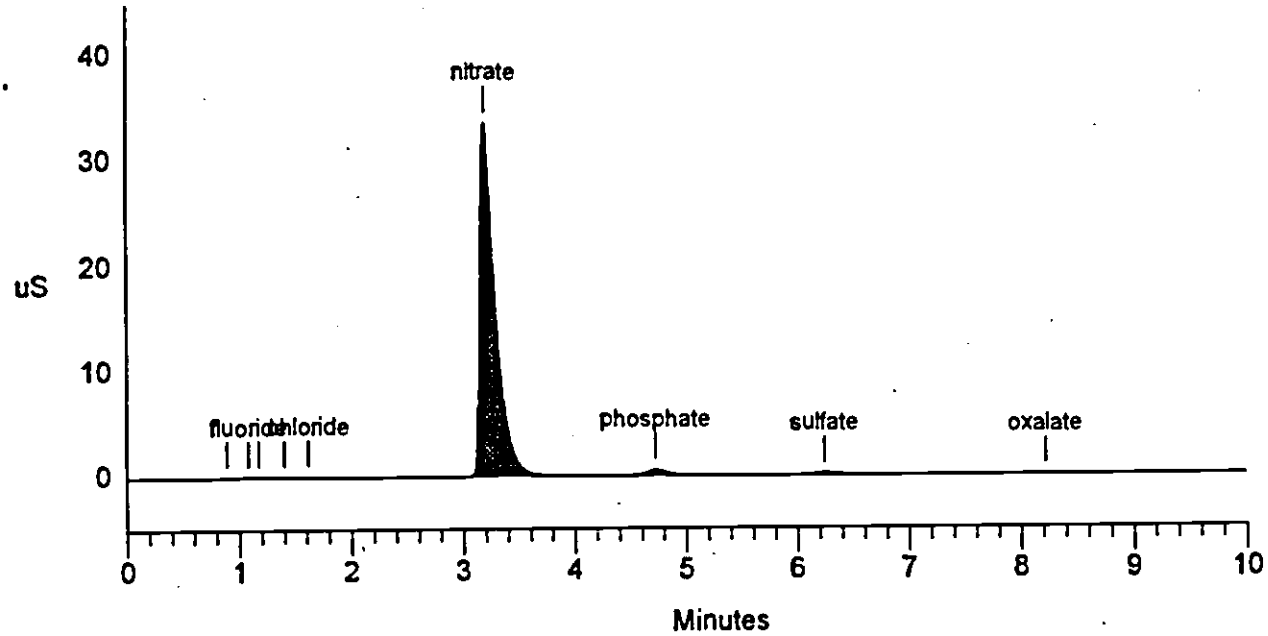
Sample Name: S96B000453 SAM Date: 10/25/1996 02:10:18
Data File : F:\DATA\96102321.D14
Method : C:\DX\METHOD\KIT.MET
ACI Address: 1 System: 1 Inject#: 14 Detector:CDM-1
Analyst : Column: AG4A/AS4A anion column

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area Reject
External	1	101	3000	5Hz	0.00	10.00	50

********** Peak Report: All Peaks **********

Pk. Num	Ret Time	Component Name	Concentration ug/ml	Height	Area	Bl. Code	%Delta
1	0.89		0.000	45	226	2	
2	1.08	fluoride	3.256	96	440	2	5.88
3	1.17		0.000	103	568	2	
4	1.40		0.000	44	260	1	
5	1.61	chloride	6.083	149	824	1	0.00
6	3.19	nitrate	3835.282	33686	332464	1	-6.35
7	4.72	phosphate	219.969	620	8725	1	-4.26
8	6.24	sulfate	41.244	246	3713	1	-4.88
9	8.21	oxalate	18.914	56	1277	1	0.04
		Totals	4124.748	35043	348496		

File: 96102321.D14 Sample: S96B000453 SAM



Data Processed On 10/30/1996 10:47:39

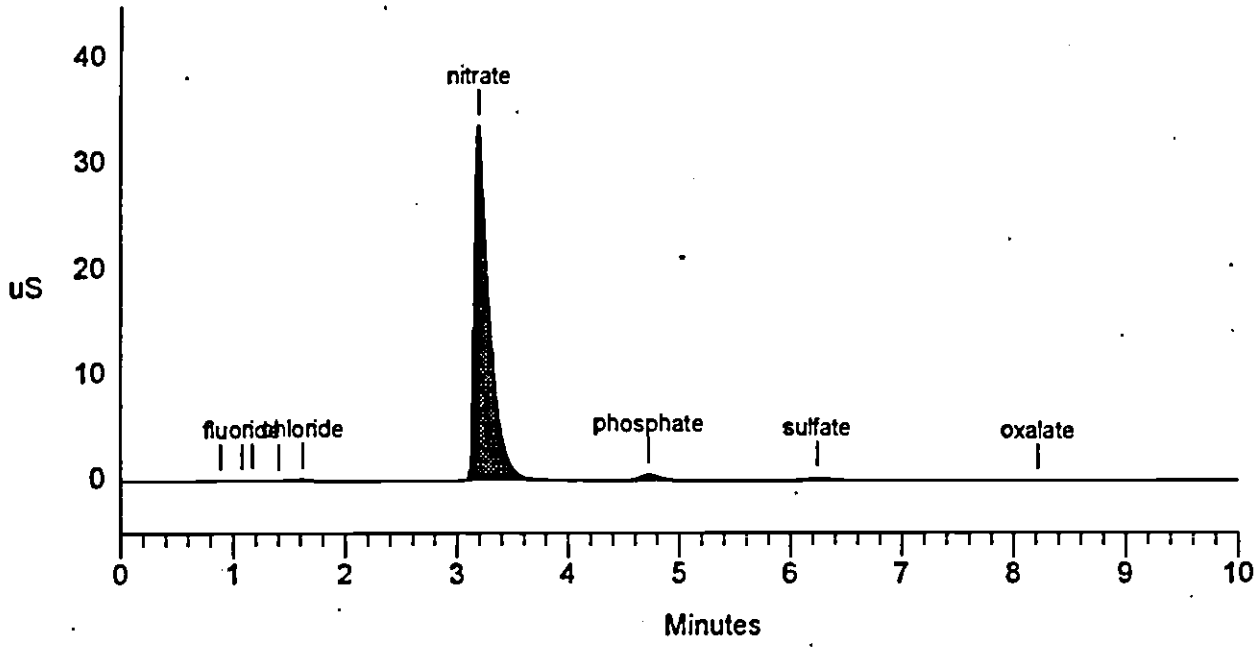
Sample Name: S96B000453 DUP Date: 10/25/1996 02:23:06
Data File : F:\DATA\96102321.D15
Method : C:\DX\METHOD\KIT.MET
ACI Address: 1 System: 1 Inject#: 15 Detector:CDM-1
Analyst : Column: AG4A/AS4A anion column

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area Reject
External	1	101	3000	5Hz	0.00	10.00	50

********** Peak Report: All Peaks **********

Pk. Num	Ret Time	Component Name	Concentration ug/ml	Height	Area	Bl. Code	%Delta
1	0.89		0.000	43	204	2	
2	1.08	fluoride	3.350	98	459	2	5.88
3	1.17		0.000	105	604	2	
4	1.41		0.000	54	330	1	
5	1.62	chloride	6.735	174	909	1	0.41
6	3.19	nitrate	3871.148	33779	336048	1	-6.35
7	4.72	phosphate	229.576	640	9109	1	-4.26
8	6.24	sulfate	46.133	269	4209	1	-4.88
9	8.21	oxalate	14.657	50	941	1	0.04
		Totals	4171.600	35212	352811		

File: 96102321.D15 Sample: S96B000453 DUP



Data Reprocessed On 10/30/1996 10:

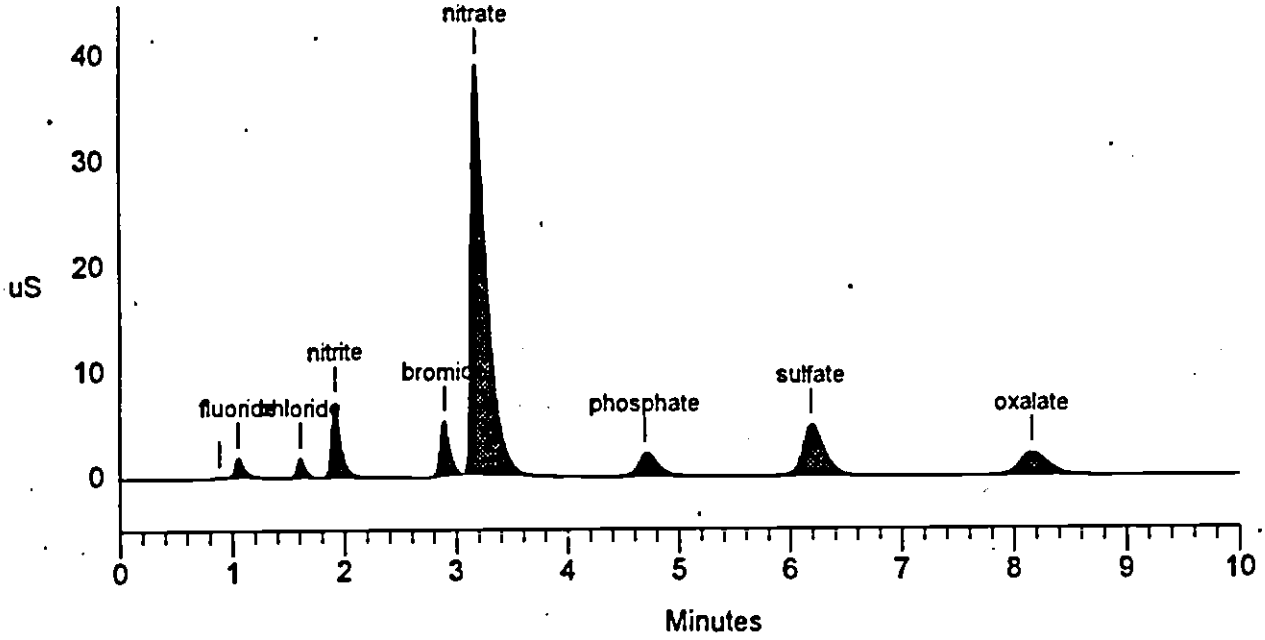
Sample Name: S96B000453 SPK Date: 10/25/1996 02:35:00
Data File : F:\DATA\96102321.D16
Method : C:\DX\METHOD\KIT.MET
ACI Address: 1 System: 1 Inject#: 16 Detector:CDM-1
Analyst : Column: AG4A/AS4A anion column

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area Reject
External	1	101	3000	5Hz	0.00	10.00	50

********** Peak Report: All Peaks **********

Pk. Num	Ret Time	Component Name	Concentration ug/ml	Height	Area	Bl. Code	%Delta
1	0.89		0.000	68	262	2	
2	1.05	fluoride	59.499	1894	11747	2	3.27
3	1.61	chloride	77.815	1922	10312	1	-0.41
4	1.92	nitrite	495.801	7220	45701	1	-3.03
5	2.89	bromide	529.076	5260	32381	1	-2.91
6	3.18	nitrate	4435.921	39013	394073	1	-6.74
7	4.69	phosphate	764.960	2211	30816	1	-4.80
8	6.19	sulfate	677.839	4891	69411	1	-5.69
9	8.16	oxalate	532.921	2224	42188	1	0.00
		Totals	7573.832	64702	636890		

File: 96102321.D16 Sample: S96B000453 SPK



10/09/96 06:39
A-0004-1

LABCORE Data Entry Template for Worklist# 13768

Analyst: J. WORRELL **Instrument:** ICP01 _____ **Book#** 61848

Method: LA-505-151/~~161~~ Rev/Mod D-3
JW 10-9-96

Worklist Comment: ICP TK24-1

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	ICV				@ICP-QC	QC		
2	ICB				@ICP-QC	QC		
3	LLS				@ICP-QC	QC		
4	ICSA				@ICP-QC	QC		
5	ICSAB				@ICP-QC	QC		
6	SAMPLE	S96B000453	0	D	@ICP-D01	LIQUID	96001333	TK 24-1
	Analytes Requested:	AG-D-01 , AL-D-01 , AS-D-01 , B-D-01 , BA-D-01 , BE-D-01 , BI-D-01 , CA-D-01 , CD-D-01 , CE-D-01 , CO-D-01 , CR-D-01 , CU-D-01 , FE-D-01 , K-D-01 , LA-D-01 , LI-D-01 , MG-D-01 , MN-D-01 , MO-D-01 , NA-D-01 , ND-D-01 , NI-D-01 , P-D-01 , PB-D-01 , S-D-01 , SB-D-01 , SE-D-01 , SI-D-01 , SM-D-01 , SR-D-01 , TI-D-01 , TL-D-01 , U-D-01 , V-D-01 , ZN-D-01 , ZR-D-01			
7	DUP	S96B000453	0	D	@ICP-D01	LIQUID		
8	SPK	S96B000453	0	D	@ICP-D01	LIQUID		
9	SPK-DUP	S96B000453	0	D	@ICP-D01	LIQUID		
10	CCV				@ICP-QC	QC		
11	CCB				@ICP-QC	QC		
12	SAMPLE	S96B000454	0	D	@ICP-D01	LIQUID	96001334	TK 21-1
	Analytes Requested:	AG-D-01 , AL-D-01 , AS-D-01 , B-D-01 , BA-D-01 , BE-D-01 , BI-D-01 , CA-D-01 , CD-D-01 , CE-D-01 , CO-D-01 , CR-D-01 , CU-D-01 , FE-D-01 , K-D-01 , LA-D-01 , LI-D-01 , MG-D-01 , MN-D-01 , MO-D-01 , NA-D-01 , ND-D-01 , NI-D-01 , P-D-01 , PB-D-01 , S-D-01 , SB-D-01 , SE-D-01 , SI-D-01 , SM-D-01 , SR-D-01 , TI-D-01 , TL-D-01 , U-D-01 , V-D-01 , ZN-D-01 , ZR-D-01			

Data Entry Comments:

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

10/09/96 12:20 3092 372 2929 WESTINGHOUSE ---- MO-924 200A 001

10/09/96 06:39
A-0004-1

LABCORE Data Entry Template for Worklist# 13768

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
13	DUP	S96B000454	0	D	@ICP-D01	LIQUID		
14	SPK	S96B000454	0	D	@ICP-D01	LIQUID		
15	SPK-DUP	S96B000454	0	D	@ICP-D01	LIQUID		
16	ICSA				@ICP-QC	QC		
17	ICSAB				@ICP-QC	QC		
18	CCV				@ICP-QC	QC		
19	CCB				@ICP-QC	QC		

Final page for worklist # 13768

[signature] 10-9-96
Analyst Signature Date

Reviewed by: [signature] 10/9/96
Analyst Signature Date

		DF
S96B000453	SAM 0.5ml - 9.5ml	20
	DUP 0.5ml - 9.5ml	20
	P.SPK 0.5ml - 1.0 - 1.0 - 7.5ml	20
	DUP P.SPK 0.5ml - 1.0 - 1.0 - 7.5ml	20
S96B000454	SAM 0.5ml - 9.5ml	20
	DUP 0.5ml - 9.5ml	20
	P.SPK 0.5ml - 1.0 - 1.0 - 7.5ml	20
	DUP P.SPK 0.5ml - 1.0 - 1.0 - 7.5ml	20

SPIKE: 1ml ea. WHC-1 & WHC-2

Data Entry Comments: Spike recovery calculation:

S96B000453 $Cr = \frac{\left(\frac{281.788}{20}\right) - \left(\frac{6.277}{20}\right)}{10} \times 100 = 97.8\%$

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

Spike true value is 10.0 ppm for all elements except for U = 20.0 ppm.

10/09/96 12:20 ☎509 372 2929 WESTINGHOUSE →→→ MO-924 200W 002

Sample #	Element	% Spk	% Spk Dup	% RPD
596B000453	Cr	97.8	~~98.~~ 100.98	3.2
	Pb	96.7	100.3	3.65
	Ba	98.3	98.2	0.10
	Na	97.6	97.2	0.40
~~596B000454~~	Cr	99.1	100.4	1.30
	Pb	100.0	103.1	3.1
	Ba	98.6	98.3	0.30
	Na	95.1	94.9	0.21

ABJ 11/25/96

ABJ 11/25/96

Identity 1: ICV Identity 2: Quality Control 10:32 AM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	4.944	4.825	5.093	4.906	4.890	5.069	4.937	4.806
S.D.	0.006	0.004	0.010	0.011	0.011	0.009	0.004	0.005
% R.S.D.	0.129	0.076	0.201	0.221	0.225	0.170	0.081	0.112

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	5.150	4.998	4.991	5.062	4.835	5.063	5.164	9.610
S.D.	0.012	0.006	0.012	0.021	0.005	0.009	0.027	0.036
% R.S.D.	0.224	0.114	0.237	0.412	0.097	0.178	0.514	0.379

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	4.915	4.867	4.874	5.014	4.953	5.055	5.121	4.752
S.D.	0.008	0.006	0.004	0.044	0.032	0.007	0.013	0.003
% R.S.D.	0.159	0.132	0.089	0.875	0.656	0.137	0.262	0.056

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	5.047	5.157	4.997	5.033	4.870	5.054	5.075	4.988
S.D.	0.007	0.045	0.007	0.018	0.003	0.008	0.011	0.017
% R.S.D.	0.141	0.878	0.140	0.363	0.059	0.160	0.212	0.345

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	5.023	4.719	5.081	5.100	4.980
S.D.	0.008	0.035	0.011	0.006	0.014
% R.S.D.	0.166	0.741	0.220	0.113	0.288

SIGNATURE BELOW REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 52 TO 60.

J L Worrell
10-9-96

TK24-1
S96B00453, 454

0.5ml - 7.5ml
FILE No: 961009B.DAT
SST-5 = 61B48B

SPIKE = Inlcu. WHC-1 & WHC-2

Identity 1: ICB Identity 2: Quality Control 10:37 AM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	0.001	0.000	0.003	-0.002	-0.005	0.005	-0.000	-0.000
S.D.	0.001	0.000	0.002	0.000	0.001	0.002	0.000	0.000
% R.S.D.	80.720	32.733	64.069	30.943	17.790	34.617	49.254	150.010

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	0.001	0.001	0.004	-0.006	0.000	0.001	-0.011	0.036
S.D.	0.000	0.000	0.002	0.002	0.000	0.001	0.002	0.021
% R.S.D.	16.683	11.955	54.275	35.406	100.000	61.406	14.205	57.991

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	-0.013	0.010	0.000	0.008	0.002	0.000	0.001	-0.001
S.D.	0.001	0.005	0.000	0.010	0.003	0.000	0.004	0.002
% R.S.D.	10.747	53.303	47.187	123.790	165.167	121717.965	262.802	299.866

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	0.001	0.001	-0.001	0.004	0.001	-0.002	0.005	0.075
S.D.	0.000	0.010	0.000	0.005	0.000	0.000	0.001	0.010
% R.S.D.	24.115	796.856	38.823	118.836	16.950	7.506	17.808	13.483

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	-0.001	-0.017	0.001	0.000	-0.027
S.D.	0.000	0.016	0.001	0.000	0.012
% R.S.D.	42.828	94.629	64.182	56.475	44.742

10/09/96 12:21 ☎509 372 2929 WESTINGHOUSE →→→ MO-924 2004 P004

Identity 1: LLS Identity 2: Quality Control 10:40 AM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	0.018	0.020	0.192	0.111	0.100	0.038	0.019	0.019
S.D.	0.000	0.000	0.011	0.001	0.001	0.003	0.000	0.000
% R.S.D.	2.361	0.184	5.625	1.248	1.115	7.515	1.411	0.601

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	0.022	0.042	0.105	0.099	0.198	0.020	0.177	0.362
S.D.	0.000	0.002	0.002	0.002	0.000	0.001	0.008	0.028
% R.S.D.	0.023	5.241	1.700	1.867	0.115	6.905	4.677	7.764

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	0.167	0.194	0.100	0.388	0.208	0.208	0.194	0.194
S.D.	0.008	0.003	0.000	0.006	0.004	0.000	0.005	0.001
% R.S.D.	4.572	1.474	0.089	1.490	1.899	0.176	2.640	0.693

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	0.092	0.217	0.017	0.215	0.019	0.009	0.100	0.531
S.D.	0.001	0.011	0.000	0.011	0.000	0.000	0.001	0.005
% R.S.D.	0.701	4.978	2.694	5.136	0.680	0.014	1.217	0.954

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	0.019	0.102	0.098	0.010	0.366
S.D.	0.000	0.013	0.000	0.000	0.020
% R.S.D.	0.872	12.752	0.277	1.275	5.394

Identity 1: ICSA Identity 2: Quality Control 10:43 AM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	-0.003	0.003	-0.039	-0.015	195.549	0.002	0.001	0.001
S.D.	0.001	0.000	0.009	0.002	0.518	0.002	0.000	0.000
% R.S.D.	44.866	5.679	22.221	10.519	0.265	75.854	24.968	28.535

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	0.006	0.006	-0.000	93.201	99.319	-0.001	0.022	-0.179
S.D.	0.000	0.001	0.003	0.509	0.321	0.002	0.013	0.075
% R.S.D.	6.103	19.951	1604.148	0.546	0.323	164.531	57.309	42.034

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	0.032	0.027	0.003	0.027	-0.056	86.225	0.017	185.236
S.D.	0.012	0.012	0.000	0.009	0.010	0.533	0.004	0.985
% R.S.D.	38.916	45.975	10.430	35.438	17.063	0.618	23.603	0.532

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	0.001	0.018	0.003	0.035	-0.001	-0.000	0.011	-0.101
S.D.	0.001	0.028	0.001	0.011	0.000	0.001	0.000	0.015
% R.S.D.	102.956	151.392	22.617	30.849	15.311	145.614	1.617	14.432

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	-0.002	-0.033	0.003	0.002	0.060
S.D.	0.001	0.021	0.001	0.000	0.039
% R.S.D.	33.890	63.738	35.650	11.039	65.197

Identity 1: ICSAB Identity 2: Quality Control 10:47 AM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	-0.003	0.002	-0.026	-0.013	197.391	0.497	0.482	0.907
S.D.	0.001	0.000	0.006	0.003	0.323	0.005	0.001	0.005
% R.S.D.	20.967	1.767	22.577	21.956	0.164	0.961	0.280	0.556

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	1.003	0.975	0.001	96.432	101.334	0.494	0.022	-0.075
S.D.	0.001	0.003	0.002	0.130	0.074	0.001	0.008	0.039
% R.S.D.	0.075	0.354	167.308	0.135	0.073	0.218	37.930	52.153

	Ce (ppm)	Sm (ppm)	Be (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	-0.010	0.053	0.493	0.019	0.001	92.459	0.022	184.641
S.D.	0.007	0.007	0.001	0.006	0.009	0.169	0.009	0.863
% R.S.D.	72.143	13.240	0.230	30.558	930.626	0.183	40.091	0.467

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	0.000	0.001	1.015	0.983	-0.000	0.987	0.017	0.104
S.D.	0.001	0.037	0.002	0.003	0.000	0.004	0.001	0.025
% R.S.D.	844.722	3900.744	0.164	0.321	94.876	0.371	4.648	23.842

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	0.492	-0.024	0.499	0.493	0.033
S.D.	0.000	0.016	0.001	0.001	0.020
% R.S.D.	0.049	67.445	0.182	0.162	60.358

10/09/96 12:23 ☎509 372 2929 #ES11JCHOLSE *** JO-924 200#

jw 10-9-96

9.5ml

Identity 1: S968000453 Identity 2: 0.5ml ~~7.5ml~~ 10:53 AM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 20.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	0.592	5.925	0.728	33.667	13.536	0.217	0.819	0.015
S.D.	0.017	0.008	0.028	0.198	0.195	0.033	0.006	0.004
% R.S.D.	2.798	0.140	3.799	0.587	1.442	15.220	0.699	29.910

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	7.115	2.990	4.957	16.196	371.247	6.277	1.542	1.948
S.D.	0.056	0.025	0.027	0.268	0.182	0.052	0.120	0.825
% R.S.D.	0.791	0.843	0.535	1.654	0.049	0.826	7.777	42.330

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	-0.486	0.682	11.464	96.921	14.852	40.837	0.190	543.386
S.D.	0.272	0.156	0.015	0.787	0.020	0.136	0.094	1.070
% R.S.D.	55.846	22.809	0.135	0.812	0.133	0.334	49.564	0.197

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Ti (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	2.096	1.051	0.588	39.188	0.148	0.140	0.091	4.798
S.D.	0.040	0.239	0.024	0.304	0.011	0.003	0.010	0.101
% R.S.D.	1.918	22.783	4.128	0.776	7.465	2.072	10.752	2.109

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	10.733	-0.777	-0.053	-0.003	-0.842
S.D.	0.042	0.412	0.028	0.005	0.648
% R.S.D.	0.395	52.997	52.945	180.861	76.898

10/09/96 12:23 ☎509 372 2929 WESTINGHOUSE +++ MO-924 200W 005

JW 10-9-96
9.5ml

Identity 1: S968000453_d Identity 2: 0.5ml ~~7.5ml~~ 10:58 AM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 20.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	0.528	6.079	0.648	33.601	12.777	0.089	0.872	0.015
S.D.	0.020	0.011	0.125	0.252	0.088	0.001	0.002	0.006
% R.S.D.	3.715	0.179	19.219	0.750	0.692	0.811	0.226	40.474

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	7.367	2.921	5.018	15.231	377.662	6.133	1.298	0.072
S.D.	0.007	0.012	0.040	0.138	0.748	0.035	0.072	0.886
% R.S.D.	0.095	0.398	0.797	0.905	0.198	0.575	5.557	1231.551

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	-0.691	0.365	11.851	97.156	14.644	39.865	0.081	559.944
S.D.	0.247	0.110	0.032	0.255	0.044	0.121	0.151	1.571
% R.S.D.	35.673	30.046	0.270	0.263	0.297	0.303	187.333	0.281

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	2.076	0.136	0.605	38.709	0.140	0.135	0.040	1.473
S.D.	0.017	0.165	0.006	0.339	0.015	0.011	0.036	0.322
% R.S.D.	0.824	121.232	0.921	0.876	10.906	8.509	89.736	21.824

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Ti (ppm)
Mean	10.621	-0.168	-0.018	-0.003	-0.388
S.D.	0.036	0.116	0.009	0.003	0.275
% R.S.D.	0.339	68.774	50.692	85.965	70.729

10/09/96 12:24 ☎509 372 2929 MESTINGHOUSE →→ 30-924 200M 009

Identity 1: S968000453_A Identity 2: 0.5ml-1ml-1ml-7.5ml 11:02 AM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 20.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	198.400	198.641	204.484	234.142	215.264	-0.114	0.915	192.453
S.D.	0.284	0.346	0.691	0.774	0.531	0.034	0.004	1.105
% R.S.D.	0.143	0.174	0.338	0.330	0.247	29.531	0.434	0.574

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	7.199	195.895	204.048	212.126	578.836	201.788	210.124	-13.202
S.D.	0.010	0.306	0.105	0.554	1.357	0.467	1.225	0.040
% R.S.D.	0.134	0.156	0.052	0.261	0.234	0.231	0.583	0.302

	Ca (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	198.809	197.276	208.043	293.704	211.555	232.424	201.734	738.602
S.D.	0.887	0.229	0.580	0.835	1.366	0.802	0.849	4.588
% R.S.D.	0.446	0.116	0.279	0.284	0.646	0.345	0.421	0.621

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Ti (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	193.465	204.989	198.725	232.622	178.116	196.392	197.193	196.525
S.D.	0.808	0.819	0.339	0.785	0.356	0.637	0.202	0.685
% R.S.D.	0.418	0.399	0.171	0.337	0.200	0.324	0.102	0.349

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	204.986	193.883	1.539	200.234	196.595
S.D.	0.219	1.590	0.030	0.245	0.594
% R.S.D.	0.107	0.820	1.933	0.122	0.302

10/09/96 12:25 ☎509 372 2929 *ESTINGHOUSE *** MO-924 2000* 010

Identity 1: S968000453_dupA Identity 2: 0.5ml-1ml-1ml-7.5ml 11:06 AM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 20.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	200.486	199.723	208.466	240.294	218.388	-0.194	0.859	191.068
S.D.	0.345	0.440	0.668	0.376	0.336	0.034	0.003	0.738
% R.S.D.	0.172	0.221	0.321	0.156	0.154	17.457	0.306	0.386

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	7.474	201.165	204.716	215.676	582.022	208.242	205.782	-12.949
S.D.	0.012	0.290	0.817	0.842	1.402	0.207	0.906	0.211
% R.S.D.	0.158	0.144	0.399	0.390	0.241	0.099	0.440	1.629

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Hg (ppm)	As (ppm)	Na (ppm)
Mean	201.055	195.560	207.876	302.931	218.973	241.008	207.450	737.825
S.D.	0.505	0.606	0.427	0.430	0.525	0.213	0.231	2.968
% R.S.D.	0.251	0.310	0.205	0.142	0.240	0.088	0.111	0.402

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	200.027	211.962	203.866	239.796	180.737	202.180	199.777	198.656
S.D.	0.343	0.799	0.233	0.401	0.327	0.260	0.412	1.302
% R.S.D.	0.172	0.377	0.114	0.167	0.181	0.128	0.206	0.655

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	210.572	194.842	1.576	202.488	198.300
S.D.	0.297	0.590	0.008	0.401	0.367
% R.S.D.	0.141	0.303	0.497	0.198	0.185

10/09/96 12:25 ☎509 372 2929 #ESTINGHOUSE

Identity 1: CCV Identity 2: Quality Control 12:37 PM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	4.928	4.843	5.066	4.831	4.876	4.932	4.947	4.830
S.D.	0.009	0.007	0.026	0.018	0.013	0.022	0.002	0.018
% R.S.D.	0.186	0.139	0.511	0.377	0.275	0.436	0.034	0.371

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	5.016	4.903	4.980	5.020	4.816	4.904	5.301	9.689
S.D.	0.025	0.017	0.013	0.017	0.008	0.033	0.015	0.078
% R.S.D.	0.508	0.354	0.264	0.345	0.160	0.677	0.278	0.807

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	5.001	4.900	4.893	4.993	4.895	4.936	5.033	4.793
S.D.	0.027	0.010	0.006	0.046	0.043	0.019	0.018	0.011
% R.S.D.	0.543	0.212	0.129	0.921	0.884	0.379	0.350	0.222

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	4.916	5.155	4.904	4.931	4.774	4.948	5.037	4.932
S.D.	0.016	0.007	0.016	0.015	0.009	0.024	0.009	0.018
% R.S.D.	0.332	0.130	0.330	0.298	0.180	0.489	0.175	0.355

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	4.908	4.667	5.001	5.067	4.934
S.D.	0.023	0.024	0.015	0.012	0.055
% R.S.D.	0.471	0.516	0.292	0.246	1.117

dentity 1: CCB Identity 2: Quality Control 12:40 PM October 9, 1996
'ask name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
)n-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	0.001	0.001	0.005	-0.003	0.000	0.006	0.001	0.001
S.D.	0.001	0.000	0.007	0.003	0.003	0.004	0.000	0.001
% R.S.D.	101.043	20.904	142.473	91.645	651.577	76.804	43.771	42.500

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	0.002	0.003	-0.000	0.001	0.001	0.005	-0.008	-0.078
S.D.	0.000	0.001	0.002	0.002	0.000	0.001	0.006	0.039
% R.S.D.	4.008	47.393	6665.873	132.272	18.875	19.670	77.083	50.397

	Ce (ppm)	Sn (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	0.004	-0.004	0.001	0.004	0.004	0.001	0.000	0.006
S.D.	0.010	0.007	0.000	0.004	0.003	0.000	0.006	0.002
% R.S.D.	243.338	169.086	24.478	105.033	73.927	15.059	3128.271	37.504

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	0.002	-0.012	0.000	0.012	0.001	-0.001	0.008	0.174
S.D.	0.001	0.011	0.001	0.006	0.001	0.001	0.001	0.004
% R.S.D.	89.252	88.166	603.412	50.974	62.710	97.270	6.815	2.522

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Ti (ppm)
Mean	0.000	0.031	0.002	0.001	0.015
S.D.	0.000	0.002	0.001	0.000	0.021
% R.S.D.	58.012	6.243	52.955	15.381	137.316

10/09/96 12:28 ☎509 372 2929

Identity 1: ICSA Identity 2: Quality Control 1:01 PM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	0.003	0.003	-0.035	-0.007	199.471	0.004	-0.001	0.001
S.D.	0.002	0.000	0.010	0.004	0.791	0.002	0.001	0.001
% R.S.D.	66.360	8.826	28.908	53.564	0.397	36.094	65.079	46.208

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	0.005	0.009	0.006	95.008	100.500	-0.001	0.009	-0.022
S.D.	0.000	0.001	0.002	0.212	0.219	0.002	0.007	0.075
% R.S.D.	5.340	15.627	31.110	0.223	0.218	238.286	81.939	348.891

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	-0.018	0.079	0.003	0.025	-0.018	89.903	0.002	186.682
S.D.	0.022	0.015	0.000	0.008	0.013	0.215	0.006	0.950
% R.S.D.	121.522	19.123	14.440	31.100	70.742	0.239	333.839	0.509

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	-0.000	0.036	0.001	0.011	0.001	-0.001	0.021	0.004
S.D.	0.001	0.020	0.001	0.022	0.001	0.001	0.001	0.027
% R.S.D.	725830.108	55.592	120.183	189.979	86.819	121.563	2.433	636.091

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	-0.002	-0.009	-0.000	0.004	-0.016
S.D.	0.001	0.042	0.001	0.000	0.042
% R.S.D.	50.324	480.584	281.751	3.208	258.900

10/09/96 12:29 ☎509 372 2929 WESTINGHOUSE →→ MO-924 200M P.015

Identity 1: ICSAB Identity 2: Quality Control 1:04 PM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	-0.001	0.002	-0.018	-0.005	195.878	0.476	0.488	0.914
S.D.	0.001	0.000	0.011	0.008	1.247	0.003	0.002	0.009
% R.S.D.	137.618	11.267	59.754	166.475	0.637	0.542	0.501	0.981

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	0.964	0.951	0.006	95.280	100.318	0.474	0.031	0.006
S.D.	0.001	0.003	0.003	0.198	0.265	0.002	0.008	0.078
% R.S.D.	0.063	0.308	47.042	0.208	0.264	0.423	27.524	1368.914

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	-0.024	0.085	0.499	0.020	-0.020	88.441	0.031	186.019
S.D.	0.026	0.017	0.002	0.007	0.008	0.082	0.009	1.939
% R.S.D.	106.787	20.258	0.433	35.169	40.533	0.092	28.631	1.042

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	0.003	0.052	0.992	0.959	0.000	0.958	0.016	-0.047
S.D.	0.001	0.027	0.003	0.005	0.001	0.006	0.001	0.029
% R.S.D.	28.784	50.553	0.302	0.522	206.335	0.630	6.698	62.396

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	0.477	0.003	0.487	0.490	0.019
S.D.	0.002	0.025	0.002	0.001	0.045
% R.S.D.	0.378	781.590	0.309	0.206	241.093

10/09/96 12:30 ☎509 372 2929 WESTINGHOUSE →→ MO-924 200W 019

Identity 1: CCV Identity 2: Quality Control 1:07 PM October 9, 1996
Task name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	4.967	4.875	5.076	4.822	4.940	4.923	4.985	4.817
S.D.	0.011	0.009	0.028	0.009	0.043	0.014	0.014	0.018
% R.S.D.	0.218	0.183	0.543	0.178	0.874	0.282	0.277	0.372

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	4.994	4.887	5.034	5.092	4.889	4.907	5.410	9.760
S.D.	0.007	0.002	0.011	0.016	0.020	0.003	0.022	0.045
% R.S.D.	0.148	0.041	0.215	0.309	0.400	0.069	0.402	0.460

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	4.976	4.953	4.931	4.981	4.845	4.959	5.029	4.846
S.D.	0.012	0.014	0.010	0.005	0.009	0.024	0.017	0.035
% R.S.D.	0.237	0.274	0.204	0.105	0.196	0.479	0.340	0.722

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Tl (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	4.882	5.112	4.910	4.923	4.778	4.945	5.060	4.904
S.D.	0.006	0.032	0.012	0.003	0.007	0.011	0.011	0.012
% R.S.D.	0.119	0.619	0.243	0.063	0.157	0.213	0.213	0.237

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	4.923	4.754	5.024	5.102	4.977
S.D.	0.003	0.037	0.009	0.011	0.002
% R.S.D.	0.059	0.778	0.170	0.213	0.041

10/09/96 12:30 ☎509 372 2929 WESTINGHOUSE --- 30-924 200W P020

dentity 1: CCB Identity 2: Quality Control 1:10 PM October 9, 1996
'ask name : OPTIMA
Sample Weight : 1.0000 Solution Volume : 1.00
On-Peak Integrations : 3 Off-Peak Integrations : 1

	Zr (ppm)	Sr (ppm)	Bi (ppm)	Si (ppm)	Al (ppm)	Co (ppm)	Cu (ppm)	Li (ppm)
Mean	0.001	0.002	-0.002	-0.003	0.010	0.011	0.003	0.003
S.D.	0.001	0.000	0.013	0.002	0.005	0.003	0.000	0.001
% R.S.D.	63.568	21.153	741.003	87.777	47.145	28.934	15.032	23.845

	Zn (ppm)	Ni (ppm)	La (ppm)	Fe (ppm)	Ca (ppm)	Cr (ppm)	Nd (ppm)	U (ppm)
Mean	0.002	0.006	0.002	0.009	0.005	0.008	-0.011	-0.039
S.D.	0.000	0.001	0.002	0.002	0.001	0.001	0.005	0.017
% R.S.D.	18.646	10.537	121.504	28.145	20.902	16.229	42.893	43.648

	Ce (ppm)	Sm (ppm)	Ba (ppm)	P (ppm)	S (ppm)	Mg (ppm)	As (ppm)	Na (ppm)
Mean	0.025	-0.000	0.002	0.010	0.003	0.006	0.004	0.016
S.D.	0.006	0.004	0.000	0.005	0.004	0.001	0.003	0.004
% R.S.D.	23.843	2029.007	19.832	50.210	118.103	19.871	78.192	21.823

	Mo (ppm)	Se (ppm)	Ag (ppm)	Pb (ppm)	Ti (ppm)	Cd (ppm)	B (ppm)	K (ppm)
Mean	0.002	-0.013	0.001	0.030	0.002	-0.012	0.009	0.141
S.D.	0.000	0.014	0.001	0.007	0.000	0.001	0.000	0.007
% R.S.D.	8.645	103.735	97.714	22.379	20.619	7.616	4.174	4.754

	Mn (ppm)	Sb (ppm)	V (ppm)	Be (ppm)	Tl (ppm)
Mean	0.001	0.031	0.002	0.002	0.044
S.D.	0.000	0.020	0.000	0.001	0.009
% R.S.D.	50.966	63.858	4.428	34.561	19.846

10/09/96 12:31 ☎509 372 2929 #ESTINGHOUSE

LABCORE Completed Worklist Report for Worklist# 13774

Analyst: krm **Instrument:** CARB2 **Book#** _____

Method: _____ **Rev/Mod** _____

Worklist Comment: TK-24-1 TICTOC. RCJ

Seq	Type	Sample#	R	A	Test	Matrix	Actual	Found	DL or Yield	Unit
1	BLNK		0		@TICTOC1 TIC-02	LIQUID	1	2.10E+0	2.100	ug/mL
1	BLNK		0		@TICTOC1 TOC-02	LIQUID	1	6.80E+0	6.800	ug/mL
2	STD		0		@TICTOC1 TIC-02	LIQUID	6.02E+02	5.97E+2	99.169	% Recovery
2	STD		0		@TICTOC1 TOC-02	LIQUID	3.00E+03	2.71E+3	90.333	% Recovery
3	SAMPLE	S96B000453	0		@TICTOC1 TIC-02	LIQUID	N/A <	5.00E+00	5.000	ug/mL
3	SAMPLE	S96B000453	0		@TICTOC1 TOC-02	LIQUID	N/A	7.42E+01	40.000	ug/mL
4	DUP	S96B000453	0		@TICTOC1 TIC-02	LIQUID	<5.00E+0	2.10E+1		RPD
4	DUP	S96B000453	0		@TICTOC1 TOC-02	LIQUID	7.42E+1	7.80E+1	4.993	RPD
5	SPK	S96B000453	0		@TICTOC1 TIC-02	LIQUID	1.00E+02	1.01E+02	101.000	% Recovery
5	SPK	S96B000453	0		@TICTOC1 TOC-02	LIQUID	1.00E+02	9.10E+01	91.000	% Recovery
6	SAMPLE	S96B000454	0		@TICTOC1 TIC-02	LIQUID	N/A <	5.00E+00	5.000	ug/mL
6	SAMPLE	S96B000454	0		@TICTOC1 TOC-02	LIQUID	N/A	9.60E+01	40.000	ug/mL
7	DUP	S96B000454	0		@TICTOC1 TIC-02	LIQUID	<5.00E+0	<5.00E+0		RPD
7	DUP	S96B000454	0		@TICTOC1 TOC-02	LIQUID	9.60E+1	8.30E+1	14.525	RPD

RCJ 11/25/96

Final page for worklist# 13774

Analyst Signature Date

Analyst Signature Date

Reviewer Signature Date

Reviewed RW Schroeder 10/29/96

Results less than detection limit for TIC's, No RPD reported. RW Schroeder 10/29/96

Units shown for QC (BLK/BKG) may not reflect the actual units.

LABCORE Data Entry Template for Worklist# 13774

Analyst: KRM **Instrument:** CARB2 _____ **Book#** 12N12F 24N12A

Method: LA-342-100 **Rev/Mod** E-0

Worklist Comment: TK-24-1 TICTOC. RCJ

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	BLNK				@TICTOC1	LIQUID		
2	STD				@TICTOC1	LIQUID		
3	SAMPLE	S96B000453	0		@TICTOC1	LIQUID	96001333	TK 24-1
	Analytes Requested: TIC-02 , TOC-02							
4	DUP	S96B000453	0		@TICTOC1	LIQUID		
5	SPK	S96B000453	0		@TICTOC1	LIQUID		
6	SAMPLE	S96B000454	0		@TICTOC1	LIQUID	96001334	TK 21-1
	Analytes Requested: TIC-02 , TOC-02							
7	DUP	S96B000454	0		@TICTOC1	LIQUID		

Final page for worklist # 13774

Analyst Signature Date 10-24-96

Linda Mack 10-25-96
Analyst Signature Date

Data Entry Comments:

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

Oct. 25. 1996 4:12AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 1/18

TIC/TOC: LA-342-100 (E-0)

WORKLIST #	ANALYST INITIALS	ANALYSIS DATE	ANALYSIS TIME	INSTRUMENT CODE
13774	KRM	10-24-96		

Sample # [X] BASELINE [ ] BLANK [ ] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] TRIPLICATE
SAMPLE # = STD STD # = 12N12F 24N12D
SAMPLE WEIGHT (g) / SPIKE/STANDARD VOLUME (mL) TIC: 1mL TOC: -2mL
FINAL COULOMETER READING (u TIC: 606.8 TOC: 569.4

Sample # [ ] BASELINE [X] BLANK [ ] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] TRIPLICATE
SAMPLE # = STD STD # =
SAMPLE WEIGHT (g) / SPIKE/STANDARD VOLUME (mL) TIC: TOC:
FINAL COULOMETER READING (u TIC: 11.8 TOC: 33.2

Sample # [ ] BASELINE [ ] BLANK [X] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] TRIPLICATE
SAMPLE # = 596B 453 STD # =
SAMPLE WEIGHT (g) .5mL / SPIKE/STANDARD VOLUME (mL) TIC: TOC:
FINAL COULOMETER READING (u TIC: 10.9 TOC: 63.5

Sample # [ ] BASELINE [ ] BLANK [ ] SAMPLE [X] DUPLICATE [ ] SPIKE [ ] TRIPLICATE
SAMPLE # = 596B 453 STD # =
SAMPLE WEIGHT (g) .5mL / SPIKE/STANDARD VOLUME (mL) TIC: TOC:
FINAL COULOMETER READING (u TIC: 20.2 TOC: 65.4

Sample # [ ] BASELINE [ ] BLANK [ ] SAMPLE [ ] DUPLICATE [X] SPIKE [ ] TRIPLICATE
SAMPLE # = 596B 453 STD # =
SAMPLE WEIGHT (g) -5mL / SPIKE/STANDARD VOLUME (mL) TIC: 5 TOC:
FINAL COULOMETER READING (u TIC: 314.1 TOC: 336.5

Sample # [ ] BASELINE [ ] BLANK [X] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] TRIPLICATE
SAMPLE # = 596B 454 STD # =
SAMPLE WEIGHT (g) .1mL / SPIKE/STANDARD VOLUME (mL) TIC: TOC:
FINAL COULOMETER READING (u TIC: 10.1 TOC: 36.0

Sample # [ ] BASELINE [ ] BLANK [ ] SAMPLE [X] DUPLICATE [ ] SPIKE [ ] TRIPLICATE
SAMPLE # = 596B 454 STD # =
SAMPLE WEIGHT (g) .1mL / SPIKE/STANDARD VOLUME (mL) TIC: TOC:
FINAL COULOMETER READING (u TIC: 9.6 TOC: 34.7

Oct. 25. 1996 4:12AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 2/18

69

WORKBOOK PAGE: BLANK1

TIC/TOC : LA-342-100 (E-0) LIQUIDS

Type			TIC	TOC
BLNK	Sample Size in mL	(SS)	0.5000	0.5000
	Dilution Factor	(DF)	1	1
Work List	µg of Carbon in Sample	(C1)	11.8	33.2
13774	µg of Carbon from Baseline	(C2)	9.7	26.4

Test Code: @TICTOC1

Matrix: LIQUID

Batch Number: 96010295

Rerun: 0

µg of Carbon = |C1-C2|

Sample Prep: N/A

Sample #:

Instrument Code: CARB2

Prepared By: LCM

Chemist: RWS

Analyst: KRM

Date Complete: 10/25/96

Analysis Date: 10/24/96

Analysis Time: 09:21 PM

Sample Point: TK 24-1

	TIC	TOC
Method Detection Limit in µg/mL	5	40
µg of Carbon	2.10E+00	6.80E+00

Data Entered By: LCM Date: 10/25/96

Signature of Chemist: [signature] Date: 10/29/96

BLANK.WB1 REV 1.0 342100ML

WORKBOOK PAGE: STD2

TIC/TOC : LA-342-100 (E-0) LIQUIDS

Type	Sample Size in mL	(SS)	TIC: 1.0000	TOC: 0.2000
STD	Dilution Factor	(DF)	1	1
Work List	Final Coulometer Reading in µg	(C1)	606.8	569.4
13774	µg of Carbon from Baseline	(C2)	9.7	26.4
Test Code	Standard Book Number		22N12F	24N12D
@TICTOC1	Standard Value (µg/ml)		602	3000

Matrix
LIQUID
Batch Number
96010295
Rerun
0
Sample Prep
N/A
Sample #
Instrument Code
CARB2
Prepared By
LCM
Chemist
RWS
Analyst
KRM
Date Complete
10/25/96
Analysis Date
10/24/96
Analysis Time
09:21 PM
Sample Point
TK 24-1

QC Actual in µg/mL = Standard Value (µg/mL)

QC Found in µg/mL = (C1 - C2) * DF / SS

QC Found in µg/mL for TIC = 5 if C1 < C2

QC Found in µg/mL for TOC = 40 if C1 < C2

% Recovery = QC Found / QC Actual * 100

	TIC	TOC
Method Detection Limit in µg/mL	5	40
QC Actual in µg/mL	6.02E+02	3.00E+03
QC Found in µg/mL	5.97E+02	2.71E+03
Percent Standard Recovery	99.2	90.5

Data Entered By: LCM Date: 10/25/96

Signature of Chemist: RW Schroeder Date: 10/29/96

STANDARD WB1 REV 1 0 342100ML

WORKBOOK PAGE: SAM3

TIC/TOC : LA-342-100 (E-0) LIQUIDS

Type	Sample Size in mL	(SS)	TIC	TOC
SAMPLE	Dilution Factor	(DF)	1	1
Work List	µg of Carbon in Sample	(C1)	10.9	63.5
13774	µg of Carbon from Baseline	(C2)	9.7	26.4
Test Code				
@TICTOC1				

Matrix	LIQUID
Batch Number	96010295
Rerun	0
Sample Prep	N/A
Sample #	S96B000453
Instrument Code	CARB2
Prepared By	LCM
Chemist	RWS
Analyst	KRM
Date Complete	10/25/96
Analysis Date	10/24/96
Analysis Time	09:21 PM
Sample Point	TK 24-1

µg of Carbon/mL = (C1-C2) * DF / SS
µg of Carbon/mL for TIC = 5 if C1 < C2
µg of Carbon/mL for TOC = 40 if C1 < C2

NOTE: FOR TIC: The Reported Result is < 5.

		TIC	TOC
Method Detection Limit in µg/mL		5	40
µg of Carbon/mL	Note: <	2.40E+00	7.42E+01

Data Entered By:	LCM	Date:	10/25/96
Signature of Chemist:	RW Edwards	Date:	10/29/96

SAMPLE.WB1 REV 1.0 342100ML

WORKBOOK PAGE: DUP4

TIC/TOC : LA-342-100 (E-0) LIQUIDS

Type			TIC	TOC
DUP	Sample Size in mL	(SS)	0.5000	0.5000
	Dilution Factor	(DF)	1	1
Work List	µg of Carbon in Sample	(C1)	20.2	65.4
13774	µg of Carbon from Baseline	(C2)	9.7	26.4
Test Code	Known µg of C from Original Sample		<2.40E+0	7.42E+1
@TICTOC1				

Matrix
LIQUID
Batch Number
96010295
Rerun
0
Sample Prep
N/A
Sample #
S96B000453
Instrument Code
CARB2
Prepared By
LCM
Chemist
RWS
Analyst
KRM
Date Complete
10/25/96
Analysis Date
10/24/96
Analysis Time
09:21 PM
Sample Point
TK 24-1

µg of Carbon/mL = (C1-C2) * DF / SS
µg of Carbon/mL for TIC = 5 if C1 < C2
µg of Carbon/mL for TOC = 40 if C1 < C2

	TIC	TOC
Method Detection Limit in µg/mL	5	40
µg of Carbon/mL	2.10E+01	7.80E+01

Data Entered By:	LCM	Date:	10/25/96
Signature of Chemist:	RW Schroeder	Date:	10/29/96

SAMPLE.WB1 REV 1 0 342100ML

WORKBOOK PAGE: SPIKE5

TIC/TOC : LA-342-100 (E-0) LIQUIDS

Type	Sample Vial Data		TIC	TOC
SPK	Sample Volume in mL	(SS)	0.5000	0.5000
Work List	Final Coulometer Reading in µg	(C1)	10.9	63.5
13774	Spiked Vial Data			
Test Code	Sample Volume in mL	(SPK SS)	0.5000	0.5000
@TICTOC1	Amount of Spike Std. in mL	(SPK VOL)	0.500	0.100
Matrix	Final Coulometer Reading in µg	(C2)	314.1	336.5
LIQUID	Spike Book Number		22N12F	24N12D
Batch Number	Spike Standard Value in µg/ml	(SPK CONC)	602	3000
96010295				
Rerun				
0				
Sample Prep				
N/A				
Sample #	Percent Spike Recovery = (C2 - C1 * (SPK SS) / SS) / ((SPK CONC) * (SPK VOL)) * 100			
S96B000453				
Instrument Code	QC Actual in µg/mL = Spike Value (µg/mL)			
CARB2	QC Found in µg/mL = (Percent Spike Recovery)*(QC Actual) / 100			
Prepared By				
LCM				
Chemist				
RWS				
Analyst				
KRM				
Date Complete				
10/25/96				
Analysis Date				
10/24/96				

Analysis Time		TIC	TOC
09:21 PM	QC Actual in µg/mL	6.02E+02	3.00E+03
Sample Point	QC Found in µg/mL	6.06E+02	2.73E+03
TK 24-1	Percent Spike Recovery	100.7	91.0

Data Entered By:	LCM	Date:	10/25/96
Signature of Chemist:	RW Schroeder	Date:	10/29/96

SPIKE.WB1 REV 1.1 342100ML

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0
<<< BLANK ANALYSIS >>>

Sample: BASE1 Date: 10/24/96 Time: 21:21:54

Sample Size = 1 uL
Dil Factor = 1
Blank ID # = BASE1
Blank Value = N/A

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	1.50	0.00
2	1.01	2.50	40.00
3	1.51	2.90	13.79
4	2.00	3.30	12.12
5	2.50	3.90	15.38
6	3.00	4.30	9.30
7	3.50	4.70	8.51
8	4.00	5.00	6.00
9	4.50	5.40	7.41
10	5.00	5.80	6.90
11	5.50	6.00	3.33
12	6.00	6.50	7.69
13	6.50	6.70	2.99
14	7.00	7.00	4.29
15	7.50	7.40	5.41
16	8.00	7.70	3.90
17	8.50	8.00	3.75
18	9.00	8.20	2.44
19	9.50	8.60	4.65
20	10.00	8.90	3.37
21	10.50	9.30	4.30
22	11.00	9.70	4.12

BLANK VALUE = 9.7 micrograms carbon
BLANK FACTOR = 9.7 / 10.99963 = +8.8E-01 ug/min Carbon

SIGNATURE BELOW REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 75 TO 86.

Sample Run By: [signature] 10-24-96
KR MONTEITH 00000

Oct. 25. 1996 4:13AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 3/18

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0
<<< BLANK ANALYSIS >>>

Sample: BASE1 Date: 10/24/96 Time: 21:34:35

Sample Size = 1 uL
Dil Factor = 1
Blank ID # = BASE1
Blank Value = N/A

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.40	0.00
2	1.01	1.00	60.00
3	1.50	3.40	70.59
4	2.00	7.60	55.26
5	2.50	12.60	39.68
6	3.00	16.00	21.25
7	3.50	18.10	11.60
8	4.00	19.40	6.70
9	4.50	20.20	3.96
10	5.00	21.10	4.27
11	5.50	21.70	2.76
12	6.00	22.20	2.25
13	6.50	22.70	2.20
14	7.00	23.20	2.16
15	7.50	23.60	1.69
16	8.00	24.10	2.07
17	8.50	24.40	1.23
18	9.00	24.90	2.01
19	9.50	25.20	1.19
20	10.00	25.70	1.95
21	10.50	26.00	1.15
22	11.00	26.40	1.52

BLANK VALUE = 26.4 micrograms carbon
BLANK FACTOR = 26.4 / 11.00061 = +2.40E+00 ug/min Carbon

<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!!>>>>

Sample Run By: _____
KR MONTEITH 00000

Oct. 25. 1996 4:13AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 4/18

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: BLK1 Date: 10/24/96 Time: 22:19:44

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = .88 ug/minute C

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	1.00	0.00
2	1.01	2.90	65.52
3	1.51	4.30	32.56
4	2.01	5.40	20.37
5	2.51	5.70	5.26
6	3.01	6.10	6.56
7	3.51	6.50	6.15
8	4.01	6.80	4.41
9	4.50	7.20	5.56
10	5.00	7.40	2.70
11	5.50	7.80	5.13
12	6.00	8.20	4.88
13	6.50	8.60	4.65
14	7.00	9.00	4.44
15	7.50	9.40	4.26
16	8.00	9.80	4.08
17	8.50	10.00	2.00
18	9.00	10.40	3.85
19	9.50	10.90	4.59
20	10.00	11.20	2.68
21	10.50	11.40	1.75
22	11.00	11.80	3.39

USER INPUT BLANK VALUE
BLANK VALUE = 9.680537 micrograms carbon
BLANK FACTOR = 9.680537 / 11.00061 = +8.8E-01 ug/min Carbon

SAMPLE RESULTS:
(11.8 - 9.679033)(1)/(1) = +2.12E+00 g/L Carbon
(11.8 - 9.679033)(1)/(1)(12) = +1.77E-01 Molar Carbon

Sample Run By: _____
KR MONTEITH 00000

Oct. 25. 1996 4:14AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 7/18

WHC-SD-WM-DP-212, REV. 0

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: BLK1 Date: 10/24/96 Time: 22:45:00

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = 2.4 ug/minute C

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.30	0.00
2	1.01	2.60	88.46
3	1.50	10.90	76.15
4	2.00	17.90	39.11
5	2.50	21.30	15.96
6	3.00	23.90	10.88
7	3.50	25.30	5.53
8	4.00	26.50	4.53
9	4.50	27.50	3.64
10	5.00	28.40	3.17
11	5.50	29.30	3.07
12	6.00	29.60	1.01
13	6.50	30.10	1.66
14	7.00	30.70	1.95
15	7.50	31.00	0.97
16	8.00	31.40	1.27
17	8.50	31.60	0.63
18	9.00	32.00	1.25
19	9.50	32.30	0.93
20	10.00	32.60	0.92
21	10.50	33.00	1.21
22	11.00	33.20	0.60

USER INPUT BLANK VALUE
BLANK VALUE = 26.40147 micrograms carbon
BLANK FACTOR = 26.40147 / 11.00061 = +2.4E+00 ug/min Carbon

SAMPLE RESULTS:
(33.2 - 26.39707)(1)/(1) = +6.80E+00 g/L Carbon
(33.2 - 26.39707)(1)/(1)(12) = +5.67E-01 Molar Carbon
<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!!>>>>

Sample Run By: _____
KR MONTEITH 00000

Oct. 25. 1996 4:15AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 8/18

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: STD1 Date: 10/24/96 Time: 21:48:42

Sample Size = 1000 uL
Dil Factor = 1
Blank ID # =
Blank Value = .88 ug/minute C

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.70	0.00
2	1.01	23.80	97.06
3	1.51	163.60	85.45
4	2.01	301.90	45.81
5	2.51	407.00	25.82
6	3.01	479.20	15.07
7	3.51	529.90	9.57
8	4.01	562.70	5.83
9	4.50	582.20	3.35
10	5.00	593.00	1.82
11	5.50	598.50	0.92
12	6.01	601.20	0.45
13	6.51	602.80	0.27
14	7.00	603.60	0.13
15	7.50	604.20	0.10
16	8.00	604.70	0.08
17	8.50	605.00	0.05
18	9.00	605.40	0.07
19	9.50	605.70	0.05
20	10.00	606.10	0.07
21	10.50	606.40	0.05
22	11.00	606.80	0.07

USER INPUT BLANK VALUE
BLANK VALUE = 9.680537 micrograms carbon
BLANK FACTOR = 9.680537 / 11.00061 = +8.8E-01 ug/min Carbon

SAMPLE RESULTS:
(606.8 - 9.682148)(1)/(1000) = +5.971E-01 g/L Carbon
(606.8 - 9.682148)(1)/(1000)(12) = +4.976E-02 Molar Carbon

Sample Run By: KR MONTEITH 00000

Oct. 25. 1996 4:14AM WHC 2225 LAB ROOM 2F BACKSIDE No. 6272 P. 5/18

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: STD1 Date: 10/24/96 Time: 22:04:52

Sample Size = 200 uL
Dil Factor = 1
Blank ID # =
Blank Value = 2.4 ug/minute C

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.30	0.00
2	1.01	1.30	76.92
3	1.50	7.40	82.43
4	2.00	17.30	57.23
5	2.50	28.20	38.65
6	3.00	41.90	32.70
7	3.50	64.90	35.44
8	4.00	167.70	61.30
9	4.50	331.40	49.40
10	5.00	428.80	22.71
11	5.50	484.70	11.53
12	6.00	515.40	5.96
13	6.50	530.70	2.88
14	7.00	538.20	1.39
15	7.50	542.40	0.77
16	8.00	544.80	0.44
17	8.50	546.30	0.27
18	9.00	548.00	0.31
19	9.50	555.30	1.31
20	10.00	560.90	1.00
21	10.50	565.20	0.76
22	11.00	569.40	0.74

USER INPUT BLANK VALUE
BLANK VALUE = 26.40147 micrograms carbon
BLANK FACTOR = 26.40147 / 11.00061 = +2.4E+00 ug/min Carbon

SAMPLE RESULTS:
(569.4 - 26.39707)(1)/(200) = +2.715E+00 g/L Carbon
(569.4 - 26.39707)(1)/(200)(12) = +2.263E-01 Molar Carbon
<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!!>>>>

Sample Run By: KR MONTEITH 00000

Oct. 25. 1996 4:14AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 6/18

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S96B453-1 Date: 10/25/96 Time: 01:23:32

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = .88 ug/minute C

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.90	0.00
2	1.01	2.90	68.97
3	1.51	5.10	43.14
4	2.01	6.10	16.39
5	2.51	6.50	6.15
6	3.01	6.80	4.41
7	3.51	7.00	2.86
8	4.01	7.40	5.41
9	4.51	7.60	2.63
10	5.01	7.90	3.80
11	5.51	8.10	2.47
12	6.01	8.40	3.57
13	6.50	8.70	3.45
14	7.00	9.00	3.33
15	7.50	9.20	2.17
16	8.00	9.50	3.16
17	8.50	9.80	3.06
18	9.00	9.90	1.01
19	9.50	10.20	2.94
20	10.00	10.50	2.86
21	10.50	10.80	2.78
22	11.00	10.90	0.92

USER INPUT BLANK VALUE
BLANK VALUE = 0 micrograms carbon
BLANK FACTOR = 0 / 0 = +8.8E-01 ug/min Carbon

SAMPLE RESULTS:
(10.9 - 9.682196)(1)/(1) = +1.22E+00 g/L Carbon
(10.9 - 9.682196)(1)/(1)(12) = +1.01E-01 Molar Carbon

Sample Run By: KR MONTEITH 00000

Oct. 25. 1996 4:15AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 9/18

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S96B453-1 Date: 10/25/96 Time: 01:37:04

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = 2.4 ug/minute C

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.20	0.00
2	1.01	0.90	77.78
3	1.51	3.80	76.32
4	2.01	8.10	53.09
5	2.51	16.80	51.79
6	3.01	28.70	41.46
7	3.51	39.10	26.60
8	4.01	46.80	16.45
9	4.50	51.90	9.83
10	5.00	55.40	6.32
11	5.51	58.50	5.30
12	6.01	60.60	3.47
13	6.51	61.80	1.94
14	7.00	61.90	0.16
15	7.50	62.10	0.32
16	8.00	62.20	0.16
17	8.50	62.40	0.32
18	9.00	62.60	0.32
19	9.50	62.90	0.48
20	10.00	63.00	0.16
21	10.50	63.20	0.32
22	11.00	63.50	0.47

USER INPUT BLANK VALUE
BLANK VALUE = 0 micrograms carbon
BLANK FACTOR = 0 / 0 = +2.4E+00 ug/min Carbon

SAMPLE RESULTS:
(63.5 - 26.40401)(1)/(1) = +3.71E+01 g/L Carbon
(63.5 - 26.40401)(1)/(1)(12) = +3.09E+00 Molar Carbon
<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!!>>>>

Sample Run By: KR MONTEITH 00000

Oct. 25. 1996 4:16AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 10/18

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S96B453DUP-1 Date: 10/25/96 Time: 01:53:35

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = .88 ug/minute C

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.30	0.00
2	1.01	2.40	87.50
3	1.50	4.60	47.83
4	2.00	6.00	23.33
5	2.50	8.00	25.00
6	3.00	10.10	20.79
7	3.50	12.10	16.53
8	4.00	13.50	10.37
9	4.50	14.70	8.16
10	5.00	15.90	7.55
11	5.50	16.20	1.85
12	6.00	16.90	4.14
13	6.50	17.30	2.31
14	7.00	17.70	2.26
15	7.50	18.10	2.21
16	8.00	18.40	1.63
17	8.50	18.70	1.60
18	9.00	19.00	1.58
19	9.50	19.30	1.55
20	10.00	19.60	1.53
21	10.50	19.90	1.51
22	11.00	20.20	1.49

USER INPUT BLANK VALUE
BLANK VALUE = 0 micrograms carbon
BLANK FACTOR = 0 / 0 = +8.8E-01 ug/min Carbon

SAMPLE RESULTS:
(20.2 - 9.679852)(1)/(1) = +1.05E+01 g/L Carbon
(20.2 - 9.679852)(1)/(1)(12) = +8.77E-01 Molar Carbon

Sample Run By: KR MONTEITH 00000

Oct. 25. 1996 4:16AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 11/18

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S96B453DUP-2 Date: I0/25/96 Time: 02:18:52

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = 2.4 ug/minute C

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.60	0.00
2	1.01	1.70	64.71
3	1.51	4.20	59.52
4	2.01	18.00	76.67
5	2.51	45.10	60.09
6	3.01	54.70	17.55
7	3.51	57.50	4.87
8	4.00	58.00	0.86
9	4.50	58.20	0.34
10	5.00	58.70	0.85
11	5.50	59.40	1.18
12	6.00	60.70	2.14
13	6.50	62.00	2.10
14	7.00	62.90	1.43
15	7.50	63:30	0.63
16	8.00	63.50	0.31
17	8.50	63.90	0.63
18	9.00	64.20	0.47
19	9.50	64.40	0.31
20	10.00	64.80	0.62
21	10.50	65.10	0.46
22	11.00	65.40	0.46

USER INPUT BLANK VALUE
BLANK VALUE = 0 micrograms carbon
BLANK FACTOR = 0 / 0 = +2.4E+00 ug/min Carbon

SAMPLE RESULTS:
(65.4 - 26.3972)(1)/(1) = +3.90E+01 g/L Carbon
(65.4 - 26.3972)(1)/(1)(12) = +3.25E+00 Molar Carbon
<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!!>>>>

Sample Run By: _____
KR MONTEITH 00000

Oct. 25. 1996 4:16AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 12/18

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S96B453SPK-1 Date: 10/25/96 Time: 02:32:13

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = .88 ug/minute C

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.30	0.00
2	1.01	15.70	98.09
3	1.51	82.10	80.88
4	2.00	161.70	49.23
5	2.50	225.00	28.13
6	3.00	267.50	15.89
7	3.51	290.50	7.92
8	4.01	301.80	3.74
9	4.50	306.50	1.53
10	5.00	308.60	0.68
11	5.50	309.50	0.29
12	6.00	310.10	0.19
13	6.50	310.60	0.16
14	7.00	311.10	0.16
15	7.50	311.50	0.13
16	8.00	312.00	0.16
17	8.50	312.40	0.13
18	9.00	312.80	0.13
19	9.50	313.10	0.10
20	10.00	313.50	0.13
21	10.50	313.90	0.13
22	11.00	314.10	0.06

USER INPUT BLANK VALUE
BLANK VALUE = 0 micrograms carbon
BLANK FACTOR = 0 / 0 = +8.8E-01 ug/min Carbon

SAMPLE RESULTS:
(314.1 - 9.678254)(1)/(1) = +3.044E+02 g/L Carbon
(314.1 - 9.678254)(1)/(1)(12) = +2.537E+01 Molar Carbon

Sample Run By: KR MONTEITH 00000

Oct. 25. 1996 4:17AM WHC 2225 LAB ROOM 2F FACSIMILE No. 6272 P. 13/18

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S96B453SPK-1 Date: 10/25/96 Time: 02:49:24

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = 2.4 ug/minute C

Analyst : KR MONTEITH
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	1.00	0.00
2	1.01	164.50	99.39
3	1.51	281.90	41.65
4	2.00	311.90	9.62
5	2.50	322.30	3.23
6	3.00	326.70	1.35
7	3.50	328.70	0.61
8	4.00	330.30	0.48
9	4.50	331.00	0.21
10	5.00	331.90	0.27
11	5.50	332.30	0.12
12	6.00	332.80	0.15
13	6.50	333.30	0.15
14	7.00	333.70	0.12
15	7.50	334.10	0.12
16	8.00	334.50	0.12
17	8.50	334.90	0.12
18	9.00	335.20	0.09
19	9.50	335.50	0.09
20	10.00	335.80	0.09
21	10.50	336.20	0.12
22	11.00	336.50	0.09

USER INPUT BLANK VALUE
BLANK VALUE = 0 micrograms carbon
BLANK FACTOR = 0 / 0 = +2.4E+00 ug/min Carbon

SAMPLE RESULTS:
(336.5 - 26.40161)(1)/(1) = +3.101E+02 g/L Carbon
(336.5 - 26.40161)(1)/(1)(12) = +2.584E+01 Molar Carbon
<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!!>>>>

Sample Run By: KR MONTEITH 00000

Oct. 25. 1996 4:17AM WHC 222S LAB ROOM 2F BACKSIDE No. 6272 P. 14/18

LABCORE Completed Worklist Report for Worklist# 15222

Analyst: rag Instrument: CARB2 Book# _____

Method: _____ Rev/Mod _____

Worklist Comment: 102LW 24-1 RUN TOC ONLY. LCM

Seq	Type	Sample#	R	A	Test	Matrix	Actual	Found	DL or Yield	Unit
1	STD			0	TOC-01	LIQUID	3.00E+03	2.72E+3	90.667	% Recovery
2	BLNK			0	TOC-01	LIQUID	1	9.00E-1	0.900	ug/mL
3	SAMPLE	S96B000453		0	TOC-01	LIQUID	N/A	1.87E+02	55.000	ug/mL
~~4~~	~~SAMPLE~~	~~S96B000521~~		~~0~~	~~TOC-01~~	~~LIQUID~~	~~N/A~~	~~2.90E+02~~	~~5.500~~	~~ug/mL~~

LBF 12/2/96

Final page for worklist# 15222

Analyst Signature Date

Analyst Signature Date

Reviewer Signature Date 11/26/96

Units shown for QC (BLK/BKG) may not reflect the actual units.

LABCORE Data Entry Template for Worklist# 15222

Analyst: RY **Instrument:** CARB2 _____ **Book#** 24 NI2-E

Method: LA-344-105 **Rev/Mod** D-1

Worklist Comment: 102LW 24-1 RUN TOC ONLY. LCM

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	STD				TOC-01	LIQUID		
2	BLNK				TOC-01	LIQUID		
3	SAMPLE	S96B000453	0		TOC-01	LIQUID	96001333	TANK 24-1
	Analytes Requested: TOC-01							
4	SAMPLE	S96S000511	0		TOC-01	LIQUID	96001517	102LW
	Analytes Requested: TOC-01							

Final page for worklist # 15222

Rae Lynn Breen 11-26-96
Analyst Signature Date

Linda Mack 11-26-96
Analyst Signature Date

Data Entry Comments: Sample S96B000453 used In Process

Ran S96S000511 4 times to verify answer. DR RS 11-26-96

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

TOC (TOTAL ORGANIC CARBON): EPA 9.1 ... (B-1)

WORKLIST #	ANALYST INITIALS	ANALYSIS DATE	ANALYSIS TIME	INSTRUMENT CODE
W15222	RL	11-26-96	02:00	

[X] BASELINE [ ] BLANK [ ] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] PREP BLANK

SAMPLE # = STD # =

SAMPLE VOL. (mL) .200
H2SO4 VOL. ADDED to SAMPLE
ALIQUOT of SPARGED SAMPLE to be SPIKED
SPIKE VOL. (mL)
H2SO4 VOL. ADDED to SAMPLE+SPIKE

[ ] BASELINE [ ] BLANK [X] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] PREP BLANK

SAMPLE # = S96S000511 STD # =

SAMPLE VOL. (mL) 2 ml
H2SO4 VOL. ADDED to SAMPLE .200 ml
ALIQUOT of SPARGED SAMPLE to be SPIKED
SPIKE VOL. (mL)
H2SO4 VOL. ADDED to SAMPLE+SPIKE

[ ] BASELINE [ ] BLANK [ ] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] PREP BLANK x STD

SAMPLE # = STD # = 24N12-E

SAMPLE VOL. (mL) .200
H2SO4 VOL. ADDED to SAMPLE 2
ALIQUOT of SPARGED SAMPLE to be SPIKED
SPIKE VOL. (mL)
H2SO4 VOL. ADDED to SAMPLE+SPIKE

[ ] BASELINE [ ] BLANK [ ] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] PREP BLANK

SAMPLE # = STD # =

SAMPLE VOL. (mL)
H2SO4 VOL. ADDED to SAMPLE
ALIQUOT of SPARGED SAMPLE to be SPIKED
SPIKE VOL. (mL)
H2SO4 VOL. ADDED to SAMPLE+SPIKE

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[ ] BASELINE [X] BLANK [ ] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] PREP BLANK

SAMPLE # = STD # =

SAMPLE VOL. (mL) .200
H2SO4 VOL. ADDED to SAMPLE
ALIQUOT of SPARGED SAMPLE to be SPIKED
SPIKE VOL. (mL)
H2SO4 VOL. ADDED to SAMPLE+SPIKE

[ ] BASELINE [ ] BLANK [ ] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] PREP BLANK

SAMPLE # = STD # =

SAMPLE VOL. (mL)
H2SO4 VOL. ADDED to SAMPLE
ALIQUOT of SPARGED SAMPLE to be SPIKED
SPIKE VOL. (mL)
H2SO4 VOL. ADDED to SAMPLE+SPIKE

[ ] BASELINE [ ] BLANK [X] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] PREP BLANK

SAMPLE # = S96B000453 STD # =

SAMPLE VOL. (mL) .500
H2SO4 VOL. ADDED to SAMPLE 5
ALIQUOT of SPARGED SAMPLE to be SPIKED
SPIKE VOL. (mL)
H2SO4 VOL. ADDED to SAMPLE+SPIKE

[ ] BASELINE [ ] BLANK [ ] SAMPLE [ ] DUPLICATE [ ] SPIKE [ ] PREP BLANK

SAMPLE # = STD # =

SAMPLE VOL. (mL)
H2SO4 VOL. ADDED to SAMPLE
ALIQUOT of SPARGED SAMPLE to be SPIKED
SPIKE VOL. (mL)
H2SO4 VOL. ADDED to SAMPLE+SPIKE

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0
<<< BLANK ANALYSIS >>>

Sample: BASELINE Date: 11/26/96 Time: 00:54:59

Sample Size = 200 uL
Dil Factor = 1
Blank ID # = BASELINE
Blank Value = N/A

Analyst : RA GREEN
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.20	0.00
2	1.01	0.80	75.00
3	1.50	1.40	42.86
4	2.00	1.80	22.22
5	2.50	2.20	18.18
6	3.00	2.40	8.33
7	3.50	2.70	11.11
8	4.00	3.00	10.00
9	4.50	3.10	3.23
10	5.00	3.40	8.82
11	5.50	3.60	5.56
12	6.00	3.80	5.26
13	6.50	4.00	5.00
14	7.00	4.10	2.44

BLANK VALUE = 4.1 micrograms carbon
BLANK FACTOR = 4.1 / 7.004002 = +5.9E-01 ug/min Carbon

Sample Run By: Rae Ann Green 11-26-96
RA GREEN 00000

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: CCV 24N12-E Date: 11/26/96 Time: 01:05:19

Sample Size = 200 uL Analyst : RA GREEN
Dil Factor = 1.1 Min Readings = 14
Blank ID # = BASELINE Max Readings = 14
Blank Value = .5853797 ug/minute C % Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	11.50	0.00
2	1.01	33.00	65.15
3	1.51	44.40	25.68
4	2.01	49.10	9.57
5	2.51	50.90	3.54
6	3.01	51.80	1.74
7	3.51	52.30	0.96
8	4.01	52.50	0.38
9	4.50	52.80	0.57
10	5.00	53.00	0.38
11	5.51	53.20	0.38
12	6.01	53.40	0.37
13	6.51	53.50	0.19
14	7.00	53.60	0.19

BLANK VALUE = 4.1 micrograms carbon
BLANK FACTOR = 4.1 / 7.004002 = +5.9E-01 ug/min Carbon

SAMPLE RESULTS:
(53.6 - 4.100487)(1.1)/(200) = +2.72E-01 g/L Carbon
(53.6 - 4.100487)(1.1)/(200)(12) = +2.27E-02 Molar Carbon

Sample Run By: Rachnn Green 11-26-96
RA GREEN 00000

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0
<<< BLANK ANALYSIS >>>

Sample: CCB Date: 11/26/96 Time: 01:17:23

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = CCB
Blank Value = N/A

Analyst : RA GREEN
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.10	0.00
2	1.01	0.70	85.71
3	1.50	1.20	41.67
4	2.01	1.50	20.00
5	2.51	1.70	11.76
6	3.01	1.90	10.53
7	3.51	2.10	9.52
8	4.01	2.20	4.55
9	4.50	2.40	8.33
10	5.00	2.50	4.00
11	5.50	2.70	7.41
12	6.01	2.90	6.90
13	6.51	3.00	3.33
14	7.00	3.20	6.25

BLANK VALUE = 3.2 micrograms carbon
BLANK FACTOR = 3.2 / 7.004829 = +4.6E-01 ug/min Carbon

Sample Run By: Rae Ann Green 11-26-96
RA GREEN 00000

ANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S96B00453 Date: 11/26/96 Time: 02:18:31

Sample Size = 200 uL
Dil Factor = 11
Blank ID # = CCB
Blank Value = .4568277 ug/minute C

Analyst : RA GREEN
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.90	0.00
2	1.01	2.60	65.38
3	1.51	3.70	29.73
4	2.01	4.40	15.91
5	2.51	4.90	10.20
6	3.01	5.40	9.26
7	3.50	5.70	5.26
8	4.00	6.00	5.00
9	4.50	6.40	6.25
10	5.00	6.60	3.03
11	5.50	6.80	2.94
12	6.00	7.10	4.23
13	6.50	7.30	2.74
14	7.00	7.50	2.67

BLANK VALUE = 3.2 micrograms carbon
BLANK FACTOR = 3.2 / 7.004829 = +4.6E-01 ug/min Carbon

SAMPLE RESULTS:
(7.5 - 3.199543)(11)/(200) = +2.4E-01 g/L Carbon
(7.5 - 3.199543)(11)/(200)(12) = +2.0E-02 Molar Carbon

Sample Run By: Rae Ann Green 11-26-96
RA GREEN 00000

WORKBOOK PAGE: STD1

TOC : LA-344-105 (D-1) LIQUIDS

Type	Sample Volume in mL (SS)	STD
STD	H2SO4 Volume in mL (VR)	2.000
Work List	Volume Injected in mL (VI)	0.200
15222	Dilution Factor (calculated) (DF)	11.000
Test Code	Digest Dilution Factor (DDF)	1
TOC-01	µg of Carbon Found (C1)	53.6
Matrix	µg of Carbon from Baseline (C2)	4.1
LIQUID	Standard Book Number	24N12E
Batch Number	Standard Value (µg/ml)	3000
96011866		
Rerun		
0	µg of Carbon/mL = (C1-C2) * DF * DDF / VI	
Sample Prep		
N/A	Method Detection Limit (µg/mL) = 1 µg C * DF * DDF / VI	
Sample #		
Instrument Code		
CARB2		
Prepared By		
LCM		
Chemist		
RWS		
Analyst		
RAG		
Date Complete		
11/26/96		
Analysis Date		
11/26/96		
Analysis Time	Method Detection Limit in µg/mL	5.50E+01
02:00 AM	QC Actual in µg/mL	3.00E+03
Sample Point	QC Found in µg/mL	2.72E+03
102LW	Percent Standard Recovery	90.8

Data Entered By:	LCM	Date:	11/26/96
Signature of Chemist:	[signature]	Date:	11/26/96

STANDARD.WB1 REV 2.0 344105ML

WORKBOOK PAGE: BLANK2

TOC : LA-344-105 (D-1) LIQUIDS

Type	Work List	Test Code	Matrix	Batch Number	Rerun	Sample Prep	Sample #	Instrument Code	Prepared By	Chemist	Analyst	Date Complete	Analysis Date	Analysis Time	Sample Point
BLNK	15222	TOC-01	LIQUID	96011866	0	N/A		CARB2	LCM	RWS	RAG	11/26/96	11/26/96	02:00 AM	102LW

		BLNK
Sample Volume in mL	(SS)	0.200
H2SO4 Volume in mL	(VR)	0.000
Volume Injected in mL	(VI)	0.200
Dilution Factor (calculated)	(DF)	1.000
Digest Dilution Factor	(DDF)	1
µg of Carbon in Blank	(C1)	3.2
µg of Carbon from Baseline	(C2)	4.1

µg of Carbon = |C1-C2|

Method Detection Limit (µg/mL) = 1 µg C * DF * DDF / VI

Method Detection Limit in µg/mL	5.00E+00
µg of Carbon	9.00E-01

Data Entered By:	LCM	Date:	11/26/96
Signature of Chemist:	RWX-hwarth	Date:	11/26/96

BLANK.WB1 REV 2.0 344105ML

WORKBOOK PAGE: SAM3

TOC : LA-344-105 (D-1) LIQUIDS

Type	Sample Volume in mL	(SS)	SAMPLE: 0.500
SAMPLE	H2SO4 Volume in mL	(VR)	5.000
Work List	Volume Injected in mL	(VI)	0.200
15222	Dilution Factor (calculated)	(DF)	11.000
Test Code	Digest Dilution Factor	(DDF)	1
TOC-01	µg of Carbon in Sample	(C1)	7.5
Matrix	µg of Carbon from Baseline	(C2)	4.1
LIQUID			
Batch Number			
96011866			
Rerun	µg of Carbon/mL = (C1-C2) * DF * DDF / VI		
0			
Sample Prep	Method Detection Limit = 1 µg C * DF * DDF / VI		
N/A			
Sample #			
S96B000453			
Instrument Code			
CARB2			
Prepared By			
LCM			
Chemist			
RWS			
Analyst			
RAG			
Date Complete			
11/26/96			
Analysis Date			
11/26/96			
Analysis Time	Method Detection Limit in µg/mL		5.50E+01
02:00 AM			
Sample Point	µg of Carbon/mL		1.87E+02
102LW			

Data Entered By:	LCM	Date:	11/26/96
Signature of Chemist:	[signature]	Date:	11/26/96

SAMPLE.WB1 REV 2.0 344105ML

worklistrad Version 1.0 05/09/96
10/28/96 03:07

LABCORE Completed RadChem Report for Worklist#: 13777

Analyst: krq **Instrument:** GEA03 **Book#** _____

Method: _____ Rev/Mod _____

Worklist Comment: Sample size is on traveler.Std:TINKFUS (1.0ml). new

Seq	Type	Sample#	R	A	Test	Matrix	Actual		Found	DL or Yield	Unit
1	STD		0	@GEA-02	CO60-02	LIQUID	7.955e-03		7.82e-03	98.303	% Recovery
1	STD		0	@GEA-02	CO60-02E	LIQUID	1		2.26	2.260	% Ct Error
1	STD		0	@GEA-02	CS13702	LIQUID	7.717e-03		7.70e-03	99.780	% Recovery
1	STD		0	@GEA-02	CS13702E	LIQUID	1		2.93	2.930	% Ct Error
2	BLNK		0	@GEA-02	CO60-02	LIQUID	1		<2.60e-2		uCi/mL
2	BLNK		0	@GEA-02	CS13702	LIQUID	1		<6.18e-2		uCi/mL
2	BLNK		0	@GEA-02	EU15402	LIQUID	1		<6.67e-2		uCi/mL
2	BLNK		0	@GEA-02	EU15502	LIQUID	1		<6.42e-2		uCi/mL
2	BLNK		0	@GEA-02	AM24102	LIQUID	1		<1.54e-1		uCi/mL
3	SAMPLE	S96B000453	0	@GEA-02	CO60-02	LIQUID	N/A	<	2.325e-02	230.0e-004	uCi/mL
3	SAMPLE	S96B000453	0	@GEA-02	CO60-02E	LIQUID	N/A		n/a	0.0e+000	% Ct. Error
3	SAMPLE	S96B000453	0	@GEA-02	CS13702	LIQUID	N/A		4.370e+01	0.0e+000	uCi/mL
3	SAMPLE	S96B000453	0	@GEA-02	CS13702E	LIQUID	N/A		1.04	0.0e+000	% Ct. Error
3	SAMPLE	S96B000453	0	@GEA-02	EU15402	LIQUID	N/A	<	9.317e-02	930.0e-004	uCi/mL
3	SAMPLE	S96B000453	0	@GEA-02	EU15402E	LIQUID	N/A		n/a	0.0e+000	% Ct. Error
3	SAMPLE	S96B000453	0	@GEA-02	EU15502	LIQUID	N/A	<	2.503e-01	250.0e-003	uCi/mL
3	SAMPLE	S96B000453	0	@GEA-02	EU15502E	LIQUID	N/A		n/a	0.0e+000	% Ct. Error
3	SAMPLE	S96B000453	0	@GEA-02	AM24102	LIQUID	N/A	<	6.492e-01	649.0e-003	uCi/mL
3	SAMPLE	S96B000453	0	@GEA-02	AM24102E	LIQUID	N/A		n/a	0.0e+000	% Ct. Error
4	DUP	S96B000453	0	@GEA-02	CO60-02	LIQUID	<2.32e-2		<2.66e-2		RPD
4	DUP	S96B000453	0	@GEA-02	CO60-02E	LIQUID	1		n/a		% Ct Error
4	DUP	S96B000453	0	@GEA-02	CS13702	LIQUID	4.37e+01		4.26e+01	2.549	RPD
4	DUP	S96B000453	0	@GEA-02	CS13702E	LIQUID	1		1.06	1.060	% Ct Error
4	DUP	S96B000453	0	@GEA-02	EU15402	LIQUID	<9.32e-2		<6.67e-2		RPD
4	DUP	S96B000453	0	@GEA-02	EU15402E	LIQUID	1		n/a		% Ct Error
4	DUP	S96B000453	0	@GEA-02	EU15502	LIQUID	<2.50e-1		<2.54e-1		RPD
4	DUP	S96B000453	0	@GEA-02	EU15502E	LIQUID	1		n/a		% Ct Error
4	DUP	S96B000453	0	@GEA-02	AM24102	LIQUID	<6.49e-1		<6.38e-1		RPD
4	DUP	S96B000453	0	@GEA-02	AM24102E	LIQUID	1		n/a		% Ct Error
5	SAMPLE	S96B000454	0	@GEA-02	CO60-02	LIQUID	N/A	<	5.088e-04	100.0e-005	uCi/mL
5	SAMPLE	S96B000454	0	@GEA-02	CO60-02E	LIQUID	N/A		n/a	0.0e+000	% Ct. Error
5	SAMPLE	S96B000454	0	@GEA-02	CS13702	LIQUID	N/A		1.900e+01	0.0e+000	uCi/mL
5	SAMPLE	S96B000454	0	@GEA-02	CS13702E	LIQUID	N/A		0.230	0.0e+000	% Ct. Error
5	SAMPLE	S96B000454	0	@GEA-02	EU15402	LIQUID	N/A	<	4.092e-03	400.0e-005	uCi/mL
5	SAMPLE	S96B000454	0	@GEA-02	EU15402E	LIQUID	N/A		n/a	0.0e+000	% Ct. Error
5	SAMPLE	S96B000454	0	@GEA-02	EU15502	LIQUID	N/A		2.108e-02	210.0e-004	uCi/mL
5	SAMPLE	S96B000454	0	@GEA-02	EU15502E	LIQUID	N/A		n/a	0.0e+000	% Ct. Error
5	SAMPLE	S96B000454	0	@GEA-02	AM24102	LIQUID	N/A	<	5.496e-02	550.0e-004	uCi/mL
5	SAMPLE	S96B000454	0	@GEA-02	AM24102E	LIQUID	N/A		n/a	0.0e+000	% Ct. Error
6	DUP	S96B000454	0	@GEA-02	CO60-02	LIQUID	<6.09e-4		<5.13e-4		RPD
6	DUP	S96B000454	0	@GEA-02	CO60-02E	LIQUID	1		n/a		% Ct Error

11/25/96

Units shown for QC (BLK/BKG) may not reflect the actual units.

LABCORE Completed RadChem Report for Worklist#: 13777

Seq	Type	Sample#	R	A	Test	Matrix	Actual	Found	DL or Yield	Unit
6	DUP	S96B000454	0	@GEA-02	CS13702	LIQUID	1.90e+01	1.88e+01	1.058	RPD
6	DUP	S96B000454	0	@GEA-02	CS13702E	LIQUID	1	0.230	0.230	% Ct Error
6	DUP	S96B000454	0	@GEA-02	EU15402	LIQUID	<4.09e-3	<3.71e-3		RPD
6	DUP	S96B000454	0	@GEA-02	EU15402E	LIQUID	1	n/a		% Ct Error
6	DUP	S96B000454	0	@GEA-02	EU15502	LIQUID	<2.11e-2	<2.10e-2		RPD
6	DUP	S96B000454	0	@GEA-02	EU15502E	LIQUID	1	n/a		% Ct Error
6	DUP	S96B000454	0	@GEA-02	AM24102	LIQUID	<5.50e-2	<5.45e-2		RPD
6	DUP	S96B000454	0	@GEA-02	AM24102E	LIQUID	1	n/a		% Ct Error

[illegible] 11/25/96

Comments Section:

Comments for sample# S96B000453 and test @GEA-02 .
DL=0 => n/a

Final page for worklist# 13777

Analyst Signature Date

Susan Bu 10/28/96
Analyst Signature Date

[illegible] 10/28/96
Reviewer Signature Date

Tech Review: [illegible] 10/28/96

Units shown for QC (BLK/BKG) may not reflect the actual units.

LABCORE Data Entry Template for Worklist# 13777

Analyst: [signature] **Instrument:** GEA00 _____ **Book#** 62556

Method: LA-548-121 **Rev/Mod** _____

Worklist Comment: Sample size is on traveler.Std:TINKFUS (1.0ml). new (G. Miller Samples)

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	STD				@GEA-02	LIQUID		
2	BLNK				@GEA-02	LIQUID		
3	SAMPLE	S96B000453	0		@GEA-02	LIQUID	96001333	TK 24-1
	Analytes Requested:	AM24102 , AM24102E, CO60-02 , CO60-02E, CS13702 , CS13702E, EU15402 , EU15402E, EU15502 , EU15502E						
4	DUP	S96B000453	0		@GEA-02	LIQUID		
5	SAMPLE	S96B000454	0		@GEA-02	LIQUID	96001334	TK 21-1
	Analytes Requested:	AM24102 , AM24102E, CO60-02 , CO60-02E, CS13702 , CS13702E, EU15402 , EU15402E, EU15502 , EU15502E						
6	DUP	S96B000454	0		@GEA-02	LIQUID		

Final page for worklist # 13777

[signature] 10/24/96
Analyst Signature Date

[signature]
Analyst Signature Date

Data Entry Comments:

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

****

pom 25-OCT-1996 03:35:08.01 *

****

>>>>>>>>>> [illegible]MATION <<<<<<<<<<

Worklist #: 13777
Sample ID: WL13777-STD
Sample Size: 1.00000E-03 L
Dilution Factor: 1.00000E+00

Removed by: SLHall

>>>>>>>>>> COUNT INFORMATION <<<<<<<<<<

Detector ID: GEA3
File Number: dka300:[spec.GEA3]3g3789.cnf
Geometry: 42
Count Time: 0 00:50:00.00 sec
Real Time: 0 00:50:05.96 sec
Dead Time: 0.2%

Verified by: [signature] 10-27-96

>>>>>>>>>> ANALYSIS INFORMATION <<<<<<<<<<

Sample Count Time: 25-OCT-1996 02:44:22.84
Decayed to: 25-OCT-1996 02:44:22.84
Standard Deviations: 2
Analysis Library: ENVGEA
Analyst: SLH2
Background Subtract: DKA300:[SPEC.GEA3]3GBACK

>>>>>>>>>> CALIBRATION INFORMATION <<<<<<<<<<

Date of last energy calibration: 11-MAR-1994 11:47:01.11
Date of last efficiency calibration: 15-MAR-1994 10:28:40.20

****

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/L
0	86.37	188	1.77	173.25	169	9	85.2		NP-237	0.696
0	122.88	15903	1.24	246.24	240	11	1.9		EU-152	17.9
									CO-57	5.92
									EU-154	12.5
0	247.42	2092	1.40	495.22	487	15	9.7		EU-154	13.7
0	344.15	828	1.63	688.61	684	9	13.5		EU-152	1.77
0	443.98	162	1.97	888.20	885	8	53.9			
0	582.39*	124	1.68	1164.97	1161	9	61.3			
0	591.80	675	1.61	1183.79	1177	16	19.0			
0	661.57*	6813	1.56	1323.31	1316	16	2.9		CS-137	7.70
0	691.85	147	1.84	1383.86	1378	14	72.1		CO-57	91.1
0	723.20	2179	1.67	1446.57	1440	15	6.5		EU-154	11.3
0	756.73	598	1.79	1513.63	1508	13	17.0			
0	778.94	215	1.82	1558.04	1553	11	38.6		EU-152	1.83
0	873.12	1102	1.61	1746.41	1740	15	11.0		EU-154	11.1
0	963.90	193	1.55	1927.99	1922	12	47.4		EU-152	1.77
0	996.10	885	1.75	1992.39	1986	12	11.7		EU-154	11.7
0	1004.58	1625	1.85	2009.36	2004	12	7.0		EU-154	12.5
0	1085.24	189	2.03	2170.71	2165	11	37.1		EU-152	2.81
0	1112.22	175	2.01	2224.68	2219	13	47.5		EU-152	1.95
0	1173.02	5005	1.87	2346.30	2336	20	3.3		CO-60	7.89
0	1246.01	61	1.43	2492.33	2487	11	59.9			

Post-NID Peak Search Report (continued)
Sample ID : WL13777-STD

Acquisition date : 25-OCT-1996 02:44:22

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/L
0	1274.21	2559	2.09	2548.75	2540	18	4.2		EU-154	12.6
0	1332.23	4426	2.01	2664.84	2655	19	3.1		CO-60	7.75
0	1397.03	52	1.51	2794.49	2785	18	51.2			
0	1407.79	202	2.35	2816.03	2806	18	16.5		EU-152	1.77
0	1493.75	49	0.66	2988.02	2983	12	34.9			
0	1596.22	137	2.24	3193.07	3186	16	19.4			

Summary of Nuclide Activity
Sample ID : WL13777-STD

Acquisition date : 25-OCT-1996 02:44:22

To HNF-3208, REV. 0, ATT A, Pg. 209 um 26
Nu... ...identified lines 6
Number of lines tentatively identified by NID 20 76.92%

Nuclide Type :

Nuclide	Hlife	Decay	Wtd Mean Uncorrected uCi/L	Wtd Mean Decay Corr uCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
~~CO-57~~	~~271.80D~~	~~1.000~~	~~9.107E+01~~	~~9.107E+01~~	~~6.568E+01~~	~~72.12~~	BKG
CO-60	5.27Y	1.000	7.816E+00	7.816E+00	0.177E+00	2.26	
CS-137	30.00Y	1.000	7.700E+00	7.700E+00	0.226E+00	2.93	
EU-152	13.54Y	1.000	1.806E+00	1.806E+00	0.169E+00	9.37	
EU-154	8.59Y	1.000	1.219E+01	1.219E+01	0.034E+01	2.81	
~~NP-237~~	~~2.14E+06Y~~	~~1.000~~	~~6.958E-01~~	~~6.958E-01~~	~~5.926E-01~~	~~85.17~~	BKG
			---	---			
	Total Activity :		1.213E+02	1.213E+02			

Grand Total Activity : 1.213E+02 1.213E+02

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Minimum Detectable Activity Report
Sample ID : WL13777-STD
Acquisition date : 25-OCT-1996 02:44:22

Nuclide	Bckgnd Sum	Energy (keV)	(uCi/L)
BE-7	662.	477.59	8.4742E-01
NA-22	2580.	1274.53	3.9871E-01
NA-24	27.	1368.55	4.4080E-02
K-40	147.	1460.75	9.9150E-01
CR-51	672.	320.08	6.4284E-01
MN-54	350.	834.83	1.0222E-01
CO-56	438.	846.76	1.1592E-01
CO-58	383.	810.78	1.0492E-01
FE-59	319.	1099.25	2.1911E-01
SE-75	797.	264.66	1.0483E-01
SR-85	542.	514.01	8.7690E-02
Y-88	4.	1836.06	2.2209E-02
NB-94	1229.	871.09	1.9891E-01
ZRNB-95	2522.	724.18	5.5616E-01
RU-103	582.	497.08	9.3306E-02
RURH-106	404.	621.93	1.7233E+00
AG-108m	2569.	722.94	2.6970E-01
CD-109	1374.	88.03	2.1241E+00
AG-110M	515.	657.76	1.0688E-01
SN-113	674.	391.69	1.1800E-01
TE-123m	938.	159.00	5.4522E-02
SB-124	432.	602.73	8.8008E-02
SB-125	631.	427.89	2.6654E-01
TE-125m	1314.	109.27	2.0425E+01
I-131	681.	364.48	8.8728E-02
CS-134	429.	604.70	8.8022E-02
BA-140	455.	537.31	3.2837E-01
LA-140	142.	1596.21	1.1750E-01
CEPR-144	796.	133.51	7.3828E-01
EU-155	1382.	105.31	2.7976E-01
HG-203	794.	279.20	7.8032E-02
TL-208	743.	277.36	9.7012E-01
BI-212	401.	727.18	1.4619E+00
PB-212	935.	238.63	1.4123E-01
BI-214	461.	609.31	2.0018E-01
PB-214	663.	351.92	3.4460E-01
RA-224	898.	240.99	1.5368E+00
RA-226	957.	186.10	1.4486E+00
AC-228	421.	911.21	4.5452E-01
TH-228	1332.	84.37	6.4422E+00
TH-229	1339.	88.47	3.0391E-01
PA-233	701.	312.17	1.6818E-01
UTH-233	1378.	245.34	7.1354E+01
PA-234M	561.	1001.03	2.5655E-01
TH-234	765.	63.29	3.2879E+00
U-235	960.	185.71	8.8172E-02
NP-239	1426.	106.12	2.7000E-01
PU-239	856.	129.30	6.6647E+02
AM-241	806.	59.54	5.9563E-01
AM-243	958.	74.67	1.5258E-01

* 222-S Laboratory [illegible] 25-OCT-1996 05:37:00.64 *

>>>>>>>>>> SAMPLE INFORMATION <<<<<<<<<<

Worklist #:	13777
Sample ID:	WL13777-BLK
Sample Size:	1.00000E-04 L
Dilution Factor:	1.01000E+02

Removed by: SLHall

>>>>>>>>>> COUNT INFORMATION <<<<<<<<<<

Detector ID:	GEA3
File Number:	NI3AC:1.cnf 3790
Geometry:	42
Count Time:	0 00:50:00.00 sec
Real Time:	0 00:50:00.44 sec
Dead Time:	0.0%

Verified by: [signature] 11-27-96

WHC-SD-WM-DP-212, REV. 0

>>>>>>>>>> ANALYSIS INFORMATION <<<<<<<<<<

Sample Count Time:	25-OCT-1996 03:37:26.48
Decayed to:	25-OCT-1996 03:37:26.48
Standard Deviations:	2
Analysis Library:	ENVGEA
Analyst:	SLH2
Background Subtract:	DKA300:[SPEC.GEA3]3GBACK

>>>>>>>>>> CALIBRATION INFORMATION <<<<<<<<<<

Date of last energy calibration: 11-MAR-1994 11:47:01.11
Date of last efficiency calibration: 15-MAR-1994 10:28:40.20

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw %Err	Fit	Nuclides	Activity uCi/L
0	609.06*	21	1.59	1218.31	1211	14112.7			
0	828.04	15	1.41	1656.24	1650	11 66.7			
0	910.49*	14	2.18	1821.16	1815	11104.5			
0	1460.37*	24	2.36	2921.23	2911	18105.5		K-40	421.

Summary of Nuclide Activity
Sample ID : WL13777-BLK

Acquisition dat : 25-OCT-1996 03:37:26

Total number of lines in spectrum	4	
Number of unidentified lines	1	
Number of lines tentatively identified by NID	3	75.00%

Nuclide Type :

Nuclide	Hlife	Decay	Wtd Mean Uncorrected uCi/L	Wtd Mean Decay Corr uCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.28E+09Y	1.000	4.213E+02	4.213E+02	4.444E+02	105.50	BKG KJH 10-27-96
	Total Activity :		4.213E+02	4.213E+02			
	Grand Total Activity :		4.213E+02	4.213E+02			

Flags: "K" = Keyline not found
"E" = Manually edited
"M" = Manually accepted
"A" = Nuclide specific abn. limit

Sample ID : WL13777-BLK Acquisition date : 25-OCT-1996 03:37:26

HNF-3208, REV. 0, ATT A, Pg. 213

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
BE-7	36.	477.59	2.0075E+02
NA-22	8.	1274.53	2.2959E+01
NA-24	4.	1368.55	1.7105E+01
CR-51	45.	320.08	1.6753E+02
MN-54	17.	834.83	2.2769E+01
CO-56	12.	846.76	1.9313E+01
CO-57	69.	122.06	1.4521E+01
CO-58	17.	810.78	2.2577E+01
FE-59	10.	1099.25	3.8702E+01
CO-60	10.	1332.50	2.5993E+01
SE-75	57.	264.66	2.8367E+01
SR-85	37.	514.01	2.3024E+01
Y-88	3.	1836.06	1.8354E+01
NB-94	20.	871.09	2.5343E+01
ZRNB-95	21.	724.18	5.1745E+01
RU-103	33.	497.08	2.2573E+01
RURH-106	35.	621.93	5.1507E+02
AG-108m	20.	722.94	2.3768E+01
CD-109	66.	88.03	4.7040E+02
AG-110M	26.	657.76	2.4340E+01
SN-113	42.	391.69	2.9642E+01
TE-123m	91.	159.00	1.7152E+01
SB-124	20.	602.73	1.9104E+01
SB-125	48.	427.89	7.4304E+01
TE-125m	75.	109.27	4.9270E+03
I-131	38.	364.48	2.1286E+01
CS-134	19.	604.70	1.8653E+01
CS-137	136.	661.66	6.1837E+01
BA-140	26.	537.31	7.9641E+01
LA-140	4.	1596.21	1.8818E+01
CEPR-144	87.	133.51	2.4639E+02
EU-152	7.	1408.01	1.0868E+02
EU-154	8.	1274.51	6.6702E+01
EU-155	71.	105.31	6.4209E+01
HG-203	53.	279.20	2.0420E+01
TL-208	57.	277.36	2.7222E+02
BI-212	25.	727.18	3.6787E+02
PB-212	91.	238.63	4.4618E+01
BI-214	53.	609.31	6.8874E+01
PB-214	68.	351.92	1.1093E+02
RA-224	77.	240.99	4.5457E+02
RA-226	91.	186.10	4.5103E+02
AC-228	35.	911.21	1.3158E+02
TH-228	75.	84.37	1.5481E+03
TH-229	66.	88.47	6.8160E+01
PA-233	55.	312.17	4.7584E+01
UTH-233	51.	245.34	1.3841E+04
PA-234M	11.	1001.03	3.6394E+01
TH-234	53.	63.29	8.7605E+02
U-235	91.	185.71	2.7356E+01
NP-237	69.	86.48	1.4419E+02

Minimum Detectable Activity Report (continued)
Sample ID : WL13777-BLK
Acquisition date : 25-OCT-1996 03:37:26

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
NP-239	78.	106.12	6.3871E+01
PU-239	67.	129.30	1.8821E+05
AM-241	53.	59.54	1.5353E+02
AM-243	73.	74.67	4.2604E+01

m 25-OCT-1996 05:31:08.50

>>>>>>>>>> SAMPLE INFORMATION <<<<<<<<<<

Worklist #:	13777
Sample ID:	S96B000453-SAM
Sample Size:	1.00000E-04 L
Dilution Factor:	1.01000E+02

Removed by: SLH

>>>>>>>>>> COUNT INFORMATION <<<<<<<<<<

Detector ID:	GEA3
File Number:	dka300:[spec.GEA3]3g3791.cnf
Geometry:	42
Count Time:	0 00:50:00.00 sec
Real Time:	0 00:50:05.21 sec
Dead Time:	0.2%

Verified by: 10-27-96

WHC-SD-WM-DP-212, REV. 0

>>>>>>>>>> ANALYSIS INFORMATION <<<<<<<<<<

Sample Count Time:	25-OCT-1996 04:40:25.75
Decayed to:	25-OCT-1996 04:40:25.75
Standard Deviations:	2
Analysis Library:	ENVGEA
Analyst:	SLH2
Background Subtract:	DKA300:[SPEC.GEA3]3GBACK

>>>>>>>>>> CALIBRATION INFORMATION <<<<<<<<<<

Date of last energy calibration: 11-MAR-1994 11:47:01.11
Date of last efficiency calibration: 15-MAR-1994 10:28:40.20

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/L
0	661.55*	38298	1.62	1323.28	1316	16	1.0		CS-137	4.372E+04
0	1120.43*	13	0.94	2241.09	2237	11	89.5			

Summary of Nuclide Activity
Sample ID : S96B000453-SAM

Acquisition date : 25-OCT-1996 04:40:25

Total number of lines in spectrum 2
Number of unidentified lines 0
Number of lines tentatively identified by NID 2 100.00%

Nuclide Type :

Nuclide	Hlife	Decay	Wtd Mean Uncorrected uCi/L	Wtd Mean Decay Corr uCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CS-137	30.00Y	1.000	4.372E+04	4.372E+04	0.046E+04	1.04	
	Total Activity :		4.372E+04	4.372E+04			
	Grand Total Activity :		4.372E+04	4.372E+04			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Minimum Detectable Activity Report
Sample ID : 96B000453-SAM

Acquisition date : 25-OCT-1996 04:40:25

HNF-3208, REV. 0, ATT A, Pg. 217

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
BE-7	1139.	477.59	1.1227E+03
NA-22	16.	1274.53	3.1913E+01
NA-24	7.	1368.55	2.2332E+01
K-40	138.	1460.75	9.7254E+02
CR-51	932.	320.08	7.6452E+02
MN-54	22.	834.83	2.5724E+01
CO-56	23.	846.76	2.6596E+01
CO-57	1197.	122.06	6.0485E+01
CO-58	26.	810.78	2.7485E+01
FE-59	12.	1099.25	4.3683E+01
CO-60	8.	1332.50	2.3249E+01
SE-75	1122.	264.66	1.2563E+02
SR-85	625.	514.01	9.5086E+01
Y-88	5.	1836.06	2.3695E+01
NB-94	15.	871.09	2.2367E+01
ZRNB-95	26.	724.18	5.7413E+01
RU-103	711.	497.08	1.0417E+02
RURH-106	235.	621.93	1.3281E+03
AG-108m	21.	722.94	2.4844E+01
CD-109	1071.	88.03	1.8942E+03
AG-110M	970.	657.76	1.4817E+02
SN-113	1069.	391.69	1.5011E+02
TE-123m	1136.	159.00	6.0621E+01
SB-124	235.	602.73	6.5475E+01
SB-125	1209.	427.89	3.7268E+02
TE-125m	1166.	109.27	1.9431E+04
I-131	904.	364.48	1.0321E+02
CS-134	246.	604.70	6.7428E+01
BA-140	414.	537.31	3.1639E+02
LA-140	3.	1596.21	1.6270E+01
CEPR-144	1088.	133.51	8.7213E+02
EU-152	6.	1408.01	9.9902E+01
EU-154	16.	1274.51	9.3174E+01
EU-155	1085.	105.31	2.5031E+02
HG-203	1052.	279.20	9.0715E+01
TL-208	1026.	277.36	1.1508E+03
BI-212	31.	727.18	4.1286E+02
PB-212	1219.	238.63	1.6287E+02
BI-214	237.	609.31	1.4503E+02
PB-214	998.	351.92	4.2675E+02
RA-224	1226.	240.99	1.8139E+03
RA-226	1405.	186.10	1.7725E+03
AC-228	29.	911.21	1.1989E+02
TH-228	1077.	84.37	5.8491E+03
TH-229	1086.	88.47	2.7641E+02
PA-233	1023.	312.17	2.0518E+02
UTH-233	1175.	245.34	6.6570E+04
PA-234M	11.	1001.03	3.6279E+01
TH-234	978.	63.29	3.7538E+03
U-235	1394.	185.71	1.0730E+02
NP-237	1075.	86.48	5.7006E+02

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
NP-239	1110.	106.12	2.4061E+02
PU-239	1178.	129.30	7.8967E+05
AM-241	939.	59.54	6.4923E+02
AM-243	1058.	74.67	1.6194E+02

* 22 25-OCT-1996 06:29:02.18 *

>>>>>>>>>> SAMPLE INFORMATION <<<<<<<<<<

Worklist #:	13777
Sample ID:	S96B000453-DUP
Sample Size:	1.00000E-04 L
Dilution Factor:	1.01000E+02

Removed by: C Henderson

>>>>>>>>>> COUNT INFORMATION <<<<<<<<<<

Detector ID:	GEA3
File Number:	dka300:[spec.GEA3]3g3792.cnf
Geometry:	42
Count Time:	0 00:50:00.00 sec
Real Time:	0 00:50:05.13 sec
Dead Time:	0.2%

Verified by: [signature] 10-27-96

>>>>>>>>>> ANALYSIS INFORMATION <<<<<<<<<<

Sample Count Time:	25-OCT-1996 05:38:18.54
Decayed to:	25-OCT-1996 05:38:18.54
Standard Deviations:	2
Analysis Library:	ENVGEA
Analyst:	SLH2
Background Subtract:	DKA300:[SPEC.GEA3]3GBACK

WHC-SD-WM-DP-212, REV. 0

>>>>>>>>>> CALIBRATION INFORMATION <<<<<<<<<<

Date of last energy calibration: 11-MAR-1994 11:47:01.11
Date of last efficiency calibration: 15-MAR-1994 10:28:40.20

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/L
0	661.56*	37320	1.60	1323.29	1315	17	1.1		CS-137	4.260E+04
0	910.12*	23	2.89	1820.42	1814	13	74.6			

Summary of Nuclide Activity
Sample ID : S96B000453-DUP Acquisition date : 25-OCT-1996 05:38:18

Total number of lines in spectrum	2	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	2	100.00%

Nuclide Type :

Nuclide	Hlife	Decay	Wtd Mean Uncorrected uCi/L	Wtd Mean Decay Corr uCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CS-137	30.00Y	1.000	4.260E+04	4.260E+04	0.045E+04	1.06	
Total Activity :			4.260E+04	4.260E+04			
Grand Total Activity :			4.260E+04	4.260E+04			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : S96B000453-DUP Acquisition date : 25-OCT-1996 05:38:18

HNF-3208, REV. 0, ATT A, Pg. 21

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
BE-7	1128.	477.59	1.1177E+03
NA-22	8.	1274.53	2.2959E+01
NA-24	16.	1368.55	3.4701E+01
K-40	108.	1460.75	8.6009E+02
CR-51	950.	320.08	7.7190E+02
MN-54	19.	834.83	2.4285E+01
CO-56	17.	846.76	2.3113E+01
CO-57	1156.	122.06	5.9423E+01
CO-58	15.	810.78	2.1176E+01
FE-59	10.	1099.25	3.9740E+01
CO-60	10.	1332.50	2.6562E+01
SE-75	1105.	264.66	1.2468E+02
SR-85	596.	514.01	9.2913E+01
Y-88	2.	1836.06	1.4986E+01
NB-94	11.	871.09	1.9402E+01
ZRNB-95	22.	724.18	5.2924E+01
RU-103	710.	497.08	1.0411E+02
RURH-106	223.	621.93	1.2934E+03
AG-108m	23.	722.94	2.5526E+01
CD-109	1094.	88.03	1.9144E+03
AG-110M	903.	657.76	1.4299E+02
SN-113	1013.	391.69	1.4617E+02
TE-123m	1120.	159.00	6.0183E+01
SB-124	235.	602.73	6.5470E+01
SB-125	1255.	427.89	3.7977E+02
TE-125m	1095.	109.27	1.8834E+04
I-131	960.	364.48	1.0636E+02
CS-134	246.	604.70	6.7421E+01
BA-140	429.	537.31	3.2193E+02
LA-140	5.	1596.21	2.1294E+01
CEPR-144	1190.	133.51	9.1199E+02
EU-152	7.	1408.01	1.0739E+02
EU-154	8.	1274.51	6.6702E+01
EU-155	1115.	105.31	2.5384E+02
HG-203	1039.	279.20	9.0152E+01
TL-208	1060.	277.36	1.1701E+03
BI-212	19.	727.18	3.2245E+02
PB-212	1242.	238.63	1.6444E+02
BI-214	263.	609.31	1.5271E+02
PB-214	941.	351.92	4.1447E+02
RA-224	1196.	240.99	1.7913E+03
RA-226	1450.	186.10	1.8009E+03
AC-228	38.	911.21	1.3751E+02
TH-228	1042.	84.37	5.7528E+03
TH-229	1078.	88.47	2.7542E+02
PA-233	975.	312.17	2.0026E+02
UTH-233	1108.	245.34	6.4619E+04
PA-234M	14.	1001.03	4.0382E+01
TH-234	957.	63.29	3.7150E+03
U-235	1447.	185.71	1.0934E+02
NP-237	1053.	86.48	5.6401E+02

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
NP-239	1146.	106.12	2.4442E+02
PU-239	1142.	129.30	7.7754E+05
AM-241	906.	59.54	6.3765E+02
AM-243	1007.	74.67	1.5806E+02

LABCORE Completed RadChem Report for Worklist#: 13772

Analyst: knt Instrument: AB12 Book# _____

Method: _____ Rev/Mod _____

Worklist Comment: Determine sample size using ludlum.Std:TINKFUS (1.0ml).new

Seq	Type	Sample#	R	A	Test	Matrix	Actual	Found	DL or Yield	Unit
1	STD		0		@SR90-01 SR90-01	LIQUID	1.40E-03	1.47E-3	105.000	% Recovery
1	STD		0		@SR90-01 SR90-01C	LIQUID	100	9.34E+01	93.400	% Recovery
1	STD		0		@SR90-01 SR90-01E	LIQUID	1.00	1.62E+00	1.620	% Ct. Erro
2	BLNK		0		@SR90-01 SR90-01	LIQUID	1	7.09E-4	70.900e-005	uCi/mL
2	BLNK		0		@SR90-01 SR90-01C	LIQUID	100	9.26E+01	92.600	% Recovery
2	BLNK		0		@SR90-01 SR90-01E	LIQUID	1.00	1.15E+02	115.000	uCi/mL
3	BLNK/BKG		0		@SR90-01 SR90-01	LIQUID	1	1.52E+00	1.520	BLNK/BKG
4	SAMPLE	S96B000453	0		@SR90-01 SR90-01	LIQUID	N/A	7.68E+01	217.0e-004	uCi/mL
4	SAMPLE	S96B000453	0		@SR90-01 SR90-01C	LIQUID	N/A	9.02E+01	0.0e+000	% Recovery
4	SAMPLE	S96B000453	0		@SR90-01 SR90-01E	LIQUID	N/A	7.24E-01	0.0e+000	% Ct. Error
5	DUP	S96B000453	0		@SR90-01 SR90-01	LIQUID	7.68E+1	7.33E+1	4.664	RPD
5	DUP	S96B000453	0		@SR90-01 SR90-01C	LIQUID	100	9.24E+01	92.400	% Recovery
5	DUP	S96B000453	0		@SR90-01 SR90-01E	LIQUID	1.00	7.32E-01	0.732	% Cnt Err
6	SAMPLE	S96B000454	0		@SR90-01 SR90-01	LIQUID	N/A	4.88E-01	109.0e-005	uCi/mL
6	SAMPLE	S96B000454	0		@SR90-01 SR90-01C	LIQUID	N/A	8.83E+01	0.0e+000	% Recovery
6	SAMPLE	S96B000454	0		@SR90-01 SR90-01E	LIQUID	N/A	2.04E+00	0.0e+000	% Ct. Error
7	DUP	S96B000454	0		@SR90-01 SR90-01	LIQUID	4.88E-1	5.01E-1	2.629	RPD
7	DUP	S96B000454	0		@SR90-01 SR90-01C	LIQUID	100	9.17E+01	91.700	% Recovery
7	DUP	S96B000454	0		@SR90-01 SR90-01E	LIQUID	1.00	1.98E+00	1.980	% Cnt Err

11/25/96

Final page for worklist# 13772

_____ _____
Analyst Signature Date

10-22-96
Analyst Signature Date

OCT 23 1996
Reviewer Signature Date

Units shown for QC (BLK/BKG) may not reflect the actual units.

10/08/96 09:56
A-0004-1

LABCORE Data Entry Template for Worklist# 13772

Analyst: KNT **Instrument:** AB00 12 **Book#** 62B56

Method: LA-220-101 **Rev/Mod** 0-1

Worklist Comment: Determine sample size using ludlum.Std:TINKFUS (1.0ml).new

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	STD				@SR90-01	LIQUID		
2	BLNK				@SR90-01	LIQUID		
3	BLNK/BKG				@SR90-01	LIQUID		
4	SAMPLE	S96B000453	0		@SR90-01	LIQUID	96001333	TK 24-1
	Analytes Requested: SR90-01 , SR90-01C, SR90-01E							
5	DUP	S96B000453	0		@SR90-01	LIQUID		
6	SAMPLE	S96B000454	0		@SR90-01	LIQUID	96001334	TK 21-1
	Analytes Requested: SR90-01 , SR90-01C, SR90-01E							
7	DUP	S96B000454	0		@SR90-01	LIQUID		

Final page for worklist # 13772

Kim Thomas 10-21-96
Analyst Signature Date

Analyst Signature Date

Data Entry Comments:

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

WORKBOOK PAGE: STD1

Sr-89/90 : LA-220-101 (D-1), 102 (E-3), 104 (D-1) LIQUIDS

						STANDARD
Type	DETECTOR NUMBER		12	CARRIER ADDED in mL	(CVA)	1.000
STD	TOTAL COUNTS	(TC)	14764	GROSS WEIGHT	(W2)	7.9274
Work List	COUNT TIME in MINUTES	(CT)	10	TARE WEIGHT	(W1)	7.8340
13772	BACKGROUND in cpm	(BKG)	2.7	NET WEIGHT	(W3)	0.0934
Test Code	SAMPLE VOLUME in mL	(SS)	1.000	DELTA TIME (HOURS)	(DT)	13.80
@SR90-01	DILUTION FACTOR	(DF)	1			
Matrix	DIGEST DILUTION FACTOR	DDF	1			
LIQUID	SAMPLE COUNT RATE	(Rs)	1473.70	SR-90 EFFICIENCY FACTO	(C1)	0.4180
Batch Number	CRITICAL LEVEL	(Lc)	0.99	Y-90 EFFICIENCY FACTOR	(C2)	0.4660
96010293	TIME OF SEPARATION	(ST)	12:40	Rmax		N/A
Rerun	DATE OF SEPARATION	(SD)	10/21/96	DETECTION LIMIT	(Ld)	2.07
0	TIME OF COUNT	(TOC)	02:28	Sr-89/90 CONC. in µCi/L		1.4730E+00
Sample Prep	DATE OF COUNT	(DOC)	10/22/96			
N/A	STANDARD BOOK #		62B56			
Sample #	STANDARD VALUE in µCi/mL		1.3994E-03			
STANDARD						
Instrument Code						
AB00	Sample Count Rate (Rs) = (Total Counts (TC) / Count Time (CT)) - Background in cpm (BKG)					
Prepared By	Sr-89/90 CONC in µCi/mL REPLACE RS WITH RMAX IF RS<=LcAND RS>=0 OR REPLACE RS WITH Lc IF RS<0					
RCJ	RS*DF*DDF*1000/((C1+C2*(1-e to the power of ((-natural log 2)/64.2*DT)))*SS*REC*2220000)					
Chemist	NOTE: 64.2 = Half Life for Y-90 and Rec. = Fractional Carrier Recovery ((W2-W1) / (CVA * 0.1000))					
SLF	Relative Counting Error = The Square Root of ((TC + BKG * CT) / (TC - BKG * CT)*1.96)					
Analyst	Percent Carrier Recovery = (Net Weight / Expected weight) * 100					
KNT	NOTE: Expected weight = CVA * 0.1					
Date Complete	Detection Levels and Less Than Values are determined from Procedure LA-508-002.					
10/22/96	Delta Time (hours) = ((DOC - SD) * 24) + (TOC - ST) / 100					
Analysis Date						DETECTION LEVEL
10/21/96	Sr-89/90 CONCENTRATION		1.47E-03	µCi/mL		
Analysis Time						
12:40 PM	RELATIVE COUNTING ERROR		1.6%			2.07E-06 µCi/L
Sample Point						
TK24-1,21-1	PERCENT CARRIER RECOVERY		93.4%			

Analyst:		KNT	Date:	22-Oct-96
Signature of Chemist:		SLF	Date:	OCT 23 1996

STANDARD WB1 REV 2.0 22010NML

WORKBOOK PAGE: BLANK2

LA-220-101 / D-1 Sr-89/90 : LA-220-101 (D-1), 102 (E-3), 104 (D-1)

							BLNK
Type:	DETECTOR NUMBER		12	CARRIER ADDED in mL	(CVA)		1.000
BLNK	TOTAL COUNTS	(TC)	41	GROSS WEIGHT	(W2)		7.9139
Work List:	COUNT TIME in MINUTES	(CT)	10	TARE WEIGHT	(W1)		7.8213
13772	BACKGROUND in cpm	(BKG)	2.7	NET WEIGHT	(W3)		0.0926
Test Code:	SAMPLE VOLUME in mL	(SS)	0.200	DELTA TIME (HOURS)	(DT)		14.42
@SR90-01	DILUTION FACTOR	DF	101				
Matrix:	DIGEST DILUTION FACTOR	(DDF)	1				
LIQUID	SAMPLE COUNT RATE	(Rs)	1.40	SR-90 EFFICIENCY FACTOR	(C1)		0.4180
Batch Number:	CRITICAL LEVEL	(Lc)	0.99	Y-90 EFFICIENCY FACTOR	(C2)		0.4660
96010293	TIME OF SEPARATION	(ST)	12:40	Rmax			N/A
Rerun:	DATE OF SEPARATION	(SD)	10/21/96	DETECTION LIMIT	.	(Ld)	2.07
0	TIME OF COUNT	(TOC)	03:05	Sr-89/90 CONC in µCi/L			7.0886E-01
Sample Prep:	DATE OF COUNT	(DOC)	10/22/96				
N/A							
Sample #2:							
BLANK							

Instrument Code:	Sample Count Rate (Rs) = (Total Counts (TC) / Count Time (CT)) - Background in cpm (BKG)
AB00	Sr-89/90 CONC in µCi/L Replace RS with RMAX if RS<=Lc and RS>=0 or Replace RS with Lc if RS<0
Prepared By:	RS*DF*DDF/((C1+C2*(1-e to the power of ((-natural log 2)/64.2*DT)))*SS*REC*2220000)
RCJ	NOTE: 64.2 = Half Life for Y-90 and Rec. = Fractional Carrier Recovery ((W2-W1) / (CVA * 0.1000))
Chemist:	Relative Counting Error = (The Square Root of (TC + BKG * CT) / (TC - BKG * CT))*1.96
SLF	Percent Carrier Recovery = (Net Weight / Expected weight) * 100
Analyst:	NOTE: Expected weight = CVA * 0.1
KNT	Detection Levels and Less Than Values are determined from Procedure LA-508-002.
Date Complete:	Delta Time (hours) = ((DOC - SD) * 24) + (TOC - ST) / 100
10/22/96	

Analysis Date:				DETECTION LEVEL
10/21/96	Sr-89/90 CONCENTRATION	7.09E-04	µCi/mL	
Analysis Time:				1.05E-03 µCi/mL
12:40 PM	RELATIVE COUNTING ERROR	115.4%		
Sample Point:				
TK24-1,21-1	PERCENT CARRIER RECOVERY	92.6%		

Analyst:	KNT	Date:	22-Oct-96
Signature of Chemist:	SLF	Date:	OCT 2 3 1996

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WORKBOOK PAGE: SAM4
Sr-89/90 : LA-220-101 (D-1), 102 (E-3), 104 (D-1)

						SAMPLE
[redacted]	DETECTOR NUMBER		12	CARRIER ADDED in mL	(CVA)	1.000
SAMPLE	TOTAL COUNTS	(TC)	73286	GROSS WEIGHT	(W2)	7.9315
[redacted]	COUNT TIME in MINUTES	(CT)	10	TARE WEIGHT	(W1)	7.8413
13772	BACKGROUND in cpm	(BKG)	2.7	NET WEIGHT	(W3)	0.0902
[redacted]	SAMPLE VOLUME in mL	(SS)	1.000	DELTA TIME (HOURS)	(DT)	14.62
@SR90-01	DILUTION FACTOR	DF	10201	[redacted]		
[redacted]	DIGEST DILUTION FACTOR	(DDF)	1	[redacted]		
LIQUID	SAMPLE COUNT RATE	(Rs)	7325.90	SR-90 EFFICIENCY FACTOR	(C1)	0.4180
[redacted]	CRITICAL LEVEL	(Lc)	0.99	Y-90 EFFICIENCY FACTOR	(C2)	0.4660
96010293	TIME OF SEPARATION	(ST)	12:40	Rmax		N/A
[redacted]	DATE OF SEPARATION	(SD)	10/21/96	DETECTION LIMIT	(Ld)	2.07
0	TIME OF COUNT	(TOC)	03:17	Sr-89/90 CONC in µCi/L		7.6786E+04
[redacted]	DATE OF COUNT	(DOC)	10/22/96			
N/A						
[redacted]						
S96B000453						

[redacted]	Sample Count Rate (Rs) = (Total Counts (TC) / Count Time (CT)) - Background in cpm (BKG)
AB00	Sr-89/90 CONC in µCi/L Replace RS with RMAX if RS<=Lc and RS>=0 or Replace RS with Lc if RS<0
[redacted]	RS*DF*DDF/((C1+C2*(1-e to the power of ((-natural log 2)/64.2*DT)))*SS*REC*2220000)
RCJ	NOTE: 64.2 = Half Life for Y-90 and Rec. = Fractional Carrier Recovery ((W2-W1) / (CVA * 0.1000))
[redacted]	Relative Counting Error = (The Square Root of (TC + BKG * CT) / (TC - BKG * CT))*1.96
SLF	Percent Carrier Recovery = (Net Weight / Expected weight) * 100
[redacted]	NOTE: Expected weight = CVA * 0.1
KNT	Detection Levels and Less Than Values are determined from Procedure LA-508-002.
[redacted]	Delta Time (hours) = ((DOC - SD) * 24) + (TOC - ST) / 100
10/22/96	

				DETECTION LEVEL
[redacted]				
10/21/96	Sr-89/90 CONCENTRATION	7.68E+01	µCi/mL	
[redacted]				
12:40 PM	RELATIVE COUNTING ERROR	0.7%		2.17E-02 µCi/mL
[redacted]				
TK24-1.21-1	PERCENT CARRIER RECOVERY	90.2%		

Analyst:	KNT	Date:	22-Oct-96
Signature of Chemist:	SLF	Date:	OCT 23 1996

SAMPLE.WB1 REV 2.0 22010NML

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WORKBOOK PAGE: DUP5
Sr-89/90 : LA-220-101 (D-1), 102 (E-3), 104 (D-1)

						DUP
[redacted]	DETECTOR NUMBER		12	CARRIER ADDED in mL	(CVA)	1.000
DUP	TOTAL COUNTS	(TC)	71806	GROSS WEIGHT	(W2)	7.9499
[redacted]	COUNT TIME in MINUTES	(CT)	10	TARE WEIGHT	(W1)	7.8575
13772	BACKGROUND in cpm	(BKG)	2.7	NET WEIGHT	(W3)	0.0924
[redacted]	SAMPLE VOLUME in mL	(SS)	1.000	DELTA TIME (HOURS)	(DT)	14.83
@SR90-01	DILUTION FACTOR	DF	10201	[redacted]		
[redacted]	DIGEST DILUTION FACTOR	(DDF)	1	[redacted]		
LIQUID	SAMPLE COUNT RATE	(Rs)	7177.90	SR-90 EFFICIENCY FACTOR	(C1)	0.4180
[redacted]	CRITICAL LEVEL	(Lc)	0.99	Y-90 EFFICIENCY FACTOR	(C2)	0.4660
96010293	TIME OF SEPARATION	(ST)	12:40	Rmax		N/A
[redacted]	DATE OF SEPARATION	(SD)	10/21/96	DETECTION LIMIT	(Ld)	2.07
0	TIME OF COUNT	(TOC)	03:30	Sr-89/90 CONC in µCi/L		7.3303E+04
[redacted]	DATE OF COUNT	(DOC)	10/22/96			
N/A						
[redacted]						
S96B000453						

[redacted]
AB00

[redacted]
RCJ

[redacted]
SLF

[redacted]
KNT

[redacted]
10/22/96

[redacted]
10/21/96

[redacted]
12:40 PM

[redacted]
TK24-1,21-1

Sample Count Rate (Rs) = (Total Counts (TC) / Count Time (CT)) - Background in cpm (BKG)
Sr-89/90 CONC in µCi/L Replace RS with RMAX if RS<=Lc and RS>=0 or Replace RS with Lc if RS<0
RS*DF*DDF/((C1+C2*(1-e to the power of ((-natural log 2)/64.2*DT)))*SS*REC*2220000)
NOTE: 64.2 = Half Life for Y-90 and Rec. = Fractional Carrier Recovery ((W2-W1) / (CVA * 0.1000))
Relative Counting Error = (The Square Root of (TC + BKG * CT) / (TC - BKG * CT))*1.96
Percent Carrier Recovery = (Net Weight / Expected weight) * 100
NOTE: Expected weight = CVA * 0.1
Detection Levels and Less Than Values are determined from Procedure LA-508-002.
Delta Time (hours) = ((DOC - SD) * 24) + (TOC - ST) / 100

			DETECTION LEVEL
Sr-89/90 CONCENTRATION	7.33E+01	µCi/mL	
RELATIVE COUNTING ERROR	0.7%		2.11E-02 µCi/mL
PERCENT CARRIER RECOVERY	92.4%		

Analyst:	KNT	Date:	22-Oct-96
Signature of Chemist:	SLF	Date:	OCT 23 1996

SAMPLE.WB1 REV 2.0 22010NML

RELEASE
HNF-3208, REV. 0, ATT A, Pg. 229
APR 27 1998
VALIDATION DOCUMENTATION
SDLA

Date: 27 April 1998
To: Waste Management Hanford
From: TechLaw, Inc.
Project: Tank 21-1 (B-Plant)
Subject: General Chemistry - Data Package No. 98000140 (SDG No. 98000140)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. 98000140 (SDG No. 98000140) which was prepared by 222-S Analytical Services. A list of the samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analysis
S988000059	02/18/98	Water	C	See Note 1

1 - IC anions (nitrate, nitrite, fluoride, sulfate, phosphate and chloride) by LA-553-105 Rev C-2, TIC by LA-342-100 Rev F-1, TOC by LA-344-105 Rev E-0, ammonia by LA-631-001 Rev C-0, pH by LA-212-106 Rev C-0.

Data validation was conducted in accordance with the validation statement of work and validation procedures (WHC 1992a). Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- Holding Times

  Analytical holding times are assessed to ascertain whether the holding time requirements have been met by the laboratory. The holding time requirements are as follows: 28 days for fluoride, sulfate, chloride, total organic carbon, total inorganic carbon, and ammonia; two days for phosphate, nitrate and nitrite; and immediate for pH.

If holding times are exceeded, but not by greater than two times the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than two times the limit, all associated detectable sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

Due to the holding time being exceeded by greater than two times, all pH results were qualified as estimates and flagged "J".

Due to the holding time being exceeded by greater than twice the limit, all nitrite were rejected and flagged "UR".

Due to the holding time being exceeded by greater than twice the limit, all nitrate and phosphate results were qualified as estimates and flagged "J".

Holding times were met for all other parameters and samples.

- Instrument Calibration

Instrument calibration is performed to establish that the instrument is capable of producing acceptable and reliable analytical data over a range of concentrations. The initial and continuing calibrations are performed according to the EPA method requirements and all results must meet validation requirements set by Westinghouse-Hanford (WHC 1992a). At least one blank and three standards are used to establish the instrument calibrations and correlation of greater than or equal to 0.995 prior to sample analysis. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible on a day-to-day basis.

Instrument calibration results are not reviewed under level C validation.

- Blanks

Method blank analyses are performed to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples. No contaminants should be present in the method blank. All blank results must fall below the CRQL to be acceptable.

All method blank results were acceptable.

- Accuracy

  Matrix Spike

  Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within the range of 75% to 125%. Samples with a spike recovery of less than 30% and a sample value below the IDL are rejected and flagged "UR". Samples with a spike recovery of 30% to 74% and a sample result less than the IDL are qualified "UJ". Samples with a spike recovery of greater than 125% or less than 75% and a sample result greater than the IDL are qualified "J". Finally, for samples with a spike recovery greater than 125% and a sample result less than the IDL, no qualification is required.

  All matrix spike results were acceptable.

  Laboratory Control Sample

  The LCS monitors the overall performance of the analysis, including the sample preparation. An LCS should be prepared (e.g., digested or distilled) and analyzed with every group of samples which have been prepared together.

  The performance criteria for aqueous LCS samples are percent recoveries between 80% and 120%. Samples with associated LCS recoveries of less that 50% are rejected and flagged "UR/R". Samples with associated LCS recoveries between 50% and 79% and a sample value below the IDL are qualified as estimates and flagged "UJ". If the LCS recovery is greater than 120% or between 50% and 79% and the sample value is above the IDL, the result is qualified as an estimate and flagged "J". For associated LCS recoveries greater than 120% and a sample value below IDL, no qualification is necessary.

  All LCS results were acceptable.

- Precision

  Laboratory Duplicate Samples

  Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Results must be within RPD limits of plus or minus 35% for solid samples. If RPD values are out of specification and the sample concentration is greater than five times the CRQL, all associated sample results are qualified as estimated and flagged "J". If RPD values are plus or minus two times the CRQL and the sample concentration is less than five times the CRQL,

all associated sample results are qualified as estimated and flagged "J/UJ". The performance criteria for aqueous laboratory duplicates are an RPD less than 20% for positive sample results greater than five times the CRQL or plus or minus the CRQL for positive sample results less than five times the CRQL. Sample results outside the criteria are qualified as estimates and flagged "J/UJ".

All precision results were acceptable.

- Analytical Detection Levels

  The laboratory reported detection limit for nitrite and fluoride were above the CRQL. Under WHC guidelines, no qualification is required.

- Completeness

  Data Package No. 98000140-QES (SDG No. 98000140) was submitted for validation and verified for completeness. The completion rate was 90%.

MAJOR DEFICIENCIES

Due to the holding time being exceeded by greater than twice the limit, all nitrite results were rejected and flagged "UR". Rejected data is unusable and should not be reported.

MINOR DEFICIENCIES

Due to the holding time being exceeded by greater than twice the limit, the the pH results for all samples were qualified as estimates and flagged "J". Due to the holding time being exceeded by greater than twice the limit, all nitrate and phosphate results were qualified as estimates and flagged "J". Data flagged "J" indicates that the associated concentration is an estimate, but under WHC guidelines, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

REFERENCES

EPA, 1987, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Third Edition, Environmental Protection Agency, Washington, D.C.

EPA, 1988a, *EPA Contract Laboratory Program Statement of Work for Organics Analyses, Multi-Media, Multi-Concentration*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1988b, *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1988c, *EPA Contract Laboratory Program Statement of Work for Inorganics Analyses, Multi-Media, Multi-Concentration*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1988d, *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1990, *EPA Contract Laboratory Program Statement of Work for Inorganic Analyses, Multi-media, Multi-Concentration*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1991, *EPA Contract Laboratory Program Statement of Work for Organics Analyses, Multi-Media, Multi-Concentration*, Environmental Protection Agency, Washington, D.C.

WHC, 1992a, *Data Validation Procedures for Chemical Analyses*, WHC-SD-EN-SPP-002, Rev. 2, Westinghouse Hanford Company, October 1993.

WHC, 1992b, *Data Validation Procedure for Radiological Analyses*, WHC-SD-EN-SPP-001, Rev. 2, Westinghouse Hanford Company, 1993.

EPA, 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, U.S. Environmental Protection Agency, Washington,

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with WHC procedures are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are usable for decision-making purposes.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: 98000140	REVIEWER: RBC	DATE: 04/27/98	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
pH	J	All	Exceeded holding time
Nitrate, phosphate	J	All	Exceeded holding time
Nitrite	UR	All	Exceeded holding time

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

GENERAL CHEMISTRY ANALYSIS, WATER MATRIX

Project: Tank 21-1 (B-Plant)																	
Laboratory: 222-S Analytical Services																	
Case	SDG: 98000140																
Sample Number		S98B000059															
Remarks																	
Sample Date		02/18/98															
General Chemistry	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
pH (s.u.)	N/A	0.71	J														
TOC	1	1310															
TIC	1	7.3															
Fluoride	0.1	<13 3	U														
Chloride	0.1	36 65															
Nitrite	0.1	<120	UR														
Nitrate	0.1	18100	J														
Phosphate	0.1	222	J														
Sulfate	0.1	361															
Ammonia	0.1	249															

UNITS ARE UG/ML

Table 1. Data Summary Report
TK-21-1 (1)

ORE NUMBER: n/a
EGMENT #: n/a

EGMENT PORTION: n/a

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S98B000059			Volume % Settled Solids	%	n/a	n/a	<1.00e-01	n/a	n/a	n/a	n/a	1.00e-01	n/a
S98B000061			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	0.00e+00	0.00e+00	0.00e+00	0.00	n/a	n/a	n/a
S98B000061			DSC Exotherm on Perkin Elmer	Joules/g	98.00	n/a	0.00e+00	0.00e+00	0.00e+00	0.00	n/a	n/a	n/a
S98B000061			OH- by Pot. Titration	ug/mL	n/a	n/a	ph=1.3	ph=1.3	n/a	n/a	n/a	125.0	n/a
S98B000061			pH Direct	pH	99.25	n/a	7.10e-01	7.10e-01	7.10e-01	0.00	n/a	1.00e-02	n/a
S98B000061			Specific Gravity	Sp.G.	97.61	n/a	1.010	1.009	1.010	0.10	n/a	1.00e-02	n/a
S98B000061			% Water by TGA on Perkin Elmer	%	100.1	n/a	99.26	98.72	98.99	0.55	n/a	n/a	n/a
S98B000061			Tot. Organic Carbon by Coul.	ug/mL	95.67	1.000	1.31e+03	1.30e+03	1.30e+03	0.77	91.70	5.500	n/a
S98B000061			TIC by Acid/Coulometry	ug/mL	100.3	4.800	7.300	8.500	7.900	15.2	98.90	5.000	n/a
S98B000061			Fluoride-IC-Dionex 4000/4500	ug/mL	101.2	<1.20e-02	< 13.33	<1.33e1	n/a	n/a	104.7	13.33	n/a
S98B000061			Chloride-IC-Dionex 4000/4500	ug/mL	101.9	<1.70e-02	36.65	41.20	38.92	11.8	97.25	18.89	n/a
S98B000061			Nitrite-IC - Dionex 4000/4500	ug/mL	97.79	<1.08e-01	<1.20e+02	<1.20e2	n/a	n/a	98.71	120.0	n/a
S98B000061			Nitrate by IC-Dionex 4000/4500	ug/mL	97.47	<1.39e-01	1.81e+04	1.78e+04	1.80e+04	1.67	95.62	154.4	n/a
S98B000061			Phosphate-IC-Dionex 4000/4500	ug/mL	96.33	<1.20e-01	2.22e+02	210.0	216.2	5.56	97.25	133.3	n/a
S98B000061			Sulfate by IC-Dionex 4000/4500	ug/mL	100.9	1.64e-01	3.61e+02	340.0	350.7	5.99	100.0	153.3	n/a
S98B000062			Hydrogen Ion Analysis	moles/Liter	95.56	95.56	2.72e-01	2.66e-01	2.69e-01	2.23	n/a	2.50e-01	n/a
S98B000062			Ammonia by ISE-Std Additions	ug/mL	96.57	<2.00e-01	2.49e+02	209.0	229.0	17.5	116.0	5.000	n/a
S98B000062			Uranium by Phosphorescence	ug/mL	91.85	5.00e-03	4.87e-02	4.49e-02	4.68e-02	8.12	96.75	4.00e-03	1.26E+00
S98B000062			Strontium-89/90 High Level	uCi/mL	107.2	2.00e-02	4.570	4.600	4.585	0.65	n/a	2.40e-02	3.03E+00
S98B000062			Pu-239/240 by TRU-SPEC Resin	uCi/mL	89.63	<2.75e-05	4.01e-04	4.22e-04	4.11e-04	5.10	n/a	4.62e-05	2.48E+00
S98B000062		D	Aluminium-ICP-Acid Dil.	ug/mL	99.60	<5.00e-02	4.770	4.700	4.735	1.48	n/a	2.50e-01	n/a
S98B000062		D	Barium-ICP-Acid Dil.	ug/mL	97.40	<5.00e-02	1.980	1.960	1.970	1.02	n/a	2.50e-01	n/a
S98B000062		D	Chromium-ICP-Acid Dil.	ug/mL	96.60	<1.00e-02	9.10e-01	9.09e-01	9.09e-01	0.11	n/a	5.00e-02	n/a
S98B000062		D	Iron-ICP-Acid Dil.	ug/mL	100.6	<5.00e-02	18.20	18.20	18.20	0.00	n/a	2.50e-01	n/a
S98B000062		D	Manganese-ICP-Acid Dil.	ug/mL	98.40	<1.00e-02	4.27e-01	4.26e-01	4.26e-01	0.23	n/a	5.00e-02	n/a
S98B000062		D	Sodium-ICP-Acid Dil.	ug/mL	102.0	<1.00e-01	1.03e+03	1.02e+03	1.02e+03	0.98	n/a	5.00e-01	n/a
S98B000062		D	Nickel-ICP-Acid Dil.	ug/mL	98.20	<2.00e-02	7.87e-01	7.87e-01	7.87e-01	0.00	n/a	1.00e-01	n/a
S98B000062		D	Lead-ICP-Acid Dil.	ug/mL	98.00	<1.00e-01	5.56e-01	5.60e-01	5.58e-01	0.72	n/a	5.00e-01	n/a
S98B000062		D	Zirconium-ICP-Acid Dil.	ug/mL	99.60	<1.00e-02	1.080	1.060	1.070	1.87	n/a	5.00e-02	n/a
S98B000062			Cesium-137 by GEA	uCi/mL	101.7	<1.65e-03	1.71e+02	168.0	169.5	1.77	n/a	n/a	0.130
S98B000062			Am-241 by Extraction	uCi/mL	109.7	<6.94e-05	3.68e-04	3.73e-04	3.71e-04	1.35	n/a	8.90e-05	2.71E+00
S98B000085		G	Selenium by GFAA	ug/L	120.0	<1.000	<1	<1	n/a	n/a	110.0	1.000	n/a
S98B000086		B	Aluminium -ICP-Acid Digest-Liq	ug/mL	98.40	8.10e-02	10.10	7.300	8.700	32.2	90.60	1.250	n/a
S98B000086		B	Barium -ICP-Acid Digest-Liquid	ug/mL	99.20	<5.00e-02	2.200	2.140	2.170	2.76	94.40	1.250	n/a
S98B000086		B	Chromium -ICP-Acid Digest-Liq	ug/mL	97.60	<1.00e-02	1.040	1.020	1.030	1.94	91.40	2.50e-01	n/a
S98B000086		B	Iron -ICP-Acid Digest-Liquid	ug/mL	98.00	1.60e-01	19.80	27.20	23.50	31.5	91.20	1.250	n/a
S98B000086		B	Manganese -ICP-Acid Digest-Liq	ug/mL	97.80	<1.00e-02	5.41e-01	5.62e-01	5.52e-01	3.81	91.60	2.50e-01	n/a
S98B000086		B	Sodium -ICP-Acid Digest-Liquid	ug/mL	115.2	3.71e-01	1.15e+03	1.10e+03	1.12e+03	4.44	58.00	2.500	n/a
S98B000086		B	Nickel -ICP-Acid Digest-Liquid	ug/mL	101.0	<2.00e-02	9.70e-01	8.68e-01	9.19e-01	11.1	94.40	5.00e-01	n/a
S98B000086		B	Lead -ICP-Acid Digest-Liquid	ug/mL	96.00	<1.00e-01	< 2.500	<2.50e0	n/a	n/a	90.40	2.500	n/a
S98B000086		B	Zirconium -ICP-Acid Digest-Liq	ug/mL	100.8	<1.00e-02	1.130	1.040	1.085	8.29	101.6	2.50e-01	n/a

04/13/98 10:53 ☎509 373 0545 LAB DATA MGMT
HNF-SD-WM-DP-801 REV.0
HNF-3208, REV. 0, ATT A, Pg. 239

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

HNF-SD-WM-DP-301, REV.0

222-S ANALYTICAL SERVICES

B PLANT CANYON SAMPLE, TK-21-1 ANALYTICAL RESULTS FOR THE FINAL REPORT

This document is the analytical laboratory report for the TK-21-1 sample collected from the B Plant Canyon on February 18, 1998. The sample was analyzed in accordance with the *Sampling and Analysis Plan for B Plant Solutions* (SAP) (Simmons, 1997) in support of the B Plant decommissioning project. Samples were analyzed to provide data both to describe the material which would remain in the tanks after the B Plant transition is complete and to determine Tank Farm compatibility. The analytical results are included in the data summary table (Table 1).

Appearance and Sample Handling

Attachment 1 is a cross reference to relate the tank farm identification numbers to the 222-S Laboratory LabCore/LIMS sample numbers. The subsamples generated in the laboratory for analyses are identified in these diagrams with their sources shown. Table 2 summarizes appearance information and over-the-top (OTR) dose readings performed on the sample.

Table 2. Appearance and OTR for B Plant Canyon Sample TK-21-1

Laboratory Id	Sample Amount	Color	Clarity	Organic Layer Extruded	Volume of Solids	OTR (mRad/hr)
S98B000059	125 mL	Colorless	Clear	None	None	5000

Analytical Results Summary

The data summary report (Table 1) compiles the analytical results and quality control (QC) data associated with the TK-21-1 sample.

Inorganic Analyses

Differential Scanning Calorimetry (DSC)

The DSC analyses were performed in duplicate on direct subsamples. The exothermic energy based on dry weight of subsample was calculated for all subsamples. The average of the TGA results for each subsample was used in the dry weight correction for that subsample. There were no exotherms observed during the analysis of the TK-21-1 sample. Therefore the results for the sample and duplicate were 0.0 J/g.

Since the sample results were zero, the calculation for the relative percent difference (RPD) is indeterminate because of the division by zero. However, due to the way the database performs calculations, zero divided by zero is reported as "0.0". The standard recovery for this analysis were within the required limits.

Thermogravimetric Analysis (TGA)

The TGA analyses were performed in duplicate on direct subsamples. The TGA result was determined by summing the weight loss steps which occurred below 250°C. The standard recovery and RPD for this analysis were within the required limits.

Specific Gravity (SpG)

The specific gravity analysis was performed in duplicate on direct subsamples. The results are provided in Table 1. The standard recovery and RPD for this analysis were within the required limits.

pH

The pH analysis was performed in duplicate on direct subsamples. The results are provided in Table 1. The standard recovery and RPD for this analysis were within the required limits.

Hydroxide (OH)

The TK-21-1 OH analysis was not performed. A value of pH = 1.3 (which represented the pH after the reagents were added) was entered to indicate the sample was too acidic (actual pH=0.7). A hydrogen ion (H+) determination was performed instead. The sample was analyzed in duplicate. The standard recovery was within the required limits.

Ion Chromatography (IC)

The IC analyses were performed in duplicate on direct subsamples. The required analytes were fluoride (F^-), chloride (Cl^-), nitrate (NO_3^-), nitrite (NO_2^-), phosphate (PO_4^{-3}) and sulfate (SO_4^{-2}). The standard recoveries, spike recoveries and RPDs for this analysis were within the required limits.

Inductively Coupled Plasma Spectrophotometry (ICP)

The liquid subsamples were prepared in duplicate by an acid adjustment of the direct subsample. This is indicated by a "D" in the A# column in Table 1.

The liquid subsamples were also prepared in duplicate by an acid digestion of the direct subsample. This is indicated by a "B" in the A# column in Table 1. A matrix spike analysis was performed on this sample in accordance with the SAP.

The required analytes for both analyses were aluminum (Al), barium (Ba), chromium (Cr), iron (Fe), lead (Pb), manganese (Mn), nickel (Ni), sodium (Na) and zirconium (Zr).

The standard recoveries and RPDs for these analyses were within the required limits.

Total Organic Carbon Persulfate (TOC)

Total organic carbon (TOC) analyses by furnace oxidation/coulometry were performed in duplicate on direct subsamples.

For all TOC analyses, an Analysis Report worksheet is included for each sample as raw data. Due to programming limitations with the instrument software, the sample size listed on the worksheet is incorrect. This value is not used in the final calculations and has no bearing on the results in Table 1. The blank is considered a reagent blank. The value was within the acceptance limits and all results were corrected for the concentration found in the blank.

The standard recovery and spike recovery for this analysis were within the required limits.

Total Inorganic/Organic Carbon (TIC)

Total inorganic carbon (TIC) analyses by persulfate oxidation/coulometry were performed in duplicate on direct subsamples.

For all TIC analyses, an Analysis Report worksheet is included for each sample as raw data. Due to programming limitations with the instrument software, the sample size listed on the worksheet is incorrect. This value is not used in the final calculations and has no bearing on the results in Table 1. The blank is considered a reagent blank. The value was within the acceptance limits and all results were corrected for the concentration found in the blank.

The standard recovery, spike recovery and RPD for this analysis were within the required limits.

Uranium (U)

Uranium was performed in duplicate on direct subsamples. The result listed as Count Err% in Table 1 is actually the percent instrument uncertainty. The standard recovery, spike recovery and RPD for this analysis were within the required limits

Selenium (Se)

Samples were prepared in for analysis by performing an acid digest as indicated by an "G" in the A# column in table 1. The standard recovery, spike recovery and RPD for this analysis were within the required limits.

Radionuclide Analyses

Gamma Energy Analysis (GEA)

The gamma energy analysis was performed in duplicate on direct subsamples. The standard recovery and RPD for this analysis were within the required limits.

Strontium 90 (Sr-90)

The strontium analysis was performed in duplicate on direct subsamples. The standard recovery and RPD for this analysis were within the required limits.

Plutonium (Pu-239/240)

The plutonium analysis was performed in duplicate on direct subsamples. The standard recovery and RPD for this analysis were within the required limits.

Americium (Am-241)

The americium analysis was performed in duplicate on direct subsamples. The standard recovery and RPD for this analysis were within the required limits.

Appendix 5

Data Validation Supporting Documentation

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: BPlant			DATA PACKAGE: 98000140		
VALIDATOR: Techlaw		LAB: 2225		DATE: 17 April 98	
CASE:			SDG: 98000140		

ANALYSES PERFORMED

☒ Anions/IC	☒ TOC	☐ TOX	☐ TPH-418.1	Oil and Grease	Alkalinity
☒ Ammonia	☐ BOD/COD	☐ Chloride	☐ Chromium-VI	☒ pH	☐ NO_3/NO_2
☐ Sulfate	☐ TDS	☐ TKN	☐ Phosphate	☐	☐
☐	☒ tic	☐	☐	☐	☐

SAMPLES/MATRIX S98B000059 Water

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . (Yes) No N/A

Is a case narrative present? . . . . . (Yes) No N/A

Comments:

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . Yes No N/A

Comments:

tic - 28 (reject nitrite

2/18/98 toc - 28 $NO_2 + NO_3$ - 2 - over 2x limit) 3/3

FL - 28 Phosphate - 2 over 2x limit

3/3 Sulfat - 28

Cl - 28 ph immed — J over

3/3 — Amm - 28 ok

PS 66

A-23

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

3. INSTRUMENT CALIBRATION

Was initial calibration performed for all applicable analyses?	Yes	No	N/A
Are initial calibration results acceptable?	Yes	No	N/A
Was a calibration check performed for all applicable analyses?	Yes	No	N/A
Are calibration check results acceptable?	Yes	No	N/A

Comments:_____

4. BLANKS

Were laboratory blanks analyzed?	Yes	No	N/A
Are laboratory blank results acceptable?	Yes	No	N/A
Were field/trip blanks analyzed?	Yes	No	N/A
Are field/trip blank results acceptable?	Yes	No	N/A

Comments:_____

5. ACCURACY

Were spike samples analyzed at the required frequency? . . .	Yes	No	N/A
Are spike recoveries acceptable?	Yes	No	N/A
Were LCS analyses performed at the required frequency?	Yes	No	N/A
Are LCS recoveries acceptable?	Yes	No	N/A

Comments:_____

LCS Amm ✓

6. PRECISION

Were laboratory duplicate samples analyzed at the required frequency?	Yes	No	N/A
Are laboratory duplicate sample RPD values acceptable? . . .	Yes	No	N/A
Are field duplicate RPD values acceptable?	Yes	No	N/A
Are field split RPD values acceptable?	Yes	No	N/A

A-24

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

Comments:

7. ANALYTE QUANTITATION

Was analyte quantitation performed properly? . . . . . Yes No (N/A)

Comments:

8. REPORTED RESULTS AND DETECTION LIMITS

Are results reported for all requested analyses? . . . . . (Yes) No N/A

Are results supported in the raw data? . . . . . (Yes) No N/A

Are results calculated properly? . . . . . Yes No (N/A)

Do results meet the CRDLs? . . . . . Yes No N/A

Comments:

Nitrite over & undetected

A-28

HOLDING TIME SUMMARY

SDG: 98000140	VALIDATOR: TechLaw	DATE: 4/23/98	PAGE 1 OF 1

COMMENTS:

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
S98B000059	Nitrate	2/18/98		3/3/98		13	J/UR
↓	nitrite	↓	↓	↓	↓	↓	J/UR
	chloride						None
	Sulfate						None
	phosphate						J/UR
	Fluoride			↓		↓	None
	TIC			3/3/98		13	None
	TOC			3/4/98		14	None
	Ammonia			3/5/98		15	None
↓	pH	↓	↓	3/2/98	↓	12	J/UR

B-1/2

0000023

WHC-SD-EN-SPP-002, Rev. 2

HNF-3208, Rev. 0
AH. A, Pg. 24

APR 27 1998
VALIDATION DOCUMENTATION
SDLA

Date: 27 April 1998
To: Waste Management Hanford
From: TechLaw, Inc.
Project: Tank 21-1 (B-Plant)
Subject: Inorganics - Data Package No. 98000140 (SDG No. 98000140)

INTRODUCTION

This memo presents the results of data validation on Data Package No. 98000140 (SDG No. 98000140) which was prepared by 222-S Analytical Services. A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analysis
S98B000059	02/18/98	Water	C	ICP metals and selenium by GFAA

Data validation was conducted in accordance with the validation statement of work and validation procedures (WHC 1992a). Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

  Analytical holding times for ICP metals and selenium were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Samples must be analyzed within six months.

  All holding times were acceptable.

- **Blanks**

Calibration Blanks

A calibration blank must be analyzed immediately after each initial and continuing calibration verification. The blank must be analyzed at the beginning of the run and after the last analytical sample. In the case of positive blank results, samples with digestate concentrations (in ug/L) of less than five times the highest amount found in any of the associated blanks have had their associated values qualified as non-detected and flagged "U". Samples with concentrations of greater than five times the highest blank value do not require qualification.

In the case of negative calibration blank results, if the absolute value of any calibration blank exceeds the Instrument Detection Limit (IDL), all nondetects are qualified as estimates and flagged "UJ", and all positive results within two times the absolute value of the blank result are qualified as estimates and flagged "J". The qualification is applied only to results generated between the associated unacceptable calibration blank and the nearest acceptable blank.

Level C validation does not include the review of data based on calibration blank results.

Preparation Blanks

At least one preparation blank, consisting of deionized distilled water processed through each sample preparation and analysis procedure, must be prepared and analyzed with every sample delivery group. In the case of positive blank results, samples with digestate concentrations (in ug/L) less than five times the preparation blank value have had their associated values qualified as non-detected and flagged "U". Samples with concentrations of greater than five times the highest blank concentration do not require qualification.

In the case of negative blank results, if the absolute value exceeds the Contract Required Detection Limit (CRDL), all nondetects are rejected and flagged "UR" and all detects that are less than ten times the absolute value of the associated preparation blank result are qualified as estimates and flagged "J". If the absolute value of the negative preparation blank is greater than the IDL and less than or equal to the CRDL, all nondetects are qualified as estimates and flagged "UJ" and all detects less than ten times the absolute value of the blank are qualified as estimates and flagged "J". If the sample results are greater than ten times the absolute value of the preparation blank, no qualification is necessary.

All preparation blank results were acceptable.

- **Accuracy**

Matrix Spike

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within the range of 75% to 125%. Samples with a spike recovery of less than 30% and a sample result below the IDL are rejected and flagged "UR". Samples with a spike recovery of 30% to 74% and a sample result less than the IDL are qualified "UJ". Samples with a spike recovery of greater than 125% or less than 75% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a spike recovery greater than 125% and a sample result less than the IDL, no qualification is required.

All matrix spike results were acceptable.

Laboratory Control Sample Recovery

The LCS monitors the overall performance of the analysis, including the sample preparation. An LCS should be digested or distilled and analyzed with every group of samples which have been prepared together. The performance criteria for solid LCS samples are established through interlaboratory studies coordinated by a certifying agency (e.g., EPA or an independent commercial supplier). One liquid LCS is digested and analyzed for each sample batch that contains water samples. The results are compared against the control limit of 80-120% as required by the WHC data validation guidelines (WHC 1992a).

Due to an LCS recovery of 58%, all sodium results were qualified as estimated and flagged "J".

All other LCS results were acceptable.

- **Precision**

Laboratory Duplicate Samples

Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Results must be within RPD limits of plus or minus 35% for solid samples. If RPD values are out of specification and the sample concentration is greater than five times the CRDL, all associated sample results are qualified as estimated and flagged "J". If RPD values are plus or minus two times the CRDL and the sample concentration is less than five times the CRDL, all associated sample results are qualified as estimated and flagged "J/UJ". The

performance criteria for aqueous laboratory duplicates are an RPD less than 20% for positive sample results greater than five times the CRDL or plus or minus the CRDL for positive sample results less than five times the CRDL. Sample results outside the criteria are qualified as estimates and flagged "J/UJ".

All laboratory duplicate results were acceptable.

ICP Serial Dilution

The ICP serial dilution is used to determine whether significant physical or chemical interferences exist due to the sample matrix. If the sample concentration is greater than or equal to 50 times the IDL for an analyte and the %D is greater than 10%, the associated data is qualified as an estimate and flagged "J".

Level C validation does not include the review of data based on ICP serial dilution results.

- **Furnace AA Quality Control**

The post-digestion analytical spike is analyzed to determine the extent of interference in the digestate matrix. When the result of the analytical spike analyses exceeds the control window of 85 to 115 percent recovery and the absorbance of the sample is greater than fifty percent of the analytical spike absorbance, then the sample must be reanalyzed using the MSA. The duplicate injections and the analytical spike recoveries establish the precision and accuracy of the individual GFAA determinations.

Duplicate Injections

Each furnace analysis requires a minimum of two injections (burns), except for full MSA. For concentrations greater than the CRDL, the duplicate injection readings must agree within 20% RSD or CV. If these requirements are not met, the analytical sample must be rerun once (i.e., two additional burns). If the readings are then still outside the QC limits, the result is qualified as an estimate and flagged "J".

Level C validation does not include the review of data based on duplicate injection results.

Analytical Spike Recoveries

For all samples whose analytical spike results are outside the 85 to 115 percent

control limit, but whose absorbances are <50 percent of the analytical spike absorbance, the samples were qualified as estimates and flagged "J". In cases where the analytical spike recovery was <10 percent, non-detect results were rejected and flagged "UR".

Level C validation does not include the review of data based on analytical spike recovery results

- **Detection Levels**

  All laboratory reported detection limits were at or above CRQLs.

- **Completeness**

  Data Package No. 98000140 (SDG No. 98000140) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to a laboratory duplicate RPD outside QC limits, all aluminum by acid digestion results were qualified as estimates and flagged "J". Due to an LCS recovery of 58%, all sodium results were qualified as estimated and flagged "J". Data flagged "J" indicates that the associated concentration is an estimate, but under WHC guidelines, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

REFERENCES

EPA, 1987, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Third Edition, Environmental Protection Agency, Washington, D.C.

EPA, 1988a, *EPA Contract Laboratory Program Statement of Work for Organics Analyses, Multi-Media, Multi-Concentration*, U.S. Environmental Protection Agency, Washington, D.C.

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WHC, 1992b, *Data Validation Procedure for Radiological Analyses*, WHC-SD-EN-SPP-001, Rev. 2, Westinghouse Hanford Company, 1993.

EPA, 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, U.S. Environmental Protection Agency, Washington, D.C.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with WHC guidelines are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

BJ - Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: 98000140	REVIEWER: RBC	DATE: 04/27/98	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Sodium	J	All	Matrix spike recovery outside QC limits

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

Project: Tank 21-1 (B-Plant)																			
Laboratory: 222-S Analytical Services																			
Case	SDG: 98000140																		
Sample Number		S98B000059																	
Remarks																			
Sample Date		02/18/98																	
Inorganic Chemistry	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum - D	20000	4.77																	
Barium -D	20000	1.98																	
Chromium -D	1000	0.91																	
Iron - D	10000	18.2																	
Manganese -D	1500	0.427																	
Sodium - D	500000	1030	J																
Nickel - D	4000	0.787																	
Lead - D	300	0.556																	
Zirconium - D		1.08																	
Selenium*	5000	<1	U																
Aluminum - B	20000	10.1																	
Barium - B	20000	2.2																	
Chromium - B	1000	1.04																	
Iron - B	10000	19.8																	
Manganese - B	1500	0.541																	
Sodium - B	500000	1150	J																
Nickel - B	4000	0.97																	
Lead - B	300	<2.5	U																
Zirconium - B		1.13																	

D = acid adjustment
B = acid digestion
UNITS ARE UG/ML
* = UNITS ARE IN UG/L

Table 1. Data Summary Report
TK-21-1 (1)

RE NUMBER: n/a
GMENT #: n/a

GMENT PORTION: n/a

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Ouplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S98B000059			Volume % Settled Solids	%	n/a	n/a	<1.00e-01	n/a	n/a	n/a	n/a	1.00e-01	n/a
S98B000061			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	0.00e+00	0.00e+00	0.00e+00	0.00	n/a	n/a	n/a
S98B000061			DSC Exotherm on Perkin Elmer	Joules/g	98.00	n/a	0.00e+00	0.00e+00	0.00e+00	0.00	n/a	n/a	n/a
S98B000061			OH- by Pot. Titration	ug/mL	n/a	n/a	ph=1.3	ph=1.3	n/a	n/a	n/a	125.0	n/a
S98B000061			pH Direct	pH	99.25	n/a	7.10e-01	7.10e-01	7.10e-01	0.00	n/a	1.00e-02	n/a
S98B000061			Specific Gravity	Sp.G.	97.61	n/a	1.010	1.009	1.010	0.10	n/a	1.00e-02	n/a
S98B000061			% Water by TGA on Perkin Elmer	%	100.1	n/a	99.26	98.72	98.99	0.55	n/a	n/a	n/a
S98B000061			Tot. Organic Carbon by Coul.	ug/mL	95.67	1.000	1.31e+03	1.30e+03	1.30e+03	0.77	91.70	5.500	n/a
S98B000061			TIC by Acid/Coulometry	ug/mL	100.3	4.800	7.300	8.500	7.900	15.2	98.90	5.000	n/a
S98B000061			Fluoride-IC-Dionex 4000/4500	ug/mL	101.2	<1.20e-02	< 13.33	<1.33e1	n/a	n/a	104.7	13.33	n/a
S98B000061			Chloride-IC-Dionex 4000/4500	ug/mL	101.9	<1.70e-02	36.65	41.20	38.92	11.8	97.25	18.89	n/a
S98B000061			Nitrite-IC - Dionex 4000/4500	ug/mL	97.79	<1.08e-01	<1.20e+02	<1.20e2	n/a	n/a	98.71	120.0	n/a
S98B000061			Nitrate by IC-Dionex 4000/4500	ug/mL	97.47	<1.39e-01	1.81e+04	1.78e+04	1.80e+04	1.67	95.62	154.4	n/a
S98B000061			Phosphate-IC-Dionex 4000/4500	ug/mL	96.33	<1.20e-01	2.22e+02	210.0	216.2	5.56	97.25	133.3	n/a
S98B000061			Sulfate by IC-Dionex 4000/4500	ug/mL	100.9	1.64e-01	3.61e+02	340.0	350.7	5.99	100.0	153.3	n/a
S98B000062			Hydrogen Ion Analysis	moles/Liter	95.56	95.56	2.72e-01	2.66e-01	2.69e-01	2.23	n/a	2.50e-01	n/a
S98B000062			Ammonia by ISE-Std Additions	ug/mL	96.57	<2.00e-01	2.49e+02	209.0	229.0	17.5	116.0	5.000	n/a
S98B000062			Uranium by Phosphorescence	ug/mL	91.85	5.00e-03	4.87e-02	4.49e-02	4.68e-02	8.12	96.75	4.00e-03	1.26E+00
S98B000062			Strontium-89/90 High Level	uCi/mL	107.2	2.00e-02	4.570	4.600	4.585	0.65	n/a	2.40e-02	3.03E+00
S98B000062			Pu-239/240 by TRU-SPEC Resin	uCi/mL	89.63	<2.75e-05	4.01e-04	4.22e-04	4.11e-04	5.10	n/a	4.62e-05	2.48E+00
S98B000062		D	Aluminium-ICP-Acid Dil.	ug/mL	99.60	<5.00e-02	4.770	4.700	4.735	1.48	n/a	2.50e-01	n/a
S98B000062		D	Barium-ICP-Acid Dil.	ug/mL	97.40	<5.00e-02	1.980	1.960	1.970	1.02	n/a	2.50e-01	n/a
S98B000062		D	Chromium-ICP-Acid Dil.	ug/mL	96.60	<1.00e-02	9.10e-01	9.09e-01	9.09e-01	0.11	n/a	5.00e-02	n/a
S98B000062		D	Iron-ICP-Acid Dil.	ug/mL	100.6	<5.00e-02	18.20	18.20	18.20	0.00	n/a	2.50e-01	n/a
S98B000062		D	Manganese-ICP-Acid Dil.	ug/mL	98.40	<1.00e-02	4.27e-01	4.26e-01	4.26e-01	0.23	n/a	5.00e-02	n/a
S98B000062		D	Sodium-ICP-Acid Dil.	ug/mL	102.0	<1.00e-01	1.03e+03	1.02e+03	1.02e+03	0.98	n/a	5.00e-01	n/a
S98B000062		D	Nickel-ICP-Acid Dil.	ug/mL	98.20	<2.00e-02	7.87e-01	7.87e-01	7.87e-01	0.00	n/a	1.00e-01	n/a
S98B000062		D	Lead-ICP-Acid Dil.	ug/mL	98.00	<1.00e-01	5.56e-01	5.60e-01	5.58e-01	0.72	n/a	5.00e-01	n/a
S98B000062		D	Zirconium-ICP-Acid Dil.	ug/mL	99.60	<1.00e-02	1.080	1.060	1.070	1.87	n/a	5.00e-02	n/a
S98B000062			Cesium-137 by GEA	uCi/mL	101.7	<1.65e-03	1.71e+02	168.0	169.5	1.77	n/a	n/a	0.130
S98B000062			Am-241 by Extraction	uCi/mL	109.7	<6.94e-05	3.68e-04	3.73e-04	3.71e-04	1.35	n/a	8.90e-05	2.71E+00
S98B000085		G	Selenium by GFAA	ug/L	120.0	<1.000	<1	<1	n/a	n/a	110.0	1.000	n/a
S98B000086		B	Aluminium -ICP-Acid Digest-Liq	ug/mL	98.40	8.10e-02	10.10	7.300	8.700	32.2	90.60	1.250	n/a
S98B000086		B	Barium -ICP-Acid Digest-Liquid	ug/mL	99.20	<5.00e-02	2.200	2.140	2.170	2.76	94.40	1.250	n/a
S98B000086		B	Chromium -ICP-Acid Digest-Liq	ug/mL	97.60	<1.00e-02	1.040	1.020	1.030	1.94	91.40	2.50e-01	n/a
S98B000086		B	Iron -ICP-Acid Digest-Liquid	ug/mL	98.00	1.60e-01	19.80	27.20	23.50	31.5	91.20	1.250	n/a
S98B000086		B	Manganese -ICP-Acid Digest-Liq	ug/mL	97.80	<1.00e-02	5.41e-01	5.62e-01	5.52e-01	3.81	91.60	2.50e-01	n/a
S98B000086		B	Sodium -ICP-Acid Digest-Liquid	ug/mL	115.2	3.71e-01	1.15e+03	1.10e+03	1.12e+03	4.44	58.00	2.500	n/a
S98B000086		B	Nickel -ICP-Acid Digest-Liquid	ug/mL	101.0	<2.00e-02	9.70e-01	8.68e-01	9.19e-01	11.1	94.40	5.00e-01	n/a
S98B000086		B	Lead -ICP-Acid Digest-Liquid	ug/mL	96.00	<1.00e-01	< 2.500	<2.50e0	n/a	n/a	90.40	2.500	n/a
S98B000086		B	Zirconium -ICP-Acid Digest-Liq	ug/mL	100.8	<1.00e-02	1.130	1.040	1.085	8.29	101.6	2.50e-01	n/a

HNF-SD-WM-DP-801 REV. 0

LAB DATA MGMT

HNF-3208, REV. 0, A11 A, Pg. 26d

04/13/98 10:33 5093735343

4/27/98

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Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

HNF-SD-WM-DP-301, REV.0

222-S ANALYTICAL SERVICES

B PLANT CANYON SAMPLE, TK-21-1
ANALYTICAL RESULTS FOR THE FINAL REPORT

This document is the analytical laboratory report for the TK-21-1 sample collected from the B Plant Canyon on February 18, 1998. The sample was analyzed in accordance with the *Sampling and Analysis Plan for B Plant Solutions* (SAP) (Simmons, 1997) in support of the B Plant decommissioning project. Samples were analyzed to provide data both to describe the material which would remain in the tanks after the B Plant transition is complete and to determine Tank Farm compatibility. The analytical results are included in the data summary table (Table 1).

Appearance and Sample Handling

Attachment 1 is a cross reference to relate the tank farm identification numbers to the 222-S Laboratory LabCore/LIMS sample numbers. The subsamples generated in the laboratory for analyses are identified in these diagrams with their sources shown. Table 2 summarizes appearance information and over-the-top (OTR) dose readings performed on the sample.

Table 2. Appearance and OTR for B Plant Canyon Sample TK-21-1

Laboratory Id	Sample Amount	Color	Clarity	Organic Layer Extruded	Volume of Solids	OTR (mRad/hr)
S98B000059	125 mL	Colorless	Clear	None	None	5000

Analytical Results Summary

The data summary report (Table 1) compiles the analytical results and quality control (QC) data associated with the TK-21-1 sample.

Inorganic Analyses

Differential Scanning Calorimetry (DSC)

The DSC analyses were performed in duplicate on direct subsamples. The exothermic energy based on dry weight of subsample was calculated for all subsamples. The average of the TGA results for each subsample was used in the dry weight correction for that subsample. There were no exotherms observed during the analysis of the TK-21-1 sample. Therefore the results for the sample and duplicate were 0.0 J/g.

Since the sample results were zero, the calculation for the relative percent difference (RPD) is indeterminate because of the division by zero. However, due to the way the database performs calculations, zero divided by zero is reported as "0.0". The standard recovery for this analysis were within the required limits.

Thermogravimetric Analysis (TGA)

The TGA analyses were performed in duplicate on direct subsamples. The TGA result was determined by summing the weight loss steps which occurred below 250°C. The standard recovery and RPD for this analysis were within the required limits.

Specific Gravity (SpG)

The specific gravity analysis was performed in duplicate on direct subsamples. The results are provided in Table 1. The standard recovery and RPD for this analysis were within the required limits.

pH

The pH analysis was performed in duplicate on direct subsamples. The results are provided in Table 1. The standard recovery and RPD for this analysis were within the required limits.

Hydroxide (OH)

The TK-21-1 OH analysis was not performed. A value of pH = 1.3 (which represented the pH after the reagents were added) was entered to indicate the sample was too acidic (actual pH=0.7). A hydrogen ion (H+) determination was performed instead. The sample was analyzed in duplicate. The standard recovery was within the required limits.

Ion Chromatography (IC)

The IC analyses were performed in duplicate on direct subsamples. The required analytes were fluoride (F^-), chloride (Cl^-), nitrate (NO_3^-), nitrite (NO_2^-), phosphate (PO_4^{-3}) and sulfate (SO_4^{-2}). The standard recoveries, spike recoveries and RPDs for this analysis were within the required limits.

Inductively Coupled Plasma Spectrophotometry (ICP)

The liquid subsamples were prepared in duplicate by an acid adjustment of the direct subsample. This is indicated by a "D" in the A# column in Table 1.

The liquid subsamples were also prepared in duplicate by an acid digestion of the direct subsample. This is indicated by a "B" in the A# column in Table 1. A matrix spike analysis was performed on this sample in accordance with the SAP.

The required analytes for both analyses were aluminum (Al), barium (Ba), chromium (Cr), iron (Fe), lead (Pb), manganese (Mn), nickel (Ni), sodium (Na) and zirconium (Zr).

The standard recoveries and RPDs for these analyses were within the required limits.

Total Organic Carbon Persulfate (TOC)

Total organic carbon (TOC) analyses by furnace oxidation/coulometry were performed in duplicate on direct subsamples.

For all TOC analyses, an Analysis Report worksheet is included for each sample as raw data. Due to programming limitations with the instrument software, the sample size listed on the worksheet is incorrect. This value is not used in the final calculations and has no bearing on the results in Table 1. The blank is considered a reagent blank. The value was within the acceptance limits and all results were corrected for the concentration found in the blank.

The standard recovery and spike recovery for this analysis were within the required limits.

Total Inorganic/Organic Carbon (TIC)

Total inorganic carbon (TIC) analyses by persulfate oxidation/coulometry were performed in duplicate on direct subsamples.

For all TIC analyses, an Analysis Report worksheet is included for each sample as raw data. Due to programming limitations with the instrument software, the sample size listed on the worksheet is incorrect. This value is not used in the final calculations and has no bearing on the results in Table 1. The blank is considered a reagent blank. The value was within the acceptance limits and all results were corrected for the concentration found in the blank.

The standard recovery, spike recovery and RPD for this analysis were within the required limits.

SK

Uranium (U)

Uranium was performed in duplicate on direct subsamples. The result listed as Count Err% in Table 1 is actually the percent instrument uncertainty. The standard recovery, spike recovery and RPD for this analysis were within the required limits

Selenium (Se)

Samples were prepared in for analysis by performing an acid digest as indicated by an "G" in the A# column in table 1. The standard recovery, spike recovery and RPD for this analysis were within the required limits.

Radionuclide Analyses

Gamma Energy Analysis (GEA)

The gamma energy analysis was performed in duplicate on direct subsamples. The standard recovery and RPD for this analysis were within the required limits.

Strontium 90 (Sr-90)

The strontium analysis was performed in duplicate on direct subsamples. The standard recovery and RPD for this analysis were within the required limits.

Plutonium (Pu-239/240)

The plutonium analysis was performed in duplicate on direct subsamples. The standard recovery and RPD for this analysis were within the required limits.

Americium (Am-241)

The americium analysis was performed in duplicate on direct subsamples. The standard recovery and RPD for this analysis were within the required limits.

GP

Appendix 5

Data Validation Supporting Documentation

WHC-SD-EN-SPP-002, Rev. 2

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: B Plant			DATA PACKAGE: 98000146		
VALIDATOR: TechLaw		LAB: 2225		DATE: 17 April	
CASE:			SDG: 98000146		
ANALYSES PERFORMED					
☒ CLP/ICP	☐ CLP/GFAA	☐ CLP/Hg	☐ CLP/Cyanide	☒ Uranium	☐
☐ SW-846/ICP	☐ SW-846/GFAA	☐ SW-846/Hg	☐ SW-846 Cyanide	☒ Selenium	☐
SAMPLES/MATRIX 598B00059				Water	

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . (Yes) No N/A

Is a case narrative present? . . . . . (Yes) No N/A

Comments: _____

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments: _____

A-19

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

Were initial calibrations performed on all instruments? . . . . Yes No N/A
Are initial calibrations acceptable? . . . . . Yes No N/A
Are ICP interference checks acceptable? . . . . . Yes No N/A
Were ICV and CCV checks performed on all instruments? . . . . . Yes No N/A
Are ICV and CCV checks acceptable? . . . . . Yes No N/A
Comments:

4. BLANKS

Were ICB and CCB checks performed for all applicable analyses? Yes No N/A
Are ICB and CCB results acceptable? . . . . . Yes No N/A
Were preparation blanks analyzed? . . . . . Yes No N/A
Are preparation blank results acceptable? . . . . . Yes No N/A
Were field/trip blanks analyzed? . . . . . Yes No N/A
Are field/trip blank results acceptable? . . . . . Yes No N/A
Comments: ~~AL - FK - NA no gal rec - all X10X <10~~
all OK -

5. ACCURACY

Were spike samples analyzed? . . . . . Yes No N/A
Are spike sample recoveries acceptable? . . . . . Yes No N/A
Were laboratory control samples (LCS) analyzed? . . . . . Yes No N/A
Are LCS recoveries acceptable? . . . . . Yes No N/A
Comments: AL - IRon Na - No gal G

(B) Na - 58% spike recovery J/UJ all (A+B)

~~A-20~~

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

6. PRECISION

Were laboratory duplicates analyzed?	(Yes)	No	N/A
Are laboratory duplicate samples RPD values acceptable?	Yes	(No)	N/A
Were ICP serial dilution samples analyzed?	Yes	No	(N/A)
Are ICP serial dilution %D values acceptable?	Yes	No	(N/A)
Are field duplicate RPD values acceptable?	Yes	No	(N/A)
Are field split RPD values acceptable?	Yes	No	(N/A)

Comments: Aluminum — Fe (B) Under 5x

7. FURNACE AA QUALITY CONTROL

Were duplicate injections performed as required?	Yes	No	(N/A)
Are duplicate injection %RSD values acceptable?	Yes	No	(N/A)
Were analytical spikes performed as required?	Yes	No	(N/A)
Are analytical spike recoveries acceptable?	Yes	No	(N/A)
Was MSA performed as required?	Yes	No	(N/A)
Are MSA results acceptable?	Yes	No	(N/A)

Comments:

8. REPORTED RESULTS AND DETECTION LIMITS

Are results reported for all requested analyses?	(Yes)	No	N/A
Are all results supported in the raw data?	(Yes)	No	N/A
Are results calculated properly?	Yes	No	(N/A)
Do results meet the CRDLs?	(Yes)	No	N/A

Comments:

HOLDING TIME SUMMARY

SDG: 98000140	VALIDATOR: TechLaw	DATE: 4/25/98	PAGE 1 OF 1

COMMENTS:

FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
S93B000059	ICP - D	2/18/98	N/A	3/5/98	1	15	none
↓	ICP - B	↓	N/A	3/27/98	1	~~17~~ 37	none
↓	Selenium	↓	3/2/98	3/4/98	12	2	none

0000222

APR 27 1998
VALIDATION DOCUMENTATION
SDLA

Date: 27 April 1998
To: Waste Management Hanford
From: TechLaw, Inc.
Project: Tank 21-1 (B-Plant)
Subject: Radiochemistry - Data Package No. 98000140 (SDG No. 98000140)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. 98000140 (SDG No. 98000140) which was prepared by 222-S Analytical Services. A list of samples validated along with the analyses reported and the requested analyte is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analysis
S98B000059	2/18/98	Water	C	Uranium, Strontium-90, Plutonium 239/240, Americium-241, Cesium-137

Data validation was conducted in accordance with the validation statement of work and validation procedures (WHC 1992b). Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

  Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for radiochemical analysis is six months.

  All holding times were acceptable.

- **Instrument Calibration and Performance**

  Instrument calibration is performed to establish that the counters used to determine radionuclide activities are capable of producing acceptable and reliable analytical data. Each counting system must be factory calibrated at installation and after any maintenance or repair. Calibration consists of an instrument efficiency determination for each applicable radionuclide. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible.

  Initial and continuing calibrations are not reviewed under Level C validation.

- **Blanks**

  Laboratory Blanks

  Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicate the presence of an analyte above the MDA, the following qualifiers are applied: All positive sample results less than five times the highest blank concentration are qualified as estimates and flagged "J"; sample results below the MDA are elevated to the MDA and qualified as undetected and flagged "U"; sample results above the MDA and greater than five times the highest blank concentration are not qualified.

  All blank results were acceptable.

- **Accuracy**

  Accuracy is evaluated by analyzing distilled water or field samples spiked with known amounts of radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable laboratory control sample recovery range is 70% to 130%, while that for a matrix spike is 60% to 140%. In addition, samples may be spiked with a radiochemical tracer to assist in isolating the radioisotope of interest with the yield of the tracer being used in calculating sample activity. The acceptable range for tracer recovery is 20% to 105%. Spike sample results outside the above ranges result in associated sample results being qualified as estimates, rejected, or not qualified, depending on the activity of the individual sample.

  All accuracy results were acceptable.

- **Precision**

  Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. Precision may also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the CRDL and the RPD is less than 35 percent for soil samples and 20 percent for water samples, the results are acceptable. If either activities are less then five times the CRDL, a control limit of less than or equal to two times the CRDL is used for soil samples and less than or equal to the CRDL for water samples. If either the original or replicate value is below the CRDL, the applicable control limits are less than or equal to the CRDL for water samples and less than or equal to two times the CRDL for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

  All precision results were acceptable.

- **Detection Levels**

  Reported laboratory detection levels were at or above the contract required MDA.

- **Completeness**

  Data Package No. 98000140 (SDG No. 98000140) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

EPA, 1987, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Third Edition, Environmental Protection Agency, Washington, D.C.

EPA, 1988a, *EPA Contract Laboratory Program Statement of Work for Organics Analyses, Multi-Media, Multi-Concentration*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1988b, *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1988c, *EPA Contract Laboratory Program Statement of Work for Inorganics Analyses, Multi-Media, Multi-Concentration*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1988d, *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1990, *EPA Contract Laboratory Program Statement of Work for Inorganic Analyses, Multi-media, Multi-Concentration*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1991, *EPA Contract Laboratory Program Statement of Work for Organics Analyses, Multi-Media, Multi-Concentration*, Environmental Protection Agency, Washington, D.C.

WHC, 1992a, *Data Validation Procedures for Chemical Analyses*, WHC-SD-EN-SPP-002, Rev. 2, Westinghouse Hanford Company, October 1993.

WHC, 1992b, *Data Validation Procedure for Radiological Analyses*, WHC-SD-EN-SPP-001, Rev. 2, Westinghouse Hanford Company, 1993.

EPA, 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, U.S. Environmental Protection Agency, Washington, D.C.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the procedures herein are as follows:

U - Indicates the compound or analyte was analyzed for and not detected above the minimum detectable activity (MDA) in the sample. The value reported is the sample result corrected for sample dilution and moisture content by the laboratory. The data is usable for decision making purposes.

UJ - Indicates the compound or analyte was analyzed for and not detected at concentrations above the minimum detectable activity (MDA) in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate, but is usable for decision making purposes.

J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: 98000140	REVIEWER: RBC	DATE: 04/27/98	PAGE 1 OF 1
COMMENTS: No qualifiers assigned			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

RADIOCHEMISTRY ANALYSIS, WATER MATRIX

Project: Tank 21-1 (B-Plant)																			
Laboratory: 222-S Analytical Services																			
Case	SDG: 98000140																		
Sample Number		S98B000059																	
Remarks																			
Sample Date		02/18/98																	
Radiochemistry	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Uranium*	0.1	0.0487																	
Strontium-89/90	2	4.57																	
Plutonium-239/240	1	0.000401																	
Cesium-137	15	171																	
Americium-241	1	0.000368																	

UNITS ARE uCi/mL
* = UNITS ARE ug/mL

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apr-1998 12:49:15
0002-1

Table 1. Data Summary Report
TK-21-1 (1)

ORE NUMBER: n/a
EGMENT #: n/a

EGMENT PORTION: n/a

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S98B000059			Volume % Settled Solids	%	n/a	n/a	<1.00e-01	n/a	n/a	n/a	n/a	1.00e-01	n/a
S98B000061			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	0.00e+00	0.00e+00	0.00e+00	0.00	n/a	n/a	n/a
S98B000061			DSC Exotherm on Perkin Elmer	Joules/g	98.00	n/a	0.00e+00	0.00e+00	0.00e+00	0.00	n/a	n/a	n/a
S98B000061			OH- by Pot. Titration	ug/mL	n/a	n/a	ph=1.3	ph=1.3	n/a	n/a	n/a	125.0	n/a
S98B000061			pH Direct	pH	99.25	n/a	7.10e-01	7.10e-01	7.10e-01	0.00	n/a	1.00e-02	n/a
S98B000061			Specific Gravity	Sp.G.	97.61	n/a	1.010	1.009	1.010	0.10	n/a	1.00e-02	n/a
S98B000061			% Water by TGA on Perkin Elmer	%	100.1	n/a	99.26	98.72	98.99	0.55	n/a	n/a	n/a
S98B000061			Tot. Organic Carbon by Coul.	ug/mL	95.67	1.000	1.31e+03	1.30e+03	1.30e+03	0.77	91.70	5.500	n/a
S98B000061			TIC by Acid/Coulometry	ug/mL	100.3	4.800	7.300	8.500	7.900	15.2	98.90	5.000	n/a
S98B000061			Fluoride-IC-Dionex 4000/4500	ug/mL	101.2	<1.20e-02	< 13.33	<1.33e1	n/a	n/a	104.7	13.33	n/a
S98B000061			Chloride-IC-Dionex 4000/4500	ug/mL	101.9	<1.70e-02	36.65	41.20	38.92	11.8	97.25	18.89	n/a
S98B000061			Nitrite-IC - Dionex 4000/4500	ug/mL	97.79	<1.08e-01	<1.20e+02	<1.20e2	n/a	n/a	98.71	120.0	n/a
S98B000061			Nitrate by IC-Dionex 4000/4500	ug/mL	97.47	<1.39e-01	1.81e+04	1.78e+04	1.80e+04	1.67	95.62	154.4	n/a
S98B000061			Phosphate-IC-Dionex 4000/4500	ug/mL	96.33	<1.20e-01	2.22e+02	210.0	216.2	5.56	97.25	133.3	n/a
S98B000061			Sulfate by IC-Dionex 4000/4500	ug/mL	100.9	1.64e-01	3.61e+02	340.0	350.7	5.99	100.0	153.3	n/a
S98B000062			Hydrogen Ion Analysis	moles/Liter	95.56	95.56	2.72e-01	2.66e-01	2.69e-01	2.23	n/a	2.50e-01	n/a
S98B000062			Ammonia by ISE-Std Additions	ug/mL	96.57	<2.00e-01	2.49e+02	209.0	229.0	17.5	116.0	5.000	n/a
S98B000062			Uranium by Phosphorescence	ug/mL	91.85	5.00e-03	4.87e-02	4.49e-02	4.68e-02	8.12	96.75	4.00e-03	1.26E+00
S98B000062			Strontium-89/90 High Level	uCi/mL	107.2	2.00e-02	4.570	4.600	4.585	0.65	n/a	2.40e-02	3.03E+00
S98B000062			Pu-239/240 by TRU-SPEC Resin	uCi/mL	89.63	<2.75e-05	4.01e-04	4.22e-04	4.11e-04	5.10	n/a	4.62e-05	2.48E+00
S98B000062		D	Aluminium-ICP-Acid Dil.	ug/mL	99.60	<5.00e-02	4.770	4.700	4.735	1.48	n/a	2.50e-01	n/a
S98B000062		D	Barium-ICP-Acid Dil.	ug/mL	97.40	<5.00e-02	1.980	1.960	1.970	1.02	n/a	2.50e-01	n/a
S98B000062		D	Chromium-ICP-Acid Dil.	ug/mL	96.60	<1.00e-02	9.10e-01	9.09e-01	9.09e-01	0.11	n/a	5.00e-02	n/a
S98B000062		D	Iron-ICP-Acid Dil.	ug/mL	100.6	<5.00e-02	18.20	18.20	18.20	0.00	n/a	2.50e-01	n/a
S98B000062		D	Manganese-ICP-Acid Dil.	ug/mL	98.40	<1.00e-02	4.27e-01	4.26e-01	4.26e-01	0.23	n/a	5.00e-02	n/a
S98B000062		D	Sodium-ICP-Acid Dil.	ug/mL	102.0	<1.00e-01	1.03e+03	1.02e+03	1.02e+03	0.98	n/a	5.00e-01	n/a
S98B000062		D	Nickel-ICP-Acid Dil.	ug/mL	98.20	<2.00e-02	7.87e-01	7.87e-01	7.87e-01	0.00	n/a	1.00e-01	n/a
S98B000062		D	Lead-ICP-Acid Dil.	ug/mL	98.00	<1.00e-01	5.56e-01	5.60e-01	5.58e-01	0.72	n/a	5.00e-01	n/a
S98B000062		D	Zirconium-ICP-Acid Dil.	ug/mL	99.60	<1.00e-02	1.080	1.060	1.070	1.87	n/a	5.00e-02	n/a
S98B000062			Cesium-137 by GEA	uCi/mL	101.7	<1.65e-03	1.71e+02	168.0	169.5	1.77	n/a	n/a	0.130
S98B000062			Am-241 by Extraction	uCi/mL	109.7	<6.94e-05	3.68e-04	3.73e-04	3.71e-04	1.35	n/a	8.90e-05	2.71E+00
S98B000085		G	Selenium by GFAA	ug/L	120.0	<1.000	<1	<1	n/a	n/a	110.0	1.000	n/a
S98B000086		B	Aluminium -ICP-Acid Digest-Liq	ug/mL	98.40	8.10e-02	10.10	7.300	8.700	32.2	90.60	1.250	n/a
S98B000086		B	Barium -ICP-Acid Digest-Liquid	ug/mL	99.20	<5.00e-02	2.200	2.140	2.170	2.76	94.40	1.250	n/a
S98B000086		B	Chromium -ICP-Acid Digest-Liq	ug/mL	97.60	<1.00e-02	1.040	1.020	1.030	1.94	91.40	2.50e-01	n/a
S98B000086		B	Iron -ICP-Acid Digest-Liquid	ug/mL	98.00	1.60e-01	19.80	27.20	23.50	31.5	91.20	1.250	n/a
S98B000086		B	Manganese -ICP-Acid Digest-Liq	ug/mL	97.80	<1.00e-02	5.41e-01	5.62e-01	5.52e-01	3.81	91.60	2.50e-01	n/a
S98B000086		B	Sodium -ICP-Acid Digest-Liquid	ug/mL	115.2	3.71e-01	1.15e+03	1.10e+03	1.12e+03	4.44	58.00	2.500	n/a
S98B000086		B	Nickel -ICP-Acid Digest-Liquid	ug/mL	101.0	<2.00e-02	9.70e-01	8.68e-01	9.19e-01	11.1	94.40	5.00e-01	n/a
S98B000086		B	Lead -ICP-Acid Digest-Liquid	ug/mL	96.00	<1.00e-01	< 2.500	<2.50e0	n/a	n/a	90.40	2.500	n/a
S98B000086		B	Zirconium -ICP-Acid Digest-Liq	ug/mL	100.8	<1.00e-02	1.130	1.040	1.085	8.29	101.6	2.50e-01	n/a

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Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

HNF-SD-WM-DP-301, REV.0

222-S ANALYTICAL SERVICES

B PLANT CANYON SAMPLE, TK-21-1 ANALYTICAL RESULTS FOR THE FINAL REPORT

This document is the analytical laboratory report for the TK-21-1 sample collected from the B Plant Canyon on February 18, 1998. The sample was analyzed in accordance with the *Sampling and Analysis Plan for B Plant Solutions* (SAP) (Simmons, 1997) in support of the B Plant decommissioning project. Samples were analyzed to provide data both to describe the material which would remain in the tanks after the B Plant transition is complete and to determine Tank Farm compatibility. The analytical results are included in the data summary table (Table 1).

Appearance and Sample Handling

Attachment 1 is a cross reference to relate the tank farm identification numbers to the 222-S Laboratory LabCore/LIMS sample numbers. The subsamples generated in the laboratory for analyses are identified in these diagrams with their sources shown. Table 2 summarizes appearance information and over-the-top (OTR) dose readings performed on the sample.

Table 2. Appearance and OTR for B Plant Canyon Sample TK-21-1

Laboratory Id	Sample Amount	Color	Clarity	Organic Layer Extruded	Volume of Solids	OTR (mRad/hr)
S98B000059	125 mL	Colorless	Clear	None	None	5000

Analytical Results Summary

The data summary report (Table 1) compiles the analytical results and quality control (QC) data associated with the TK-21-1 sample.

Inorganic Analyses

Differential Scanning Calorimetry (DSC)

The DSC analyses were performed in duplicate on direct subsamples. The exothermic energy based on dry weight of subsample was calculated for all subsamples. The average of the TGA results for each subsample was used in the dry weight correction for that subsample. There were no exotherms observed during the analysis of the TK-21-1 sample. Therefore the results for the sample and duplicate were 0.0 J/g.

Since the sample results were zero, the calculation for the relative percent difference (RPD) is indeterminate because of the division by zero. However, due to the way the database performs calculations, zero divided by zero is reported as "0.0". The standard recovery for this analysis were within the required limits.

Thermogravimetric Analysis (TGA)

The TGA analyses were performed in duplicate on direct subsamples. The TGA result was determined by summing the weight loss steps which occurred below 250 °C. The standard recovery and RPD for this analysis were within the required limits.

Specific Gravity (SpG)

The specific gravity analysis was performed in duplicate on direct subsamples. The results are provided in Table 1. The standard recovery and RPD for this analysis were within the required limits.

pH

The pH analysis was performed in duplicate on direct subsamples. The results are provided in Table 1. The standard recovery and RPD for this analysis were within the required limits.

Hydroxide (OH)

The TK-21-1 OH analysis was not performed. A value of pH = 1.3 (which represented the pH after the reagents were added) was entered to indicate the sample was too acidic (actual pH=0.7). A hydrogen ion (H+) determination was performed instead. The sample was analyzed in duplicate. The standard recovery was within the required limits.

Ion Chromatography (IC)

The IC analyses were performed in duplicate on direct subsamples. The required analytes were fluoride (F^-), chloride (Cl^-), nitrate (NO_3^-), nitrite (NO_2^-), phosphate (PO_4^{-3}) and sulfate (SO_4^{-2}). The standard recoveries, spike recoveries and RPDs for this analysis were within the required limits.

Inductively Coupled Plasma Spectrophotometry (ICP)

The liquid subsamples were prepared in duplicate by an acid adjustment of the direct subsample. This is indicated by a "D" in the A# column in Table 1.

The liquid subsamples were also prepared in duplicate by an acid digestion of the direct subsample. This is indicated by a "B" in the A# column in Table 1. A matrix spike analysis was performed on this sample in accordance with the SAP.

The required analytes for both analyses were aluminum (Al), barium (Ba), chromium (Cr), iron (Fe), lead (Pb), manganese (Mn), nickel (Ni), sodium (Na) and zirconium (Zr).

The standard recoveries and RPDs for these analyses were within the required limits.

Total Organic Carbon Persulfate (TOC)

Total organic carbon (TOC) analyses by furnace oxidation/coulometry were performed in duplicate on direct subsamples.

For all TOC analyses, an Analysis Report worksheet is included for each sample as raw data. Due to programming limitations with the instrument software, the sample size listed on the worksheet is incorrect. This value is not used in the final calculations and has no bearing on the results in Table 1. The blank is considered a reagent blank. The value was within the acceptance limits and all results were corrected for the concentration found in the blank.

The standard recovery and spike recovery for this analysis were within the required limits.

Total Inorganic/Organic Carbon (TIC)

Total inorganic carbon (TIC) analyses by persulfate oxidation/coulometry were performed in duplicate on direct subsamples.

For all TIC analyses, an Analysis Report worksheet is included for each sample as raw data. Due to programming limitations with the instrument software, the sample size listed on the worksheet is incorrect. This value is not used in the final calculations and has no bearing on the results in Table 1. The blank is considered a reagent blank. The value was within the acceptance limits and all results were corrected for the concentration found in the blank.

The standard recovery, spike recovery and RPD for this analysis were within the required limits.

Uranium (U)

Uranium was performed in duplicate on direct subsamples. The result listed as Count Err% in Table 1 is actually the percent instrument uncertainty. The standard recovery, spike recovery and RPD for this analysis were within the required limits

Selenium (Se)

Samples were prepared in for analysis by performing an acid digest as indicated by an "G" in the A# column in table 1. The standard recovery, spike recovery and RPD for this analysis were within the required limits.

Radionuclide Analyses

Gamma Energy Analysis (GEA)

The gamma energy analysis was performed in duplicate on direct subsamples. The standard recovery and RPD for this analysis were within the required limits.

Strontium 90 (Sr-90)

The strontium analysis was performed in duplicate on direct subsamples. The standard recovery and RPD for this analysis were within the required limits.

Plutonium (Pu-239/240)

The plutonium analysis was performed in duplicate on direct subsamples. The standard recovery and RPD for this analysis were within the required limits.

Americium (Am-241)

The americium analysis was performed in duplicate on direct subsamples. The standard recovery and RPD for this analysis were within the required limits.

Appendix 5

Data Validation Supporting Documentation

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: B-Plant TK-21-1			DATA PACKAGE: 98000140		
VALIDATOR: TechLaw		LAB: 2225		DATE: 17 April 98	
CASE:			SDG: 98000140		

ANALYSES PERFORMED

☐ Gross Alpha/Beta	☒ Strontium-90	☐ Technetium-99	☒ Alpha Spectroscopy	☒ Gamma Spectroscopy	
☒ Total Uranium	☐ Radium-22	☐ Tritium	☐		

SAMPLES/MATRIX 98B000059 water

1. Completeness . . . . . ☐ N/A

Technical verification forms present? . . . . . (Yes) No N/A

Comments: _____

2. Initial Calibration . . . . . ☒ N/A

Instruments/detectors calibrated within one year of sample analysis? . . . . . Yes No N/A

Initial calibration acceptable? . . . . . Yes No N/A

Standards NIST traceable? . . . . . Yes No N/A

Standards Expired? . . . . . Yes No N/A

Comments: _____

3. Continuing Calibration . . . . . ☒ N/A

Calibration checked within one week of sample analysis? . . .	Yes	No	N/A
Calibration check acceptable?	Yes	No	N/A
Calibration check standards NIST traceable?	Yes	No	N/A
Calibration check standards expired?	Yes	No	N/A

Comments:_____

4. Blanks . . . . . ☐ N/A

Method blank analyzed?	(Yes)	No	N/A
Method blank results acceptable?	(Yes)	No	N/A
Analytes detected in method blank?	Yes	(No)	N/A
Field blank(s) analyzed?	Yes	(No)	N/A
Field blank results acceptable?	Yes	No	(N/A)
Analytes detected in field blank(s)?	Yes	No	(N/A)
Transcription/Calculation Errors?	Yes	No	(N/A)

Comments: Gt ok Sr-90 ✓ Am 241/243 ✓

5. Matrix Spikes . . . . . ☒ N/A

Matrix spike analyzed?	Yes	No	N/A
Spike recoveries acceptable?	Yes	No	N/A
Spike source traceable?	Yes	No	N/A
Spike source expired?	Yes	No	N/A
Transcription/Calculation Errors?	Yes	No	N/A

Comments:_____

6. Laboratory Control Samples . . . . . ☐ N/A

LCS analyzed? . . . . . Yes No N/A
LCS recoveries acceptable? . . . . . Yes No N/A
LCS traceable? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments: CS-137 ✓

7. Chemical Recovery . . . . . ☐ N/A

Chemical carrier added? . . . . . Yes No N/A
Chemical recovery acceptable? . . . . . Yes No N/A
Chemical carrier traceable? . . . . . Yes No N/A
Chemical carrier expired? . . . . . Yes No N/A
Transcription/Calculation errors? . . . . . Yes No N/A

Comments: SR90 - IR AM241 IR

8. Duplicates . . . . . ☐ N/A

Duplicates Analyzed? . . . . . Yes No N/A
RPD Values Acceptable? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments: SR-90 ✓ AM ✓

A-3

9. Field QC Samples . . . . . ☐ N/A

Field duplicate sample(s) analyzed?	Yes	No	N/A
Field duplicate RPD values acceptable?	Yes	No	N/A
Field split sample(s) analyzed?	Yes	No	N/A
Field split RPD values acceptable?	Yes	No	N/A
Performance audit sample(s) analyzed?	Yes	No	N/A
Performance audit sample results acceptable?	Yes	No	N/A

Comments:_____

10. Holding Times

Are sample holding times acceptable?	(Yes)	No	N/A

Comments:_____

11. Results and Detection Limits (Levels D & E) . . . . . ☐ N/A

Results reported for all required sample analyses?	(Yes)	No	N/A
Results supported in raw data?	(Yes)	No	N/A
Results Acceptable?	(Yes)	No	N/A
Transcription/Calculation errors?	Yes	No	(N/A)
MDA's meet required detection limits?	(Yes)	No	N/A
Transcription/calculation errors?	Yes	No	(N/A)

Comments:_____

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ANALYTICAL SERVICES

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B PLANT CANYON SAMPLE, TK21-1 ANALYTICAL RESULTS FOR THE FINAL REPORT

Project Coordinator: Franciska H. Steen

Prepared for the U.S. Department of Energy
Office of Environmental Restoration
and Waste Management

by

222-S Laboratory
Waste Management of Hanford, Inc.
P.O. Box 700
Richland, Washington

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NARRATIVE

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222-S ANALYTICAL SERVICES

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Total inorganic carbon (TIC) analyses by persulfate oxidation/coulometry were performed in duplicate on direct subsamples.

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The standard recovery, spike recovery and RPD for this analysis were within the required limits.

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Uranium (U)

Uranium was performed in duplicate on direct subsamples. The result listed as Count Err% in Table 1 is actually the percent instrument uncertainty. The standard recovery, spike recovery and RPD for this analysis were within the required limits

Selenium (Se)

Samples were prepared in for analysis by performing an acid digest as indicated by an "G" in the A# column in table 1. The standard recovery, spike recovery and RPD for this analysis were within the required limits.

Radionuclide Analyses

Gamma Energy Analysis (GEA)

The gamma energy analysis was performed in duplicate on direct subsamples. The standard recovery and RPD for this analysis were within the required limits.

Strontium 90 (Sr-90)

The strontium analysis was performed in duplicate on direct subsamples. The standard recovery and RPD for this analysis were within the required limits.

Plutonium (Pu-239/240)

The plutonium analysis was performed in duplicate on direct subsamples. The standard recovery and RPD for this analysis were within the required limits.

Americium (Am-241)

The americium analysis was performed in duplicate on direct subsamples. The standard recovery and RPD for this analysis were within the required limits.

RECORD COPY

Procedures

Table 3 lists the analytical procedures used for performing the sample analyses. Abbreviations for analyses are defined in the table notes.

Table 3. Analytical Procedures

Analysis	Sample Portion	Preparation Procedure +	Analysis Procedure
DSC	Liquid	N/A	LA-514-114 Rev. D-1
TGA	Liquid	N/A	LA-514-114 Rev. D-1
Sp.G.	Liquid	N/A	LA-510-112 Rev. D-1
pH	Liquid	N/A	LA-212-106 Rev. C-0
H+	Liquid	N/A	LA-211-102 Rev. D-0
OH	Liquid	N/A	LA-211-102 Rev. D-1
NH3	Liquid	N/A	LA-631-001 Rev. C-0
GFAA	Liquid	LA-505-158 Rev. E-0	LA-505-102 Rev. A-0
IC	Liquid	N/A	LA-533-105 Rev. E-0
ICP	Liquid	N/A	LA-505-161 Rev. C-2
TIC	Liquid	N/A	LA-342-100 Rev. F-1

RECORD COPY

Table 3. Analytical Procedures

Analysis	Sample Portion	Preparation Procedure +	Analysis Procedure
TOC	Liquid	N/A	LA-344-105 Rev. E-0
U	Liquid	N/A	LA-925-009 Rev. A-1
GEA	Liquid	N/A	LA-548-121 Rev. F-0
Am241	Liquid	N/A	LA-953-104 Rev. B-0
Pu239	Liquid	N/A	LA-953-104 Rev. B-0
Sr90	Liquid	N/A	LA-220-101 Rev. E-3

Abbreviations:
N/A = not applicable (these are direct samples)
DSC = differential scanning calorimetry
TGA = thermogravimetric analysis
Sp.G. = specific gravity
IC = ion chromatography
ICP = inductively coupled plasma
TOC = total organic carbon
TIC = total inorganic carbon
NH3 = ammonia
U = uranium
GEA = gamma energy analysis
Am241 = americium
Pu239 = plutonium
Sr90 = strontium
GFAA = graphite furnace atomic absorption

References

Simmons, F. M., 1997, *Sampling and Analysis Plan (SAP) for B Plant Solutions*, HNF-SD-WM-EV-118, Rev. 0-A, Babcock & Wilcox Hanford Company, Richland, WA 99352.

Meznarich, H. K., 1995, *222-S Laboratory Quality Assurance Plan*, WHC-SD-CP-QAPP-016, Rev. 1-A, Westinghouse Hanford Company , Richland, WA 99352

RECORD COPY

HNF-SD-WM-DP-301, REV. 0

SAMPLE DATA SUMMARY

Table 1. Data Summary Report
TK-21-1 (1)

RECORD COPY

CORE NUMBER: n/a
SEGMENT #: n/a

SEGMENT PORTION: n/a

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S98B000059			Volume % Settled Solids	%	n/a	n/a	<1.00e-01	n/a	n/a	n/a	n/a	1.00e-01	n/a
S98B000061			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	0.00e+00	0.00e+00	0.00e+00	0.00	n/a	n/a	n/a
S98B000061			DSC Exotherm on Perkin Elmer	Joules/g	98.00	n/a	0.00e+00	0.00e+00	0.00e+00	0.00	n/a	n/a	n/a
S98B000061			OH- by Pot. Titration	ug/mL	n/a	n/a	ph=1.3	ph=1.3	n/a	n/a	n/a	125.0	n/a
S98B000061			pH Direct	pH	99.25	n/a	7.10e-01	7.10e-01	7.10e-01	0.00	n/a	1.00e-02	n/a
S98B000061			Specific Gravity	Sp.G.	97.61	n/a	1.010	1.009	1.010	0.10	n/a	1.00e-02	n/a
S98B000061			% Water by TGA on Perkin Elmer	%	100.1	n/a	99.26	98.72	98.99	0.55	n/a	n/a	n/a
S98B000061			Tot. Organic Carbon by Coul.	ug/mL	95.67	1.000	1.31e+03	1.30e+03	1.30e+03	0.77	91.70	5.500	n/a
S98B000061			TIC by Acid/Coulometry	ug/mL	100.3	4.800	7.300	8.500	7.900	15.2	98.90	5.000	n/a
S98B000061			Fluoride-IC-Dionex 4000/4500	ug/mL	101.2	<1.20e-02	< 13.33	<1.33e1	n/a	n/a	104.7	13.33	n/a
S98B000061			Chloride-IC-Dionex 4000/4500	ug/mL	101.9	<1.70e-02	36.65	41.20	38.92	11.8	97.25	18.89	n/a
S98B000061			Nitrite-IC - Dionex 4000/4500	ug/mL	97.79	<1.08e-01	<1.20e+02	<1.20e2	n/a	n/a	98.71	120.0	n/a
S98B000061			Nitrate by IC-Dionex 4000/4500	ug/mL	97.47	<1.39e-01	1.81e+04	1.78e+04	1.80e+04	1.67	95.62	154.4	n/a
S98B000061			Phosphate-IC-Dionex 4000/4500	ug/mL	96.33	<1.20e-01	2.22e+02	210.0	216.2	5.56	97.25	133.3	n/a
S98B000061			Sulfate by IC-Dionex 4000/4500	ug/mL	100.9	1.64e-01	3.61e+02	340.0	350.7	5.99	100.0	153.3	n/a
S98B000062			Hydrogen Ion Analysis	moles/Liter	95.56	95.56	2.72e-01	2.66e-01	2.69e-01	2.23	n/a	2.50e-01	n/a
S98B000062			Ammonia by ISE-Std Additions	ug/mL	96.57	<2.00e-01	2.49e+02	209.0	229.0	17.5	116.0	5.000	n/a
S98B000062			Uranium by Phosphorescence	ug/mL	91.85	5.00e-03	4.87e-02	4.49e-02	4.68e-02	8.12	96.75	4.00e-03	1.26E+00
S98B000062			Strontium-89/90 High Level	uCi/mL	107.2	2.00e-02	4.570	4.600	4.585	0.65	n/a	2.40e-02	3.03E+00
S98B000062			Pu-239/240 by TRU-SPEC Resin	uCi/mL	89.63	<2.75e-05	4.01e-04	4.22e-04	4.11e-04	5.10	n/a	4.62e-05	2.48E+00
S98B000062		D	Aluminium-ICP-Acid Dil.	ug/mL	99.60	<5.00e-02	4.770	4.700	4.735	1.48	n/a	2.50e-01	n/a
S98B000062		D	Barium-ICP-Acid Dil.	ug/mL	97.40	<5.00e-02	1.980	1.960	1.970	1.02	n/a	2.50e-01	n/a
S98B000062		D	Chromium-ICP-Acid Dil.	ug/mL	96.60	<1.00e-02	9.10e-01	9.09e-01	9.09e-01	0.11	n/a	5.00e-02	n/a
S98B000062		D	Iron-ICP-Acid Dil.	ug/mL	100.6	<5.00e-02	18.20	18.20	18.20	0.00	n/a	2.50e-01	n/a
S98B000062		D	Manganese-ICP-Acid Dil.	ug/mL	98.40	<1.00e-02	4.27e-01	4.26e-01	4.26e-01	0.23	n/a	5.00e-02	n/a
S98B000062		D	Sodium-ICP-Acid Dil.	ug/mL	102.0	<1.00e-01	1.03e+03	1.02e+03	1.02e+03	0.98	n/a	5.00e-01	n/a
S98B000062		D	Nickel-ICP-Acid Dil.	ug/mL	98.20	<2.00e-02	7.87e-01	7.87e-01	7.87e-01	0.00	n/a	1.00e-01	n/a
S98B000062		D	Lead-ICP-Acid Dil.	ug/mL	98.00	<1.00e-01	5.56e-01	5.60e-01	5.58e-01	0.72	n/a	5.00e-01	n/a
S98B000062		D	Zirconium-ICP-Acid Dil.	ug/mL	99.60	<1.00e-02	1.080	1.060	1.070	1.87	n/a	5.00e-02	n/a
S98B000062			Cesium-137 by GEA	uCi/mL	101.7	<1.65e-03	1.71e+02	168.0	169.5	1.77	n/a	n/a	0.130
S98B000062			Am-241 by Extraction	uCi/mL	109.7	<6.94e-05	3.68e-04	3.73e-04	3.71e-04	1.35	n/a	8.90e-05	2.71E+00
S98B000085		G	Selenium by GFAA	ug/L	120.0	<1.000	<1	<1	n/a	n/a	110.0	1.000	n/a
S98B000086		B	Aluminium -ICP-Acid Digest-Liq	ug/mL	98.40	8.10e-02	10.10	7.300	8.700	32.2	90.60	1.250	n/a
S98B000086		B	Barium -ICP-Acid Digest-Liquid	ug/mL	99.20	<5.00e-02	2.200	2.140	2.170	2.76	94.40	1.250	n/a
S98B000086		B	Chromium -ICP-Acid Digest-Liq	ug/mL	97.60	<1.00e-02	1.040	1.020	1.030	1.94	91.40	2.50e-01	n/a
S98B000086		B	Iron -ICP-Acid Digest-Liquid	ug/mL	98.00	1.60e-01	19.80	27.20	23.50	31.5	91.20	1.250	n/a
S98B000086		B	Manganese -ICP-Acid Digest-Liq	ug/mL	97.80	<1.00e-02	5.41e-01	5.62e-01	5.52e-01	3.81	91.60	2.50e-01	n/a
S98B000086		B	Sodium -ICP-Acid Digest-Liquid	ug/mL	115.2	3.71e-01	1.15e+03	1.10e+03	1.12e+03	4.44	58.00	2.500	n/a
S98B000086		B	Nickel -ICP-Acid Digest-Liquid	ug/mL	101.0	<2.00e-02	9.70e-01	8.68e-01	9.19e-01	11.1	94.40	5.00e-01	n/a
S98B000086		B	Lead -ICP-Acid Digest-Liquid	ug/mL	96.00	<1.00e-01	< 2.500	<2.50e0	n/a	n/a	90.40	2.500	n/a
S98B000086		B	Zirconium -ICP-Acid Digest-Liq	ug/mL	100.8	<1.00e-02	1.130	1.040	1.085	8.29	101.6	2.50e-01	n/a

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HNF-SD-WM-DP-301 REV. 0A

HNF-SD-WM-DP-301, Rev 0A

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 644959

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. USQ Required?	5. Date
Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	Franciska H. Steen, Production Planning & Control, T6-12, 372, 2495	[] Yes [X] No	04/13/98
	6. Project Title/No./Work Order No.: B Plant	7. Bldg./Sys./Fac. No.: B Plant	8. Approval Designator: Q
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.): HNF-SD-WM-DP-301, Rev. 0	10. Related ECN No(s).: N/A	11. Related PO No.: N/A

12a. Modification Work	12b. Work Package No.	12c. Modification Work Complete	12d. Restored to Original Condition (Temp. or Standby ECN only)
[] Yes (fill out Blk. 12b) [X] No (NA Blks. 12b, 12c, 12d)	N/A	N/A Design Authority/Cog. Engineer Signature & Date	N/A Design Authority/Cog. Engineer Signature & Date

13a. Description of Change

13b. Design Baseline Document? [] Yes [X] No

Page 12 is replaced with page 12.

14a. Justification (mark one)

Criteria Change	[X]	Design Improvement	[]	Environmental	[]	Facility Deactivation	[]
As-Found	[]	Facilitate Const	[]	Const. Error/Omission	[]	Design Error/Omission	[]

14b. Justification Details

This ECN will assist in the completion of the documentation process for this document.

15. Distribution (include name, MSIN, and no. of copies)

See attached distribution.

RELEASE STAMP

DATE: APR 14 1998 STA: 4 HANFORD RELEASE ID: 2

A-7900-013-2 (05/96) GEF095

A-7900-013-1

12A

ENGINEERING CHANGE NOTICE

 | ECN-644959

16. Design Verification Required	17. Cost Impact				18. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
[] Yes	Additional	[] $	Additional	[] $	Improvement	[]
[X] No	Savings	[] $	Savings	[] $	Delay	[]

19. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 13. Enter the affected document number in Block 20.

SDD/DD	[]	Seismic/Stress Analysis	[]	Tank Calibration Manual	[]
Functional Design Criteria	[]	Stress/Design Report	[]	Health Physics Procedure	[]
Operating Specification	[]	Interface Control Drawing	[]	Spares Multiple Unit Listing	[]
Criticality Specification	[]	Calibration Procedure	[]	Test Procedures/Specification	[]
Conceptual Design Report	[]	Installation Procedure	[]	Component Index	[]
Equipment Spec.	[]	Maintenance Procedure	[]	ASME Coded Item	[]
Const. Spec.	[]	Engineering Procedure	[]	Human Factor Consideration	[]
Procurement Spec.	[]	Operating Instruction	[]	Computer Software	[]
Vendor Information	[]	Operating Procedure	[]	Electric Circuit Schedule	[]
OM Manual	[]	Operational Safety Requirement	[]	ICRS Procedure	[]
FSAR/SAR	[]	IEFD Drawing	[]	Process Control Manual/Plan	[]
Safety Equipment List	[]	Cell Arrangement Drawing	[]	Process Flow Chart	[]
Radiation Work Permit	[]	Essential Material Specification	[]	Purchase Requisition	[]
Environmental Impact Statement	[]	Fac. Proc. Samp. Schedule	[]	Tickler File	[]
Environmental Report	[]	Inspection Plan	[]		[]
Environmental Permit	[]	Inventory Adjustment Request	[]		[]

20. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision
N/A		

21. Approvals

Signature		Date	Signature	Date
Design Authority			Design Agent	
Cog. Eng. F. H. Steen	F. H. Steen	4/13/98	PE	
Cog. Mgr. D. B. Hardy	D. B. Hardy	4/13/98	QA	
QA T. L. Tung	T. L. Tung	4/13/98	Safety	
Safety			Design	
Environ.			Environ.	
Other			Other	
			DEPARTMENT OF ENERGY	
			Signature or a Control Number that tracks the Approval Signature	
			ADDITIONAL	

B Plant Canyon Sample, TK-21-1 Analytical Results for the Final Report

Franciska H. Steen
Waste Management of Hanford, Inc., Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: ECN-644959 UC: 2070
Org Code: 7576B Charge Code: N4K4C
B&R Code: EW 3120074 Total Pages: 201

Key Words: B Plant, Canyon Sample, TK-21-1, Analytical Results, Final Report

Abstract: N/A

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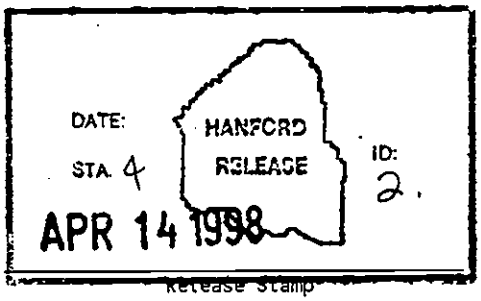

Release Stamp

Release Approval

4/14/98
Date

Approved for Public Release

RECORD OF REVISION	(1) Document Number HNF-SD-WM-DP-301	Page 1

(2) Title
B Plant Canyon Sample, TK-21-i Analytical Results for the Final Report

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release (5) Cog. Engr.	(6) Cog. Mgr. Date
0	(7) Initially released 04/10/98 on EDT-623148	F.H. Steen 4/13/98	D.B. Hardy 4/13/98
0A RS	Incorporate per ECN-644959	F.H. Steen 4/13/98	D.B. Hardy 4/13/98

SAMPLE BREAKDOWN
ATTACHMENT 1

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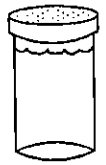
Attachment 1

B PLANT TK 21-1 SAMPLE BREAKDOWN



VOL %
SOLIDS

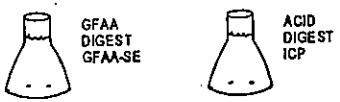
S98B000059

S98B000061

DSC
TGA
TIC/TOC
PH
OH
SPG
IC-ANIONS
TOC

S98B000624

GEA
AM241
PU239
SR90
ICP
NH3
H +
U



GFAA
DIGEST
GFAA-SE

ACID
DIGEST
ICP

S98B000085

S98B000086

worklistrpt Version 2.1 05/15/95
02/27/98 07:22

LABCORE Data Entry Template for Worklist# 22563

Analyst: RLC **Instrument:** NONE _____ **Book #** _____

Method: LA-519-151 Rev/Mod F-0

Worklist Comment: TK-21-1 21-1-021898 Breakdown lad

GROUP	PROJECT	S	TYPE	SAMPLE#	R	A	-------TEST------	MATRIX	ACTUAL	FOUND	DL	UNIT
98000140	TK-21-1 (1)	1	SAMPLE	S98B000059	0		@BRKDWN1 DOSERATE	LIQUID	N/A	5000		mrad/hour
98000140	TK-21-1 (1)	1	SAMPLE	S98B000059	0		@BRKDWN1 SEALNUM	LIQUID	N/A	N/A		
98000140	TK-21-1 (1)	1	SAMPLE	S98B000059	0		@BRKDWN1 ETCHNUM	LIQUID	N/A	N/A		
98000140	TK-21-1 (1)	1	SAMPLE	S98B000059	0		@BRKDWN1 APPEAR02	LIQUID	N/A	Clear		
98000140	TK-21-1 (1)	1	SAMPLE	S98B000059	0		@BRKDWN1 SAMPAMT2	LIQUID	N/A	100		mL SKW 2/28/98
98000140	TK-21-1 (1)	1	SAMPLE	S98B000059	0		@BRKDWN1 STLSLD01	LIQUID	N/A	SB 2/27/98 ~~<1%~~	~~0~~	% <.1%
98000140	TK-21-1 (1)	1	SAMPLE	S98B000059	0		@BRKDWN1 COLOR-01	LIQUID	N/A	Colorless		
98000140	TK-21-1 (1)	1	SAMPLE	S98B000059	0		@BRKDWN1 ORGVOL02	LIQUID	N/A	None		mL

Final page for worklist # 22563

RL Chambers 2-27-98
Analyst Signature **Date**

Sandra K Wollom 2/28/98
Analyst Signature **Date**

Data Entry Comments:

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

HNF-SD-WM-DP-301, REV. 0

REQUEST FOR SAMPLE ANALYSIS

~~HNF-SD-WM-DP-301 REV. 0~~

TK-21-1 (B)

in cell #3 Group 98000140

REQUEST FOR SAMPLE ANALYSIS (RSA)

Group ID No. (For lab use only)

1. Sample Origin	2. Date Sampled	4. Requestor's Name	6. TPCN	7. Org. Code
Tk-21-1 (B Plant, 221-B)	02/18/98	J. H. E. Rasmussen	KN604	16D00

Customer/Project Code	3. Submitted By	5. Requestor's Phone/MSIN/FAX
	J. H. E. Rasmussen	373-1128 S6-51 372-0050

8. Customer ID No.	9. Laboratory Sample No.	10. Volume of Sample	11. Matrix of Sample	12. Requested Analyses	13. Expected Range
21-1-021898	98000059	100 ml	LA	Per HNF-SD-EV-118, Rev. 0-A	
				@BRKDWN1	

14. Does sample have a MSDS?

☐ Yes HEHF assigned MSDS No. _____

☒ No Description of process that produced waste/sample:

Low level liquid waste from B Plant Canyon

15. Is this sample RCRA listed? ☒ Yes ☐ No

Applicable Listed Waste Codes:

☐ Yes ☒ No P Codes: (list) _____

☐ Yes ☒ No U Codes: (list) _____

☐ Yes ☒ No K Codes: (list) _____

☒ Yes ☐ No F Codes: (list) F001-F005

Applicable Characteristic Codes:

☐ Yes ☒ No D001: (how determined) Source Ignitable

☒ Yes ☐ No D002: (how determined) Analysis Corrosive

☐ Yes ☒ No D003: (how determined) Source Reactive

☐ Yes ☒ No Toxic: (list codes) Source

PCB: Does this waste/sample contain PCBs?

☐ Yes Over 500 ppm

☐ Yes Over 50 ppm

☐ Yes PCBs are suspected

☒ No PCBs are suspected

If YES, what is the source of the PCBs?

☐ Transformer, capacitor, or ballast

☐ Other, specify _____

☐ Unknown

16. Sample Disposition

☐ Return to Customer

☐ Samples found to contain PCBs will be returned to the customer

☒ Dispose of per facility procedures with applied charges for analyses and disposal

Sample(s) Dose Rate at Contact

HPT Signature

17. QC Required ☒ Per 222-S Laboratory Quality Assurance Plan (HNF-SD-CP-QAPP-016)

☐ Other (list reference document or attach) _____

18. Special Instructions (Special Storage Requirements, Reporting format, holding times, etc.)

Contact Jennifer Nuzum upon arrival.

19. Requested Turnaround Time

☐ 2 Weeks ☐ 4 Weeks

☒ Other Per SAP

20. Sample Received By: _____ Date 2/18/98 Time 2045

21. Chain of Custody

☐ No ☒ Yes

Number: _____

FEB 19 1998 2:47PM ... (05/97)

HNF-SD-WM-DP-301, REV. 0

SAMPLE PREPARATIONS

worklistrpt Version 2.1 05/15/95
03/02/98 14:25

HNF-SD-WM-DP-301 REV. 0

LABCORE Data Entry Template for Worklist# 22670

Analyst: AVH Instrument: ACD01 Book # WHC-1A > 2.5 ml each for STD
WHC-2

Method: LA-505-158 Rev/Mod 7 0

WHC-1A > 1.25 ml each for spike
WHC-2
DF = 20 X

Worklist Comment: B PLANT TANK 21 ACID DIGEST lad

GROUP	PROJECT	S	TYPE	SAMPLE#	R	A	TEST	MATRIX	ACTUAL	FOUND	DL	UNIT
		1	BLNK-PREP				ACIDIG02	LIQUID	1	1	N/A	DF
		2	STD-PREP				ACIDIG02	LIQUID	20	20	N/A	DF
98000140	TK-21-1 (1)	3	SAMPLE	S9880000086	0	B	ACIDIG02	LIQUID	N/A	25		DF
				1.0 ml → 25 ml total volume								
98000140	TK-21-1 (1)	4	SAMPLE	S9880000086	0	B	DOSE-02	LIQUID	N/A	60		mrad/hour
98000140	TK-21-1 (1)	5	DUP	S9880000086	0	B	ACIDIG02	LIQUID	25	25	N/A	DF
				1.0 ml → 25 ml total volume								
98000140	TK-21-1 (1)	6	DUP	S9880000086	0	B	DOSE-02	LIQUID	60	60	N/A	mrad/hour
98000140	TK-21-1 (1)	7	SPK	S9880000086	0	B	ACIDIG02	LIQUID	NA	25	N/A	DF * see note
				1.0 ml → 25 ml total volume								
98000140	TK-21-1 (1)	8	SPK	S9880000086	0	B	DOSE-02	LIQUID	RKF 3/25/98 NA	60	N/A	mrad/hour

Final page for worklist # 22670

Alita Hurson
Analyst Signature Date

C.J. Quinn 3/25/98
Analyst Signature Date

Validated
3/25/98
R.K. Fuller

Data Entry Comments: Used low sample size because only ~5 ml of sample available

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

LABCORE Data Entry Template for Worklist# 22752

Analyst: ADP **Instrument:** GAA01 **Book #** 58W10-A

Method: LA-505-100 Rev/Mod A-O

* Note Used 25mls to 25mls total volume (10X dilution) for both Std and Spike

Worklist Comment: B-PLANT TK-21-1 GFAA DIGEST lad

GROUP	PROJECT	S	TYPE	SAMPLE#	R	A	TEST	MATRIX	ACTUAL	FOUND	DL	UNIT
		1	BLNK-PREP				GFADIG01	LIQUID	1	0.025	N/A	DF
		2	STD-PREP				GFADIG01	LIQUID	10	1.0	N/A	DF
98000140	TK-21-1 (1)	3	SAMPLE	S98B000085	0	G	GFADIG01	LIQUID	N/A	50		DF
			0.500ml → 25ml									
98000140	TK-21-1 (1)	4	SAMPLE	S98B000085	0	G	DOSE-02	LIQUID	N/A	9		mrad/hour
98000140	TK-21-1 (1)	5	DUP	S98B000085	0	G	GFADIG01	LIQUID	50	50	N/A	DF
			0.500ml → 25mL									
98000140	TK-21-1 (1)	6	DUP	S98B000085	0	G	DOSE-02	LIQUID	9	7.5	N/A	mrad/hour
98000140	TK-21-1 (1)	7	SPK	S98B000085	0	G	GFADIG01	LIQUID	NA	50	N/A	DF * See note
			0.500ml → 25mL									
98000140	TK-21-1 (1)	8	SPK	S98B000085	0	G	DOSE-02	LIQUID	NA	8.25	N/A	mrad/hour

Final page for worklist # 22752

Anthony Puente 4-2-98
Analyst Signature **Date**

Tom DMS 4/3/98
Analyst Signature **Date**

S98B000062 → S98B000085

Validated 4/3/98 WBard

Data Entry Comments: HPt Cindy Belew

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit. S = Worklist Slot Number. R = Replicate Number, A = Aliquot Code.

HNF-SD-WM-DP-301, REV. 0

INORGANIC ANALYSIS

worklistrpt Version 2.1 05/15/95
03/02/98 10:02

LABCORE Data Entry Template for Worklist# 22662

Analyst: [illegible] **Instrument:** DSC0 3 **Book #** 12 NHB

Method: LA-514-114 Rev/Mod D-1

Worklist Comment: B Plant Tk21-1 DSC-03 skb

GROUP	PROJECT	S TYPE	SAMPLE#	R	A	-------TEST------	MATRIX	ACTUAL	FOUND	DL	UNIT
		1 STD				DSC-03	LIQUID	28.45 ~~24.85~~ 3/6/98	27.88	N/A	Joules/g
98000140	TK-21-1 (1)	2 SAMPLE	S98B000061	0		DSC-03	LIQUID	N/A	0		Joules/g
98000140	TK-21-1 (1)	3 DUP	S98B000061	0		DSC-03	LIQUID	0	0	N/A	Joules/g

Final page for worklist # 22662

[signature] 3/6/98
Analyst Signature **Date**

[signature] 3/06/98
Analyst Signature **Date**

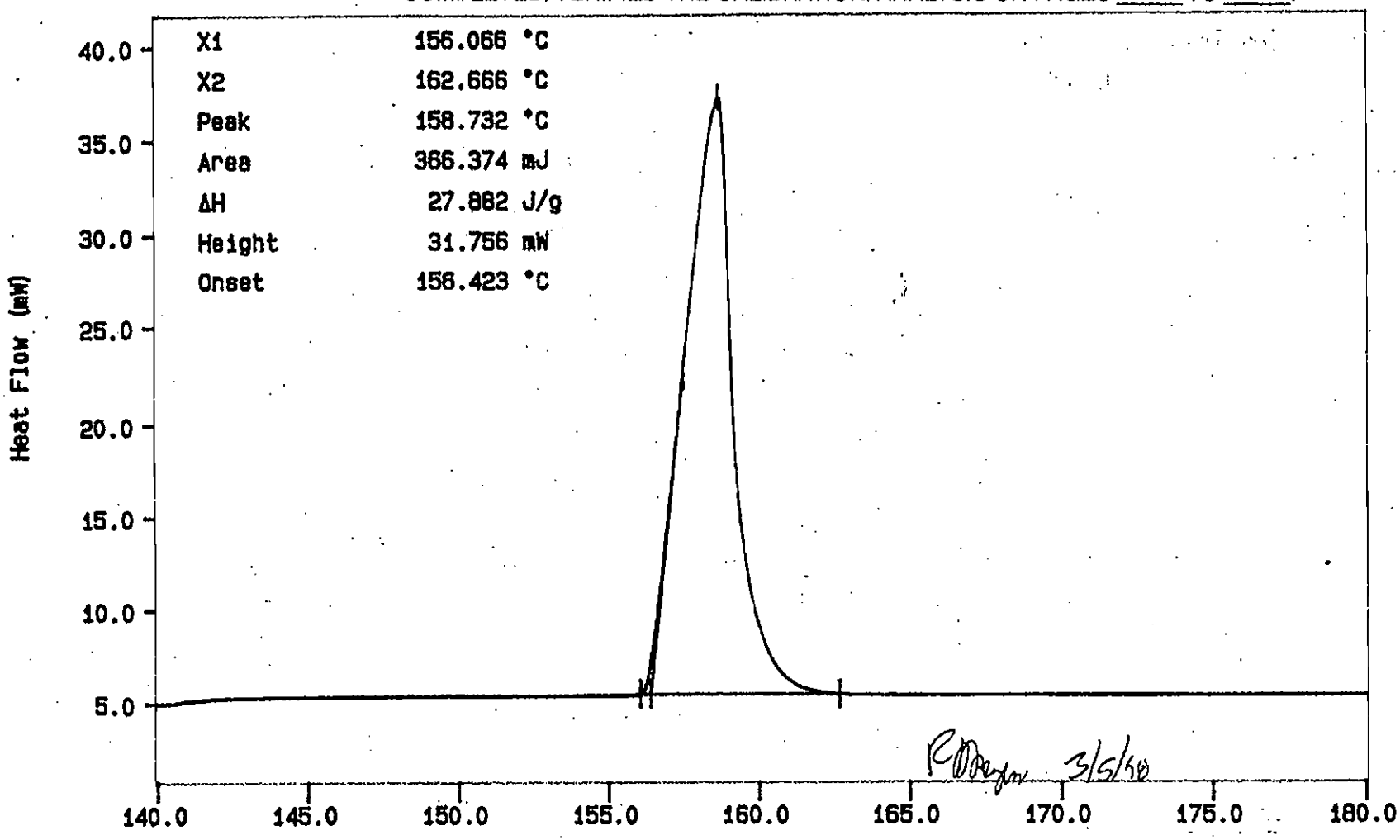
Validated 3/6/98 [signature]

Data Entry Comments:

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

Curve 1: DSC
File info: IND030501 Thu Mar 5 19:05:45 1998
Sample Weight: 13.140 mg
STD 12N14-B

SIGNATURE BELOW REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES _____ TO _____.



N2, EXOTHERM DOWN
TEMP1: 140.0 C TIME1: 0.0 min RATE1: 10.0 C/min
TEMP2: 180.0 C

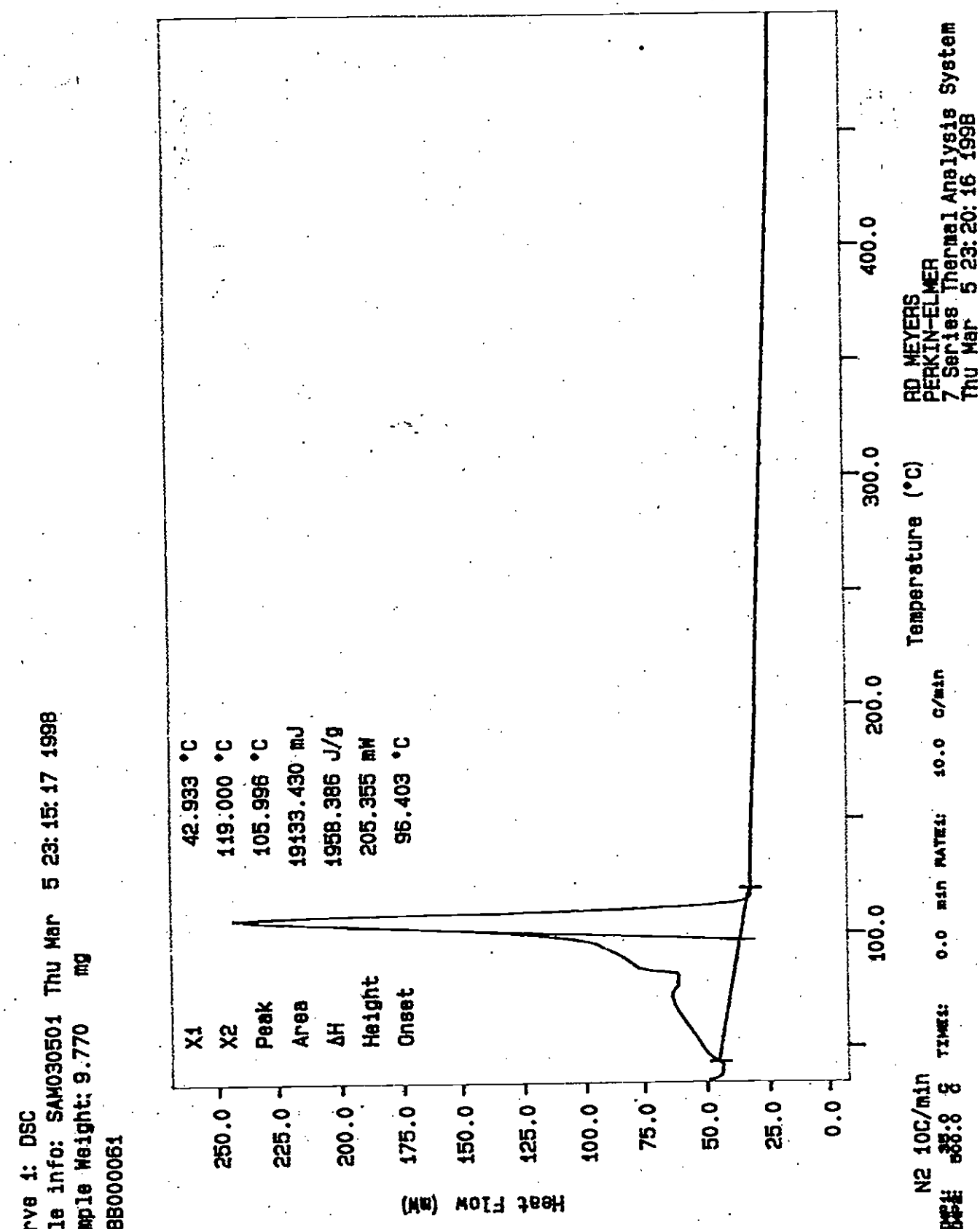
RD MEYERS
PERKIN-ELMER
7 Series Thermal Analysis System
Thu Mar 5 22:13:13 1998

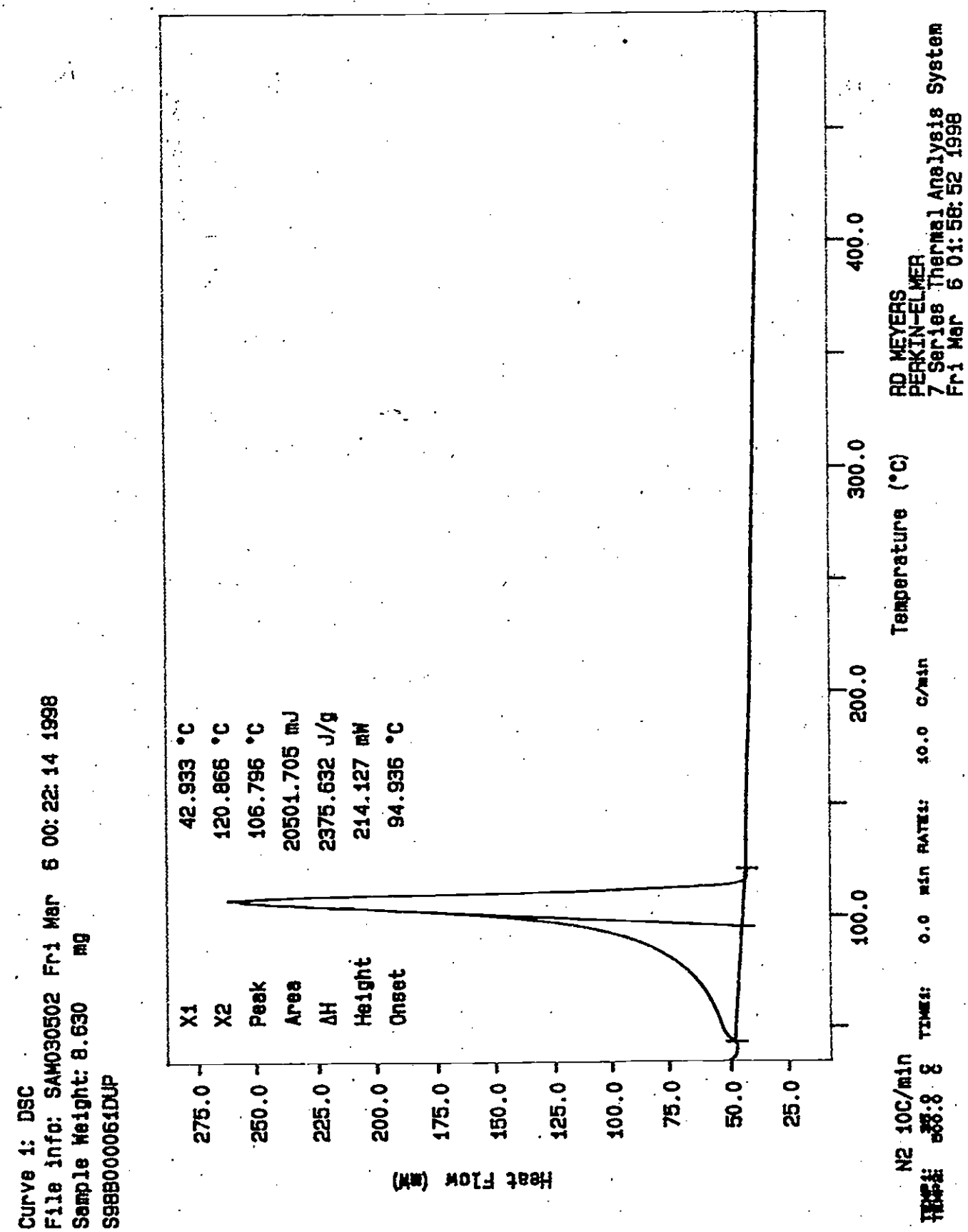
HNF-SD-WM-DP-801 REV. 0

Mar. 6. 1998 7:54AM WHC 222S LAB ROOM 2F BACKSIDE

HNF-3208, REV. 0, ATT A, Pg. 322

27


Curve 1: DSC
File info: SAM030501 Thu Mar 5 23:15:17 1998
Sample Weight: 9.770 mg
S98B000061
X1 42.933 °C
X2 119.000 °C
Peak 105.996 °C
Area 19133.430 mJ
ΔH 1958.386 J/g
Height 205.355 mW
Onset 96.403 °C
Heat Flow (mW)
250.0
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
100.0
200.0
300.0
400.0
Temperature (°C)
RD MEYERS
PERKIN-ELMER
7 Series Thermal Analysis System
Thu Mar 5 23:20:16 1998
N2 10C/min
0.0 min RATE: 10.0 C/min


Curve 1: DSC
File Info: SAM030502 Fri Mar 6 00:22:14 1998
Sample Weight: 8.630 mg
S9BB000061DUP
X1 42.933 °C
X2 120.866 °C
Peak 106.796 °C
Area 20501.705 mJ
ΔH 2375.632 J/g
Height 214.127 mW
Onset 94.936 °C
Heat Flow (mW)
275.0
250.0
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
100.0
200.0
300.0
400.0
Temperature (°C)
N2 10C/min
RD MEYERS
PERKIN-ELMER
7 Series Thermal Analysis System
Fri Mar 6 01:58:52 1998

worklistrpt Version 2.1 05/15/95
03/17/98 13:22

HNF-SD-WM-DP-301 REV. 0

LABCORE Data Entry Template for Worklist# 23002

Analyst: ppb **Instrument:** DSC0 2 **Book #** NA

~~**Method:** LA-514-113 Rev/Mod~~ 3/17/98

Worklist Comment: dsc02 for B-Plant liquid. seh

GROUP	PROJECT	S	TYPE	SAMPLE#	R	A	-------TEST------	MATRIX	ACTUAL	FOUND	DL	UNIT
98000140	TK-21-1 (1)	1	SAMPLE	S98B000061	0		DSC-02	LIQUID	N/A	0		Joules/g Dry
98000140	TK-21-1 (1)	2	DUP	S98B000061	0		DSC-02	LIQUID	0	0	N/A	Joules/g Dry

Final page for worklist # 23002

Bachelor 3/17/98
Analyst Signature **Date**

Analyst Signature **Date**

Data Entry Comments:

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

worklistrpt Version 2.1 05/15/95
03/02/98 09:09

LABCORE Data Entry Template for Worklist# 22654

Analyst: [signature] **Instrument:** TGA0 3 **Book #** 103N8A

Method: LA-514-114 Rev/Mod D-1

Worklist Comment: B Plant Tk21-1 .010mL TERLIQ skb

GROUP	PROJECT	S	TYPE	SAMPLE#	R	A	TEST	MATRIX	ACTUAL	FOUND	DL	UNIT
		1	STD				TGA-03	LIQUID	59.0	59.07	N/A	%
98000140	TK-21-1 (1)	2	SAMPLE	S98B000061	0		TGA-03	LIQUID	N/A	99.26		%
98000140	TK-21-1 (1)	3	DUP	S98B000061	0		TGA-03	LIQUID	99.26	98.72	N/A	%

Final page for worklist # 22654

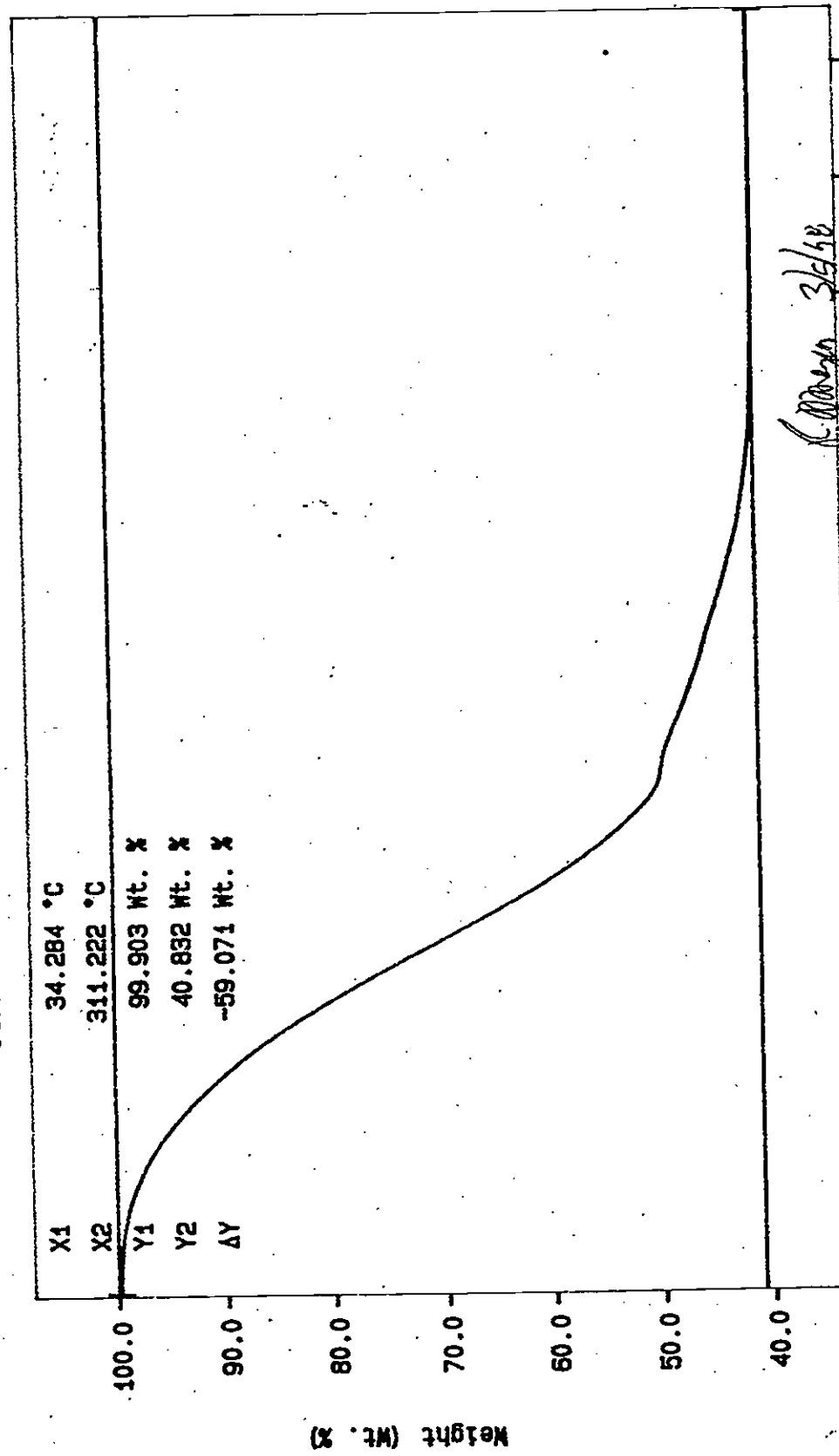
[signature] 3/6/98
Analyst Signature **Date**

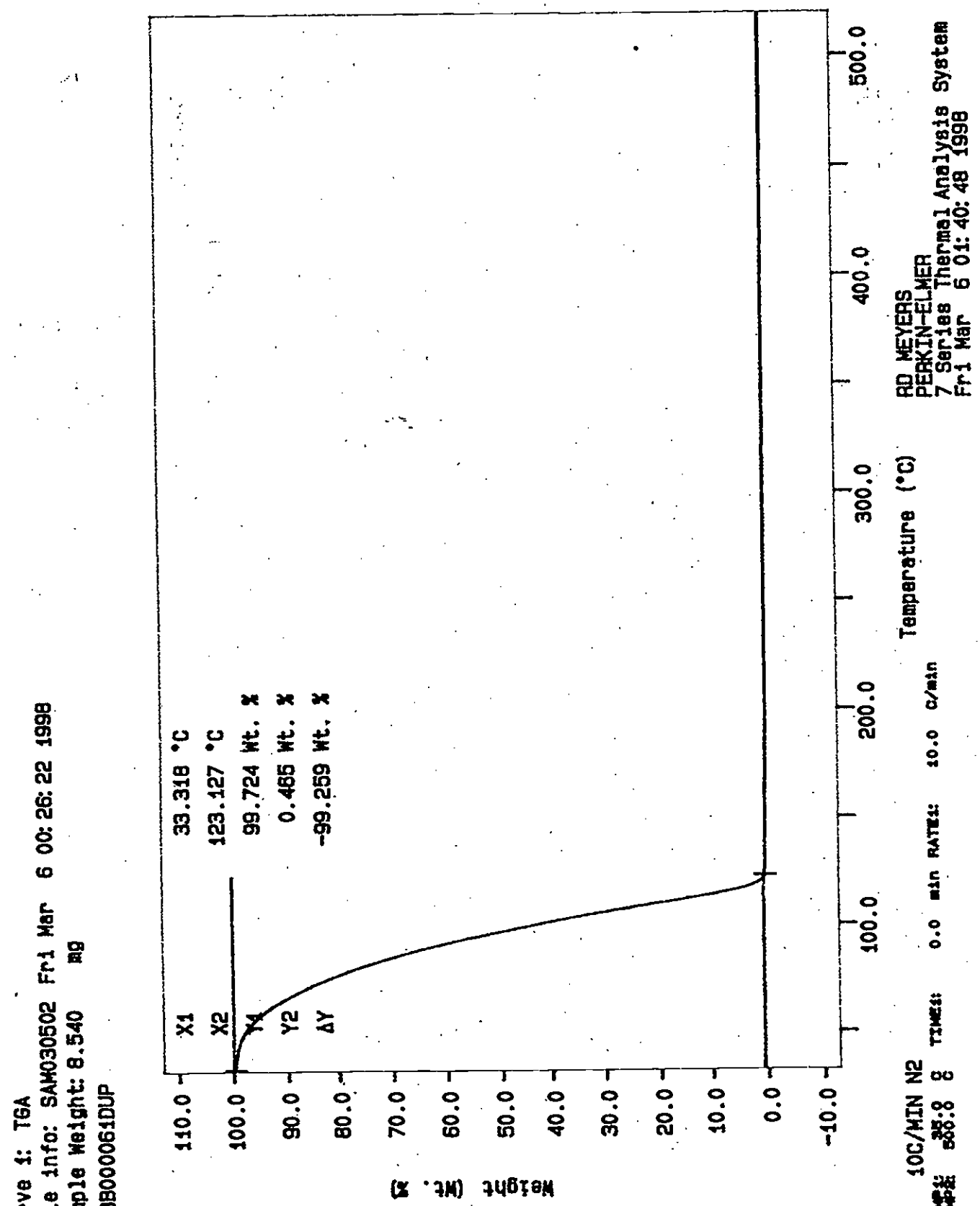
[signature] 3/6/98
Analyst Signature **Date**

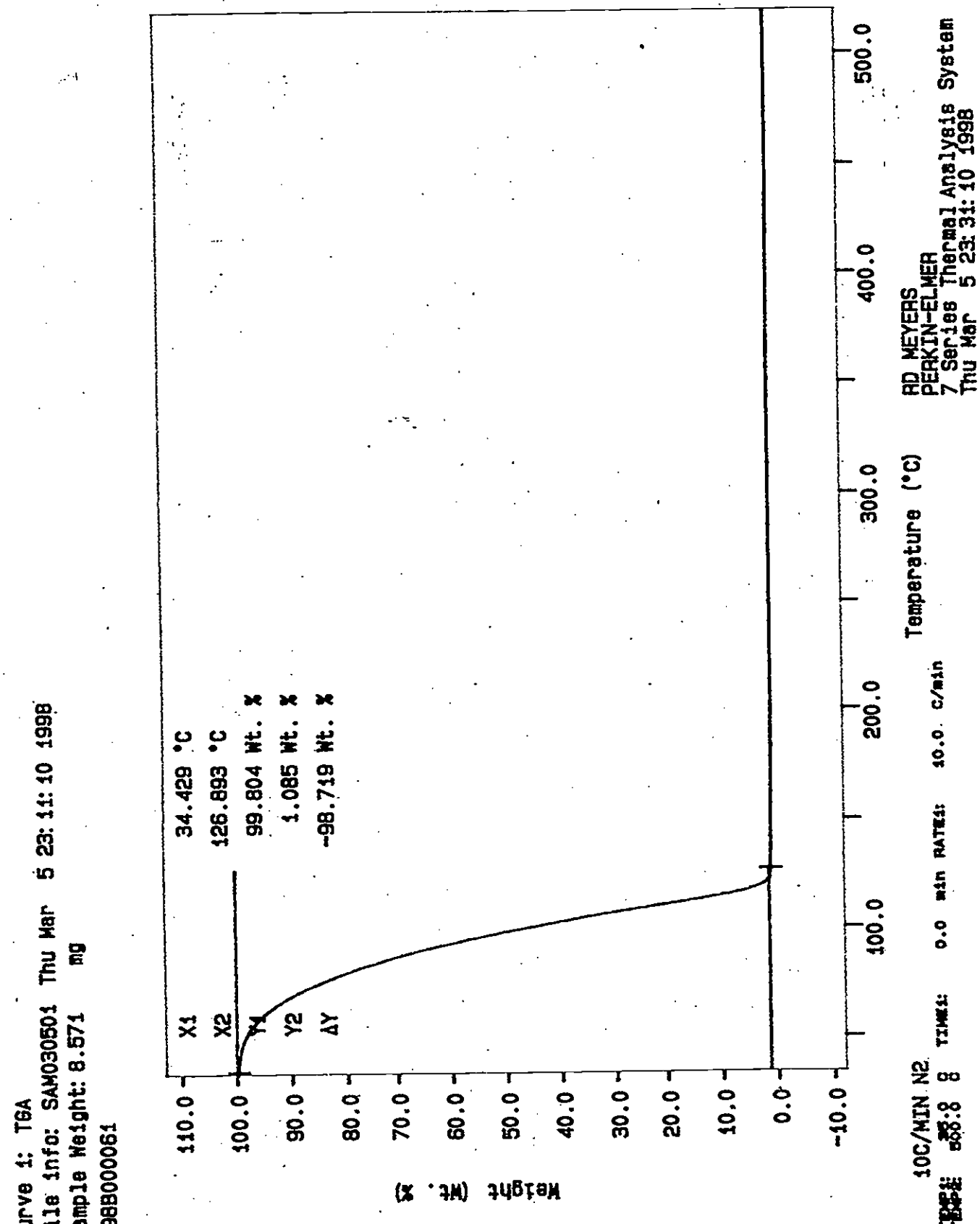
Validated 3/6/98 [signature]

Data Entry Comments:

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.


Curve 1: T6A
File Info: TEWR030501 Thu Mar 5 19:30:18 1998
Sample Weight: 12.026 mg
103N8-A STD
SIGNATURE BELOW REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES ____TO ____
X1 34.284 °C
X2 311.222 °C
Y1 99.903 Wt. %
Y2 40.832 Wt. %
ΔY -59.071 Wt. %
Weight (Wt. %)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
75.0
125.0
175.0
225.0
275.0
Temperature (°C)
10C/MIN N2
RD MEYERS
PERKIN-ELMER
7 Series Thermal Analysis System
Thu Mar 5 20:19:59 1998


Curve 1: TGA
File info: SAM030502 Fri Mar 6 00:26:22 1998
Sample Weight: 8.540 mg
S98B00006IDUP
X1 33.318 °C
X2 123.127 °C
Y1 99.724 Wt. %
Y2 0.485 Wt. %
ΔY -99.259 Wt. %
Weight (Wt. %)
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
100.0
200.0
300.0
400.0
500.0
Temperature (°C)
10C/MIN N2
RD MEYERS
PERKIN-ELMER
7 Series Thermal Analysis System
Fri Mar 6 01:40:48 1998


Curve 1: TGA
File info: SAM030501 Thu Mar 5 23:11:10 1998
Sample Weight: 8.571 mg
S98B000061
X1 34.429 °C
X2 126.893 °C
Y1 99.804 Wt. %
Y2 1.085 Wt. %
ΔY -98.719 Wt. %
Weight (Wt. %)
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
100.0
200.0
300.0
400.0
500.0
Temperature (°C)
RD MEYERS
PERKIN-ELMER
7 Series Thermal Analysis System
Thu Mar 5 23:31:10 1998
10C/MIN N2
0.0 min RATE: 10.0 C/min

LABCORE Data Entry Template for Worklist# 22648

Analyst: RDS **Instrument:** BA001 **Book #** 134 NH4 C

Method: LA-510-112 Rev/Mod D-1

Worklist Comment: B Plant Tk21-1 SPG-01 ZNCL2 std skb

GROUP	PROJECT	S	TYPE	SAMPLE#	R	A	TEST	MATRIX	ACTUAL	FOUND	DL	UNIT
		1	STD				SPG-01	LIQUID	1.3779	1.345	N/A	Sp.G.
98000140	TK-21-1 (1)	2	SAMPLE	S98B000061	0		SPG-01	LIQUID	N/A	1.010	0.010	Sp.G.
98000140	TK-21-1 (1)	3	DUP	S98B000061	0		SPG-01	LIQUID	1.010	1.009	N/A	Sp.G.

Final page for worklist # 22648

RDDavis 3/3/98
Analyst Signature **Date**

Susan Lee 3/04/98
Analyst Signature **Date**

Approved RW Schroeder 3/9/98

Data Entry Comments:

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

SPECIFIC GRAVITY : LA-510-112 (D-1)

Type		STANDARD	STANDARD
STANDARD	Gross Weight (W2)	1.9720	1.9525
Work List	Tare Weight (W1)	1.8709	1.8514
22648	Weight of Solution (W2-W1)	0.1011	0.1011
Test Code	Volume of Solution µL	75.1400	75.1400
SPG-01	Specific Gravity	1.3455	1.3455
Matrix	Specific Gravity (Average)	1.3455	
LIQUID			
Sample #			
STANDARD			
Instrument Code	Gross Weight (W2) = Wt. of vial + cap + cotton + solution		
BA001	Tare Weight (W1) = Wt. of vial + cap + cotton		
Analyst			
RDM	Specific Gravity = [(W2-W1) * 1000 µL/mL] / [Vol. of Solution µL * 1.000 g/mL]		
Date			
03/04/98	v RESULT v		
Time	Specific Gravity Average =	1.345	
04:30 AM			

Data Entry by:		Date:	03/04/98
Approved by:	RW Schneider	Date:	3/9/98

Form 510112L1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

SPECIFIC GRAVITY : LA-510-112 (D-1)

Type		SAMPLE	REPLICATE
SAMPLE	Gross Weight (W2)	1.8994	0.0000
Work List	Tare Weight (W1)	1.8235	0.0000
22648	Weight of Solution (W2-W1)	0.0759	0
Test Code	Volume of Solution µL	75.1400	0.0000
SPG-01	Specific Gravity	1.0101	NA
Matrix			
LIQUID			
Sample #			
S98B000061			
Instrument Code	Gross Weight (W2) = Wt. of vial + cap + cotton + solution		
BA001	Tare Weight (W1) = Wt. of vial + cap + cotton		
Analyst			
RDM	Specific Gravity = [(W2-W1) * 1000 µL/mL] / [Vol. of Solution µL * 1.000 g/mL]		
Date			
03/04/98	v RESULT v		
Time	Specific Gravity =	1.010	
04:30 AM			

Data Entry by:		Date:	03/04/98
Approved by:	Rex Schroeder	Date:	3/9/98

Form 510112L1 Rev. 1.1

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

SPECIFIC GRAVITY : LA-510-112 (D-1)

Type
DUP
Work List
22648
Test Code
SPG-01
Matrix
LIQUID
Sample #
S98B000061
Instrument Code
BA001
Analyst
RDM
Date
03/04/98
Time
04:30 AM

	DUP	REPLICATE
Gross Weight (W2)	1.9731	0.0000
Tare Weight (W1)	1.8973	0.0000
Weight of Solution (W2-W1)	0.0758	0
Volume of Solution µL	75.1400	0.0000
Specific Gravity	1.0088	NA

Gross Weight (W2) = Wt. of vial + cap + cotton + solution

Tare Weight (W1) = Wt. of vial + cap + cotton

Specific Gravity = [(W2-W1) * 1000 µL/mL] / [Vol. of Solution µL * 1.000 g/mL]

v RESULT v

Specific Gravity =	1.009

Data Entry by:		Date:	03/04/98
Approved by:	RW Schroeder	Date:	3/9/98

Form 510112L1 Rev. 1.1

LABCORE Data Entry Template for Worklist# 22647

Analyst: [signature] **Instrument:** PH01 _____ **Book #** 16N19D

Method: LA-212-106 Rev/Mod C-O

Worklist Comment: B Plant Tk21-1 PH-01 DIRECT std. skb

GROUP	PROJECT	S TYPE	SAMPLE#	R	A	TEST	MATRIX	ACTUAL	FOUND	DL	UNIT
		1 STDPH				PH-01	LIQUID	8.00	7.94	N/A	pH
98000140	TK-21-1 (1)	2 SAMPLE	S98B000061	0		PH-01	LIQUID	N/A	0.71	0.01	pH
98000140	TK-21-1 (1)	3 DUP	S98B000061	0		PH-01	LIQUID	0.71	0.71	N/A	pH

Final page for worklist # 22647

[signature] 3/3/98
Analyst Signature **Date**

[signature] 3/09/98
Analyst Signature **Date**

Approved RW Schroeder 3/9/98

Data Entry Comments:

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

worklistrpt Version 2.1 05/15/95
03/02/98 08:08

LABCORE Data Entry Template for Worklist# 22652

Analyst: NK **Instrument:** PH01 **Book #** 10/18-A

Method: LA-211-102 Rev/Mod

Worklist Comment: B Plant Tk21-1 OH-01 skb

GROUP	PROJECT	S	TYPE	SAMPLE#	R	A	-------TEST------	MATRIX	ACTUAL	FOUND	DL	UNIT
		1	STD				OH-01	LIQUID	N/A	PH=1.3	N/A	ug/mL
		2	BLNK				OH-01	LIQUID	N/A	PH=1.3	N/A	ug/mL
98000140	TK-21-1 (1)	3	SAMPLE	S98B000061	0		OH-01	LIQUID	N/A	PH=1.3		ug/mL
98000140	TK-21-1 (1)	4	DUP	S98B000061	0		OH-01	LIQUID	N/A	PH=1.3	N/A	ug/mL

Final page for worklist # 22652

Nat Kim 3/5/98
Analyst Signature **Date**

3-5-98
Analyst Signature **Date**

Approved RW Schneider 3/5/98

Data Entry Comments: Sample PH to low to run R. Kim

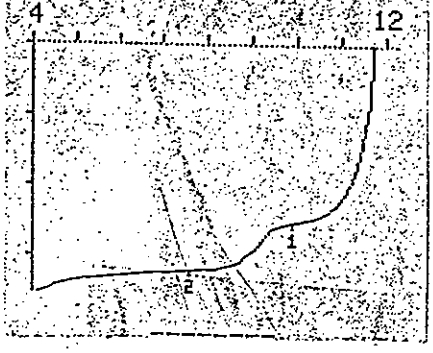
Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

```
date 98-03-05 time 16:40
GET pH          12  #  284
Id.#1          209
Id.#2        .1994
pH(init)      5.80
              V/ml          pH
EP1           .008        4.78
manual stop
        ========


date 98-03-05 time 16:40
GET pH          12  #  284
.10ml/div          ΔpH=1/div
start V     .000 ml
```

```
date 98-03-05 time 16:46
GET pH          12  #  285
Id.#1          209
Id.#2        .1994
pH(init)     11.70
              V/ml          pH
EP1           .253        9.90
EP2           .322        7.57
manual stop
        ========


date 98-03-05 time 16:46
GET pH          12  #  285
.10ml/div          ΔpH=1/div
start V     .000 ml
```



S98000006/

```
C00=            1ml

date 98-03-05 time 16:54
GET pH          12  #  286
Id.#1         61-1
Id.#2        .1994
pH(init)     11.30
manual stop
        ========
```

```
calibration data
date       98-03-05
pH(S) 1        7.00
pH(S) 2       10.00
t.cal.         23.0 °C
slope(rel)     .983
U(as)         -1.5 mV
electr. input   1
        ========
```

worklistrpt Version 2.1 05/15/95
04/01/98 10:29

HNF-SD-WM-DP-301 REV. 0

LABCORE Data Entry Template for Worklist# 23253

Analyst: NK **Instrument:** PH01 **Book #** 9678-A

Method: LA-211-102 Rev/Mod D-0

Worklist Comment: H+ION-01 FOR B PLANT TK-21-1 RUSH RTS

GROUP	PROJECT	S TYPE	SAMPLE#	R A	-------TEST------	MATRIX	ACTUAL	FOUND	DL	UNIT
		1 STD			H+ION-01	LIQUID	2.02	1.93	N/A	moles/Liter
		2 BLNK			H+ION-01	LIQUID	1	ok	N/A	moles/Liter
98000140	TK-21-1 (1)	3 SAMPLE	S98B000062	0	H+ION-01	LIQUID	N/A	2.72 e-1		moles/Liter
98000140	TK-21-1 (1)	4 DUP	S98B000062	0	H+ION-01	LIQUID	2.72 e-1	2.66 e-1	N/A	moles/Liter

Final page for worklist # 23253

Nat Wing 4/2/98
Analyst Signature Date

[signature] 4/6/98
Analyst Signature Date

Approved RW Schroeder 4/6/98

Data Entry Comments:

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

```
calibration data
date     98-04-02
pH(S) 1      4.00
pH(S) 2      7.00
t.cal.       23.5 °C
slope(rel)   .988
U(as)        -7.2 mV
electr. input  1
         ========
```

Blank

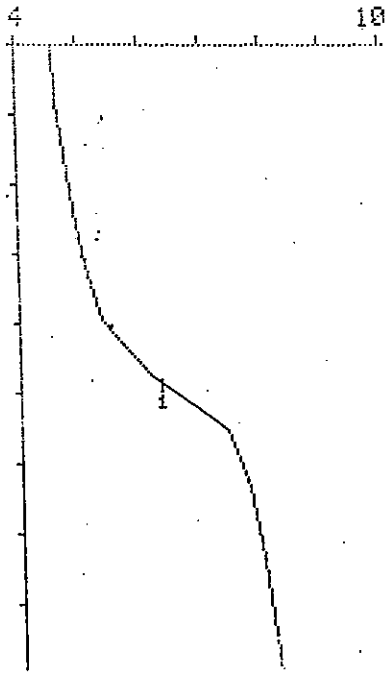
```
pH          6.80
```

Std

```
C00=        .050ml

date 98-04-02 time 09:28
GET pH          11  #  297
Id.#1         61-1
Id.#2        .2012
pH(init)      4.61
            V/ml          pH
EP1          .480        6.32
manual stop
         ========
```

```
date 98-04-02 time 09:29
GET pH          11  #  297
.10ml/div       ΔpH=1/div
start V    .000 ml
```

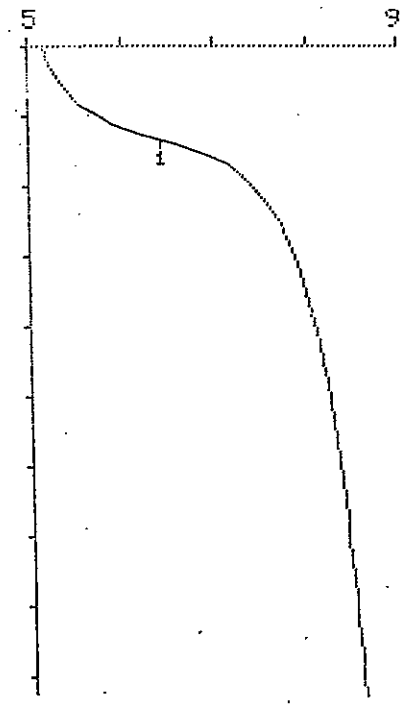


S98B000062

```
Id.#1          62
C00=        .100ml

date 98-04-02 time 09:51
GET pH          11  #  299
Id.#1          62
Id.#2        .2012
pH(init)      5.16
            V/ml          pH
EP1          .135        6.44
manual stop
         ========
```

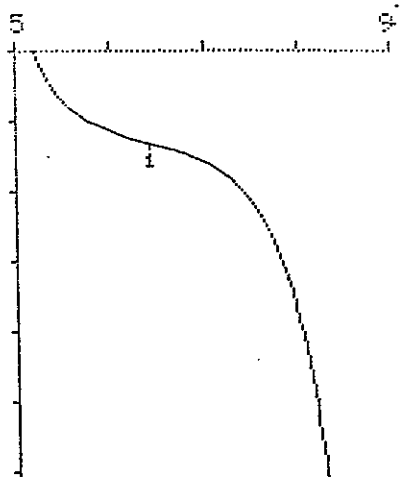
```
date 98-04-02 time 09:52
GET pH          11  #  299
.10ml/div       ΔpH=1/div
start V    .000 ml
```



S98B000062Dup

```
date 98-04-02 time 09:59
GET pH          11  #  300
Id.#1        62-2
Id.#2        .2012
pH(init)      5.19
            V/ml          pH
EP1          .132        6.42
manual stop
         ========
```

```
date 98-04-02 time 10:00
GET pH          11  #  300
.10ml/div       ΔpH=1/div
start V    .000 ml
```



PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

All values are for H^+ ion instead of OH^-
RWS 4/6/98

OH (AUTO) : LA-211-102 (D-0)

Type	Sample Size (mL) SS	STD
STD	Concentration of HNO3 (Molarity)	0.050
Work List	HNO3 Titrant at OH end-point in mL	0.2012
23253	Dilution Factor DF	0.480
Test Code	Concentration of OH in Sample (Molarity)	1
H+ION-01	OH in Sample in µg/mL (PPM)	1.93E+00
Matrix		3.28E+04
LIQUID		
Sample#	Detection Limit = 125µg / SS * DF	
STD		
Instrument Code	Detection Limit (µg/mL)	2.50E+03
PH-01		
Analyst	OH Molarity =((mL HNO3)*(M HNO3))/Sample Size in mL*Dilution Factor	
rwk		
Date	OH in µg/mL = (OH MOLARITY)*(17.0g/mole)*((1000000µg/g)/(1000mL/L))	
04/02/98		
Time	RWS 4/6/98	STD
	Concentration of ~~OH~~ H^+ in Sample (Molarity)	1.93E+00
	OH in Sample in µg/mL (PPM)	3.28E+04

Data Entry by:		Date:	04/06/98
Approved by:	RW Edwards	Date:	4/6/98

Form 211102_1 Rev. 1.3

Page 1 of 1

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

OH (AUTO) : LA-211-102 (D-0)

Type	Work List	Test Code	Matrix	Sample #	Instrument Code	Analyst	Date	Time
SAMPLE	23253	H+ION-01	LIQUID	S98B000062	PH-01	rwk	04/02/98	

	SAMPLE
Sample Size (mL) SS	0.100
Concentration of HNO3 (Molarity)	0.2012
HNO3 Titrant at OH end-point in mL	0.135
Dilution Factor DF	1
Concentration of OH in Sample (Molarity)	2.72E-01
OH in Sample in µg/mL (PPM)	4.62E+03

Detection Limit = 125µg / SS * DF

Detection Limit (µg/mL)	1.25E+03

OH Molarity =((mL HNO3)*(M HNO3))/Sample Size in mL*Dilution Factor

OH in µg/mL = (OH MOLARITY)*(17.0g/mole)*((1000000µg/g)/(1000mL/L))

4/09/98

	SAMPLE
Concentration of OH in Sample (Molarity) H+	2.72E-01
OH in Sample in µg/mL (PPM)	4.62E+03

Data Entry by:		Date:	04/06/98
Approved by:	RW Schroeder	Date:	4/6/98

PLACE ANALYTICAL CARD IN BOX BELOW OR ATTACH TRAVELER

OH (AUTO) : LA-211-102 (D-0)

		DUP
Type	Sample Size (mL) SS	0.100
DUP	Concentration of HNO3 (Molarity)	0.2012
Work List	HNO3 Titrant at OH end-point in mL	0.132
23253	Dilution Factor DF	1
Test Code	Concentration of OH in Sample (Molarity)	2.66E-01
H+ION-01	OH in Sample in µg/mL (PPM)	4.51E+03
Matrix		
LIQUID		
Sample #	Detection Limit = 125µg / SS * DF	
S98B000062		
Instrument Code	Detection Limit (µg/mL)	1.25E+03
PH-01		
Analyst	OH Molarity =((mL HNO3)*(M HNO3))/Sample Size in mL*Dilution Factor	
rwk		
Date	OH in µg/mL = (OH MOLARITY)*(17.0g/mole)*((1000000µg/g)/(1000mL/L))	
04/02/98		
Time	4/09/98	DUP
	Concentration of ~~OH~~ in Sample (Molarity) H+	2.66E-01
	OH in Sample in µg/mL (PPM)	4.51E+03

Data Entry by:		Date:	04/06/98
Approved by:	RW Schroeder	Date:	4/6/98

Form 211102_1 Rev. 1.3 Page 1 of 1

worklistrpt Version 2.1 05/15/95
03/05/98 19:56

HNF-SD-WM-DP-301 REV. 0

LABCORE Data Entry Template for Worklist# 22661

Analyst: RWK **Instrument:** NH301 _____ **Book #** 41N19D

Method: LA-631-001 Rev/Mod C-0

Worklist Comment: B Plant Tk21-1 NH3-01 1mL NH3STD skb

GROUP	PROJECT	S	TYPE	SAMPLE#	R	A	-------TEST------	MATRIX	ACTUAL	FOUND	DL	UNIT
		1	STD				NH3-01	LIQUID	4.08e2	4.39e2	N/A	ug/mL
		2	BLNK				NH3-01	LIQUID	1	<0.200	N/A	ug/mL
98000140	TK-21-1 (1)	3	SAMPLE	S98B000062	0		NH3-01	LIQUID	N/A	2.49e2	5.00	ug/mL
98000140	TK-21-1 (1)	4	DUP	S98B000062	0		NH3-01	LIQUID	2.49e2	2.09e2	N/A	ug/mL
98000140	TK-21-1 (1)	5	SPK	S98B000062	0		NH3-01	LIQUID	100	116	N/A	ug/mL
		6	STD				NH3-01	LIQUID	4.08e2	3.94e2	N/A	ug/mL

Final page for worklist # 22661

SEE ATTACHED
Analyst Signature **Date**

RW Schroeder 3/9/98
Analyst Signature **Date**

Data Entry Comments:

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

03/02/98 10:19
A-0004-1

HNF-SD-WM-DP-301 REV. 0

LABCORE Data Entry Template for Worklist# 22661

Analyst: NK **Instrument:** NH301 _____ **Book#** 4/17/9-D

Method: LA-631-001 Rev/Mod _____

Worklist Comment: B Plant Tk21-1 NH3-01 1mL NH3STD skb

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	STD				NH3-01	LIQUID		
2	BLNK				NH3-01	LIQUID		
3	SAMPLE	S98B000062	0		NH3-01	LIQUID	98000140	TK-21-1 (1)
		Analytes Requested: NH3-01						
4	DUP	S98B000062	0		NH3-01	LIQUID		
5	SPK	S98B000062	0		NH3-01	LIQUID		
6	STD				NH3-01	LIQUID		

Final page for worklist # 22661

Nob Kim 3/5/98
Analyst Signature Date

Analyst Signature Date

Data Entry Comments:

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

HNF-SD-WM-DP-301 REV. 0

WORKBOOK PAGE: STD1

AMMONIA (NH3) : LA-631-001 (C-0) LIQUIDS/SOLIDS

			STD
Type	Instrument Data (µg/mL)	ID	17.700
STD	Blank Result from the Instrument (µg/mL)	BR	0.1210
Work List	Vol of Sample for Dilution (mL) or Vol of Sample Direct (mL)	VSAM	1.0
22661	Final Vol of Dilution (mL) or Vol of Sample Direct (mL)	FVOL	25.0
Test Code	LCS Standard Book Number	LCS	41N19D
NH3-01	LCS Standard Concentration (µg/mL)	STD VAL	4.08E+02
Matrix			
LIQUID			
Batch Number			
98001000			
Rerun			
0			
Sample Prep			
N/A	NH3 Concentration (µg/mL)	NH3 CONC	4.39E+02
Sample #			
STANDARD	Method Detection Limit (µg/mL)	1.00	
Instrument Code			
NH301			
Prepared By			
RCJ	NH3 Concentration (µg/mL) = (ID-BR) * (FVOL / VSAM)		
Chemist			
RWS			
Analyst			
RWK	LCS Standard % Recovery = (NH3 CONC / STD VAL) * 100		
Date Complete			
03/05/98			
Analysis Date			
03/05/98			
Analysis Time	LCS Standard % Recovery		108%
03:00 PM			
Sample Point	NH3 Concentration (µg/mL)		4.39E+02
TK 21-1			

Analyst: RWK Date: 03/05/98

Signature of Chemist: RW Schroeder RWS Date: 3/9/98

SAMPLE.WB1 REV XX 37810NML

HNF-SD-WM-DP-301 REV. 0

WORKBOOK PAGE: BLANK2

AMMONIA (NH3) : LA-631-001 (C-0) LIQUIDS/SOLIDS

			BLNK
Type	Instrument Data (µg/mL)	ID	0.121
BLNK	Blank Result from the Instrument (µg/mL)	BR	0.1210
Work List	Vol of Sample for Dilution (mL) or Vol of Sample Direct (mL)	VSAM	25 ~~1.0~~ A
22661	Final Vol of Dilution (mL) or Vol of Sample Direct (mL)	FVOL	25.0
Test Code			
NH3-01			
Matrix			
LIQUID			
Batch Number			
98001000			
Rerun			
0			
Sample Prep			
N/A	NH3 Concentration (µg/mL)	NH3 CONC	< ~~1.00E+00~~
Sample #			< 0.200 3/
BLANK	Method Detection Limit (µg/mL)	.200 x 25/25 = 5.00 / 0.200	~~1.00~~ RWS 3/9/98
Instrument Code			
NH301			
Prepared By			
RCJ	NH3 Concentration (µg/mL) = ~~(BR)~~ (ID-BR) * (FVOL / VSAM)		
Chemist			
RWS	RWS 3/9/98		
Analyst			
RWK			
Date Complete			
03/05/98			
Analysis Date			
03/05/98			
Analysis Time			
03:00 PM			
Sample Point	NH3 Concentration (µg/mL)	< 0.200	~~< 1.00E+00~~
TK 21-1			RWS 3/9/98

Analyst:		RWK Date:	03/05/98
Signature of Chemist:	RW Schroeder	RWS Date:	3/9/98

SAMPLE.WB1 REV XX 37810NML

HNF-SD-WM-DP-301 REV. 0

WORKBOOK PAGE: SAM3

AMMONIA (NH3) : LA-631-001 (C-0) LIQUIDS/SOLIDS

			SAMPLE
Type	Instrument Data (µg/mL)	ID	10.100
SAMPLE	Blank Result from the Instrument (µg/mL)	BR	0.1210
Work List	Vol of Sample for Dilution (mL) or Vol of Sample Direct (mL)	VSAM	1.0
22661	Final Vol of Dilution (mL) or Vol of Sample Direct (mL)	FVOL	25.0
Test Code			
NH3-01			
Matrix			
LIQUID			
Batch Number			
98001000			
Rerun			
0			
Sample Prep			
N/A	NH3 Concentration (µg/mL)	NH3 CONC	2.49E+02
Sample #			
S98B000062	Method Detection Limit (µg/mL)	.200 X 25/1 = 5.00 ~~1.00~~ RWS 3/9/98	
Instrument Code			
NH301			
Prepared By			
RCJ	NH3 Concentration (µg/mL) = (ID-BR) * (FVOL / VSAM)		
Chemist			
RWS			
Analyst			
RWK			
Date Complete			
03/05/98			
Analysis Date			
03/05/98			
Analysis Time			
03:00 PM			
Sample Point	NH3 Concentration (µg/mL)		2.49E+02
TK 21-1			

Analyst:		RWK Date: 03/05/98
Signature of Chemist:	RW Schroeder	RWS Date: 3/9/98

37810NML

SAMPLE.WB1 REV XX

HNF-SD-WM-DP-301 REV. 0

WORKBOOK PAGE: DUP4

AMMONIA (NH3) : LA-631-001 (C-0) LIQUIDS/SOLIDS

			DUP
Type	Instrument Data (µg/mL)	ID	8.490
DUP	Blank Result from the Instrument (µg/mL)	BR	0.1210
Work List	Vol of Sample for Dilution (mL) or Vol of Sample Direct (mL)	VSAM	1.0
22661	Final Vol of Dilution (mL) or Vol of Sample Direct (mL)	FVOL	25.0
Test Code			
NH3-01			
Matrix			
LIQUID			
Batch Number	Sample Concentration (µg/mL)	SAM CONC	2.49E+02
98001000			
Rerun			
0			
Sample Prep			
N/A	NH3 Concentration (µg/mL)	NH3 CONC	2.09E+02
Sample #			
S98B000062	Method Detection Limit (µg/mL) .200 x 25/1 = 5.00 ~~1.00~~ RWS 3/9/98		
Instrument Code			
NH301	RPD (DUP & SAM) = Absolute Val. ((NH3 CONC - SAM CONC) / ((NH3 CONC + SAM CONC) / 2)) * 10		
Prepared By			
RCJ	NH3 Concentration (µg/mL) = (ID-BR) * (FVOL / VSAM)		
Chemist			
RWS			
Analyst			
RWK			
Date Complete			
03/05/98			
Analysis Date			
03/05/98			
Analysis Time			
03:00 PM	RPD (DUP & SAM)		18%
Sample Point	NH3 Concentration (µg/mL)		2.09E+02
TK 21-1			

Analyst:		RWK Date: 03/05/98
Signature of Chemist:	RW Schroeder	RWS Date: 3/9/98

SAMPLE.WB1 REV XX 37810NML

I:\631001\OUT\22661.WB1 03/05/98 19:57:17

HNF-SD-WM-DP-301 REV. 0

WORKBOOK PAGE: SPIKE5

AMMONIA (NH3) : LA-631-001 (C-0) LIQUIDS/SOLIDS

			SPK
Type	Instrument Data (µg/mL)	ID	23.000
SPK	Blank Result from the Instrument (µg/mL)	BR	0.1210
Work List	Vol of Sample for Dilution (mL) or Vol of Sample Direct (mL)	VSAM	1.0
22661	Final Vol of Dilution (mL) or Vol of Sample Direct (mL)	FVOL	25.0
Test Code	Spike Book Number	SPK	41N19D
NH3-01	Spike Value (µg/mL)	SPK VAL	4.08E+02
Matrix	Vol of Spike Standard Used (mL)	VOL SPK	0.680
LIQUID			
Batch Number			
98001000			
Rerun	Sample Instrument Data (µg/mL)	SAM ID	10.1
0	Sample Volume of Sample (mL)	SAM VSAM	1.0
Sample Prep	Sample Final Volume (mL)	SAM FVOL	25.0
N/A	NH3 Concentration (µg/mL)	NH3 CONC	5.72E+02
Sample #			
S98B000062	Method Detection Limit (µg/mL)	1.00	
Instrument Code			
NH301			
Prepared By			
RCJ	NH3 Concentration (µg/mL) = (ID-BR) * (FVOL / VSAM)		
Chemist			
RWS	QC ACTUAL = SPK VAL * Vol spk		
Analyst	QC FOUND = (((ID-BR) * FVOL) - (SAM ID - BR) * SAM FVOL * (VSAM / SAM VSAM))		
RWK	Spike % Recovery =		
Date Complete	((((ID-BR) * FVOL) - (SAM ID - BR) * SAM FVOL * (VSAM / SAM VSAM)) / (SPK VAL * VOL SPK)) * 100		
03/05/98			
Analysis Date	QC ACTUAL (µg)	2.77e2	4.08E+02
03/05/98	QC FOUND (µg)	3.23e2	~~3.23E+02~~ 93
Analysis Time	Spike % Recovery	116%	4/8/98
03:00 PM			
Sample Point	NH3 Concentration (µg/mL)	5.72E+02	
TK 21-1			

Analyst: RWK Date: 03/05/98

Signature of Chemist: RW Schroeder RWS Date: 5/7/98

37810NML

SAMPLE.WB1 REV XX

WORKBOOK PAGE: ST_END6

AMMONIA (NH3) : LA-631-001 (C-0) LIQUIDS/SOLIDS

Type	Instrument Data (µg/mL)	ID	STD
STD	Blank Result from the Instrument (µg/mL)	BR	15.900
Work List	Vol of Sample for Dilution (mL) or Vol of Sample Direct (mL)	VSAM	0.1210
22661	Final Vol of Dilution (mL) or Vol of Sample Direct (mL)	FVOL	1.0
Test Code	LCS Standard Book Number	LCS	25.0
NH3-01	LCS Standard Concentration (µg/mL)	STD VAL	41N19D
Matrix			4.08E+02
LIQUID			
Batch Number			
98001000			
Rerun			
0			
Sample Prep			
N/A	NH3 Concentration (µg/mL)	NH3 CONC	3.94E+02
Sample #			
ENDING STANDAR	Method Detection Limit (µg/mL)	.200 x 25/1 = 5.00 ~~1.00~~	
Instrument Code			
NH301			
Prepared By			
RCJ	NH3 Concentration (µg/mL) = (ID-BR) * (FVOL / VSAM)		
Chemist			
RWS			
Analyst			
RWK	LCS Standard % Recovery = (NH3 CONC / STD VAL) * 100		
Date Complete			
03/05/98			
Analysis Date			
03/05/98			
Analysis Time	LCS Standard % Recovery		97%
03:00 PM			
Sample Point	NH3 Concentration (µg/mL)		3.94E+02
TK 21-1			

RWS 3/9/98

Analyst:		RWK Date:	03/05/98
Signature of Chemist:	RW Schroeder	RWS Date:	3/9/98

SAMPLE.WB1 REV XX 37810NML

DOUBLE KNOWN ADDITION SELECTED
AT 09:07, 03-05-98

SAMPLE VOL= 25.000 AT 09:07, 03-05-98
ENTERED

EMF= 59.6 mV AT 09:09, 03-05-98

EMF= 58.9 mV AT 09:09, 03-05-98

EMF= 58.7 mV AT 09:10, 03-05-98

EMF= 58.6 mV AT 09:10, 03-05-98

EMF= 58.7 mV AT 09:11, 03-05-98
ENTERED

STD CONCN= 1000 AT 09:11, 03-05-98
ENTERED

STD VOL= .25000 AT 09:11, 03-05-98
ENTERED

EMF= 47.7 mV AT 09:13, 03-05-98

EMF= 47.5 mV AT 09:14, 03-05-98

EMF= 47.3 mV AT 09:14, 03-05-98

EMF= 47.2 mV AT 09:14, 03-05-98

EMF= 47.2 mV AT 09:15, 03-05-98
ENTERED

STD VOL= 2.5000 AT 09:16, 03-05-98
ENTERED

EMF= 10.0 mV AT 09:19, 03-05-98

EMF= 9.7 mV AT 09:19, 03-05-98

EMF= 9.5 mV AT 09:20, 03-05-98

EMF= 9.5 mV AT 09:20, 03-05-98
ENTERED

1:NH3 SLOPE=-60.6 mV/DEC
AT 09:20, 03-05-98

1:NH3 CONCN= 17.7

Std

DOUBLE KNOWN ADDITION SELECTED
AT 07:39, 03-05-98

SAMPLE VOL= 25.000 AT 07:40, 03-05-98
ENTERED

EMF= 180.4 mV AT 07:55, 03-05-98

EMF= 182.2 mV AT 07:57, 03-05-98

EMF= 182.7 mV AT 07:57, 03-05-98

EMF= 183.1 mV AT 07:58, 03-05-98

EMF= 183.3 mV AT 07:58, 03-05-98

EMF= 183.7 mV AT 07:58, 03-05-98

EMF= 183.9 mV AT 07:59, 03-05-98

EMF= 184.3 mV AT 07:59, 03-05-98

EMF= 184.4 mV AT 07:59, 03-05-98
ENTERED

STD CONCN= 1000 AT 08:00, 03-05-98
ENTERED

STD VOL= .25000 AT 08:00, 03-05-98
ENTERED

EMF= 71.6 mV AT 08:04, 03-05-98

EMF= 71.1 mV AT 08:04, 03-05-98

EMF= 71.0 mV AT 08:05, 03-05-98

EMF= 70.6 mV AT 08:05, 03-05-98

EMF= 70.5 mV AT 08:05, 03-05-98

EMF= 70.4 mV AT 08:06, 03-05-98
ENTERED

STD VOL= 2.5000 AT 08:06, 03-05-98
ENTERED

EMF= 11.9 mV AT 08:10, 03-05-98

EMF= 11.6 mV AT 08:10, 03-05-98

EMF= 11.3 mV AT 08:11, 03-05-98

EMF= 11.2 mV AT 08:11, 03-05-98
ENTERED

1:NH3 SLOPE=-59.5 mV/DEC
AT 08:11, 03-05-98

```
DOUBLE KNOWN ADDITION SELECTED
 AT 10:49, 03-05-98

SAMPLE VOL= 25.000 AT 10:50, 03-05-98
ENTERED

EMF= 77.2 mV AT 10:54, 03-05-98

EMF= 77.1 mV AT 10:55, 03-05-98

EMF= 76.6 mV AT 10:55, 03-05-98

EMF= 76.7 mV AT 10:56, 03-05-98

EMF= 76.8 mV AT 10:56, 03-05-98
ENTERED

STD CONCN= 1000 AT 10:56, 03-05-98
ENTERED

STD VOL= .25000 AT 10:57, 03-05-98
ENTERED

EMF= 60.1 mV AT 10:59, 03-05-98

EMF= 59.3 mV AT 10:59, 03-05-98

EMF= 59.1 mV AT 11:00, 03-05-98

EMF= 58.9 mV AT 11:00, 03-05-98

EMF= 58.9 mV AT 11:00, 03-05-98
ENTERED

STD VOL= 2.5000 AT 11:01, 03-05-98
ENTERED

EMF= 15.0 mV AT 11:04, 03-05-98

EMF= 14.6 mV AT 11:04, 03-05-98

EMF= 14.4 mV AT 11:05, 03-05-98

EMF= 14.3 mV AT 11:05, 03-05-98
ENTERED

1:NH3 SLOPE=-60.6 mV/DEC
 AT 11:05, 03-05-98

1:NH3 CONCN= 10.1
```

S 98B000062
1 ml

DOUBLE KNOWN ADDITION SELECTED
AT 11:15, 03-05-98

SAMPLE VOL= 25.000 AT 11:15, 03-05-98
ENTERED

EMF= 82.8 mV AT 11:16, 03-05-98

EMF= 82.3 mV AT 11:16, 03-05-98

EMF= 82.1 mV AT 11:17, 03-05-98

EMF= 81.9 mV AT 11:17, 03-05-98

EMF= 81.8 mV AT 11:17, 03-05-98
ENTERED

STD CONCN= 1000 AT 11:17, 03-05-98
ENTERED

STD VOL= .25000 AT 11:18, 03-05-98
ENTERED

EMF= 62.3 mV AT 11:20, 03-05-98

EMF= 62.1 mV AT 11:21, 03-05-98

EMF= 61.9 mV AT 11:21, 03-05-98

EMF= 61.9 mV AT 11:22, 03-05-98

EMF= 61.7 mV AT 11:22, 03-05-98

EMF= 61.8 mV AT 11:22, 03-05-98
ENTERED

STD VOL= 2.5000 AT 11:23, 03-05-98
ENTERED

EMF= 16.7 mV AT 11:26, 03-05-98

EMF= 16.2 mV AT 11:26, 03-05-98

EMF= 16.1 mV AT 11:27, 03-05-98

EMF= 15.9 mV AT 11:27, 03-05-98

EMF= 15.9 mV AT 11:27, 03-05-98
ENTERED

1:NH3 SLOPE=-59.9 mV/DEC
AT 11:28, 03-05-98

S98B0000 62
1 ML
DUP

```
DOUBLE KNOWN ADDITION SELECTED
 AT 11:35, 03-05-98

SAMPLE VOL= 25.000 AT 11:35, 03-05-98
ENTERED

EMF= 59.0 mV AT 11:36, 03-05-98

EMF= 59.2 mV AT 11:37, 03-05-98

EMF= 59.2 mV AT 11:37, 03-05-98
ENTERED

STD CONCN= 1000 AT 11:38, 03-05-98
ENTERED

STD VOL= .25000 AT 11:38, 03-05-98
ENTERED

EMF= 50.1 mV AT 11:40, 03-05-98

EMF= 49.8 mV AT 11:41, 03-05-98

EMF= 49.7 mV AT 11:41, 03-05-98

EMF= 49.2 mV AT 11:42, 03-05-98

EMF= 49.5 mV AT 11:42, 03-05-98

EMF= 49.5 mV AT 11:42, 03-05-98

EMF= 49.5 mV AT 11:43, 03-05-98
ENTERED

STD VOL= 2.5000 AT 11:43, 03-05-98
ENTERED

EMF= 14.5 mV AT 11:46, 03-05-98

EMF= 14.1 mV AT 11:46, 03-05-98

EMF= 13.8 mV AT 11:47, 03-05-98

EMF= 13.6 mV AT 11:48, 03-05-98

EMF= 13.6 mV AT 11:48, 03-05-98
ENTERED

1:NH3 SLOPE=-63.6 mV/DEC
 AT 11:48, 03-05-98

1:NH3 CONCN= 23.0
```

Spike

S98B000062

1mL S.S,
.680 mL Spike

```
DOUBLE KNOWN ADDITION SELECTED
 AT 12:00, 03-05-98

SAMPLE VOL= 25.000 AT 12:00, 03-05-98
ENTERED

EMF= 68.1 mV AT 12:03, 03-05-98

EMF= 67.0 mV AT 12:03, 03-05-98

EMF= 66.4 mV AT 12:04, 03-05-98

EMF= 66.2 mV AT 12:04, 03-05-98

EMF= 65.9 mV AT 12:04, 03-05-98

EMF= 65.7 mV AT 12:05, 03-05-98

EMF= 65.8 mV AT 12:05, 03-05-98

EMF= 65.5 mV AT 12:06, 03-05-98

EMF= 65.5 mV AT 12:06, 03-05-98
ENTERED

STD CONCN= 1000 AT 12:07, 03-05-98
ENTERED

STD VOL= .25000 AT 12:07, 03-05-98
ENTERED

EMF= 54.2 mV AT 12:09, 03-05-98

EMF= 53.8 mV AT 12:09, 03-05-98

EMF= 53.5 mV AT 12:10, 03-05-98

EMF= 53.4 mV AT 12:10, 03-05-98

EMF= 53.3 mV AT 12:10, 03-05-98

EMF= 53.3 mV AT 12:11, 03-05-98
ENTERED

STD VOL= 2.5000 AT 12:11, 03-05-98
ENTERED

EMF= 15.9 mV AT 12:14, 03-05-98

EMF= 15.5 mV AT 12:14, 03-05-98

EMF= 15.4 mV AT 12:15, 03-05-98

EMF= 15.3 mV AT 12:16, 03-05-98

EMF= 15.3 mV AT 12:17, 03-05-98
ENTERED

1:NH3 SLOPE=-58.9 mV/DEC
 AT 12:17, 03-05-98
```

Ending Std

LABCORE Completed Worklist Report for Worklist# 22649

Analyst: vlm **Instrument:** IC01 **Book#** 1/18N207

Method: LA-533-105 Rev/Mod E-0

Worklist Comment: B Plant Tk21-1 IC-01 .100mL-10mL DIONEX IV skb

Seq	Type	Sample#	R	A	Test	Matrix	Actual		Found	DL or Yield	Unit
1	CCB		0		@IC-QC	F	QC	1		<1.20e-2		ug/mL
1	CCB		0		@IC-QC	CL	QC	1		<1.70e-2		ug/mL
1	CCB		0		@IC-QC	NO2	QC	1		<1.08e-1		ug/mL
1	CCB		0		@IC-QC	BR	QC	1		<1.25e-1		ug/mL
1	CCB		0		@IC-QC	NO3	QC	1		<1.39e-1		ug/mL
1	CCB		0		@IC-QC	PO4	QC	1		<1.20e-1		ug/mL
1	CCB		0		@IC-QC	SO4	QC	1		1.64e-01	0.164	ug/mL
1	CCB		0		@IC-QC	OXALATE2	QC	1		<1.05e-1		ug/mL
2	CCV		0		@IC-QC	F	QC	5.90e1		5.97e+01	101.186	% Recovery
2	CCV		0		@IC-QC	CL	QC	8.00e1		8.15e+01	101.875	% Recovery
2	CCV		0		@IC-QC	NO2	QC	5.42e2		5.30e+02	97.786	% Recovery
2	CCV		0		@IC-QC	BR	QC	5.89e2		5.87e+02	99.660	% Recovery
2	CCV		0		@IC-QC	NO3	QC	5.94e2		5.79e+02	97.475	% Recovery
2	CCV		0		@IC-QC	PO4	QC	5.45e2		5.25e+02	96.330	% Recovery
2	CCV		0		@IC-QC	SO4	QC	6.32e2		6.38e+02	100.949	% Recovery
2	CCV		0		@IC-QC	OXALATE2	QC	5.31e2		5.26e+02	99.058	% Recovery
3	SAMPLE	S98B000061	0		@IC-01	F-02	LIQUID	N/A	<	1.333e+01	13.330	ug/mL
3	SAMPLE	S98B000061	0		@IC-01	CL-02	LIQUID	N/A		3.665e+01	18.890	ug/mL
3	SAMPLE	S98B000061	0		@IC-01	NO2-02	LIQUID	N/A	<	1.200e+02	120.000	ug/mL
3	SAMPLE	S98B000061	0		@IC-01	BR-02	LIQUID	N/A	<	1.389e+02	138.900	ug/mL
3	SAMPLE	S98B000061	0		@IC-01	NO3-02	LIQUID	N/A		1.810e+04	154.400	ug/mL
3	SAMPLE	S98B000061	0		@IC-01	PO4-02	LIQUID	N/A		2.223e+02	133.300	ug/mL
3	SAMPLE	S98B000061	0		@IC-01	SO4-02	LIQUID	N/A		3.614e+02	153.300	ug/mL
3	SAMPLE	S98B000061	0		@IC-01	OXALATE2	LIQUID	N/A		1.256e+03	116.700	ug/mL
4	DUP	S98B000061	0		@IC-01	F-02	LIQUID	<1.33e1		<1.33e1		RPD
4	DUP	S98B000061	0		@IC-01	CL-02	LIQUID	3.66e+01		4.12e+01	11.825	RPD
4	DUP	S98B000061	0		@IC-01	NO2-02	LIQUID	<1.20e2		<1.20e2		RPD
4	DUP	S98B000061	0		@IC-01	BR-02	LIQUID	<1.39e2		<1.39e2		RPD
4	DUP	S98B000061	0		@IC-01	NO3-02	LIQUID	1.81e+04		1.78e+04	1.671	RPD
4	DUP	S98B000061	0		@IC-01	PO4-02	LIQUID	2.22e+02		2.10e+02	5.556	RPD
4	DUP	S98B000061	0		@IC-01	SO4-02	LIQUID	3.61e+02		3.40e+02	5.991	RPD
4	DUP	S98B000061	0		@IC-01	OXALATE2	LIQUID	1.26e+03		1.25e+03	0.797	RPD
5	SPK	S98B000061	0		@IC-01	F-02	LIQUID	5.90e1		6.18e+01	104.746	% Recovery
5	SPK	S98B000061	0		@IC-01	CL-02	LIQUID	8.00e1		7.78e+01	97.250	% Recovery
5	SPK	S98B000061	0		@IC-01	NO2-02	LIQUID	5.42e2		5.35e+02	98.708	% Recovery
5	SPK	S98B000061	0		@IC-01	BR-02	LIQUID	5.89e2		5.87e+02	99.660	% Recovery
5	SPK	S98B000061	0		@IC-01	NO3-02	LIQUID	5.94e2		5.68e+02	95.623	% Recovery
5	SPK	S98B000061	0		@IC-01	PO4-02	LIQUID	5.45e2		5.30e+02	97.248	% Recovery
5	SPK	S98B000061	0		@IC-01	SO4-02	LIQUID	6.32e2		6.32e+02	100.000	% Recovery
5	SPK	S98B000061	0		@IC-01	OXALATE2	LIQUID	5.31e2		5.21e+02	98.117	% Recovery

Units shown for QC (BLK/BKG) may not reflect the actual units.

LABCORE Completed Worklist Report for Worklist# 22649

Seq	Type	Sample#	R	A	Test	Matrix	Actual	Found	DL or Yield	Unit

Final page for worklist# 22649

RLthal 3/4/98
Analyst Signature Date

Analyst Signature Date

James M. Frye 3/4/98
Reviewer Signature Date

Units shown for QC (BLK/BKG) may not reflect the actual units.

LABCORE Data Entry Template for Worklist# 22649

Analyst: VLM **Instrument:** IC0 IC01 **Book#** 11820 N20-19 VLM 3-03-98

Method: LA-533-105 Rev/Mod E-0

Worklist Comment: B Plant Tk21-1 IC-01 .100mL-10mL DIONEX IV skb

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	CCB				@IC-QC	QC		
2	CCV				@IC-QC	QC		
3	SAMPLE	S98B000061	0		@IC-01	LIQUID	98000140	TK-21-1 (1)
	Analytes Requested:	BR-02 , CL-02 , F-02 , NO2-02 , NO3-02 , OXALATE2, PO4-02 , SO4-02						
4	DUP	S98B000061	0		@IC-01	LIQUID		
5	SPK	S98B000061	0		@IC-01	LIQUID		

Final page for worklist # 22649

Valerie L Massi 03-03-98
Analyst Signature **Date**

Analyst Signature **Date**

Data Entry Comments:

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

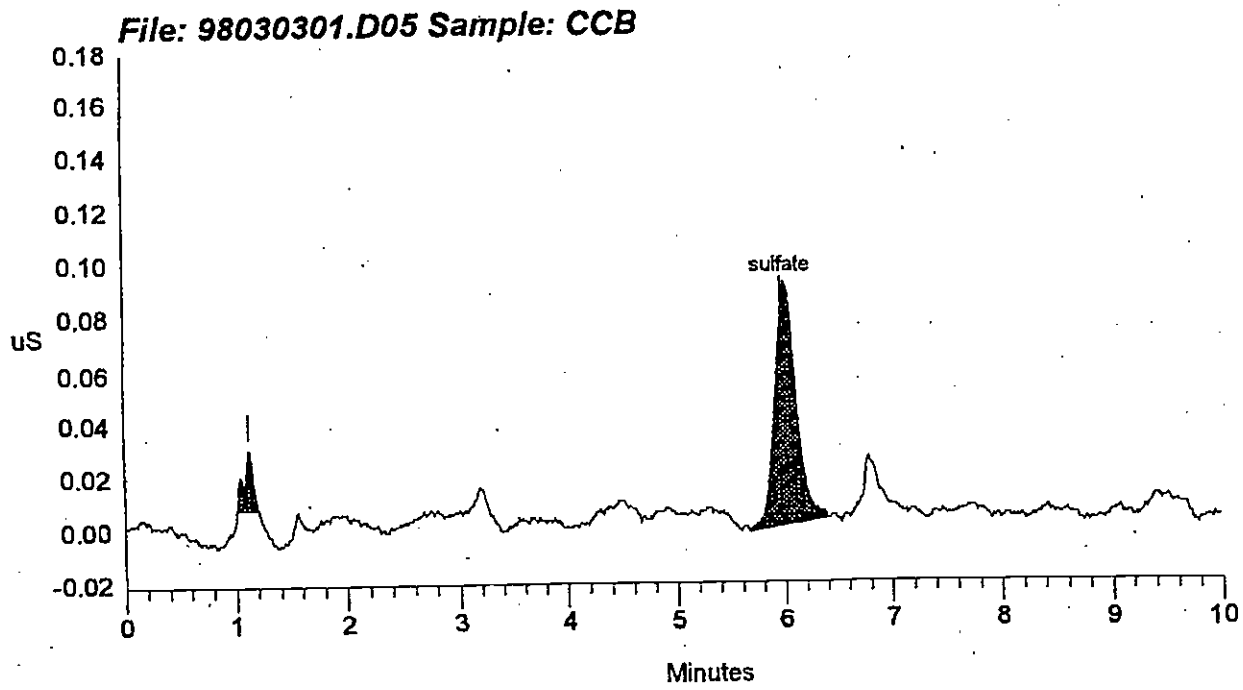
Sample Name: CCB
Data File : C:\DX\DATA\98030301.D05
Method : C:\DX\METHOD\KIT.MET
ACI Address: 1 System: 1 Inject#: 5
Analyst : Valeria Massie 03-03-98

Date: 03/03/1998 13:59:14
HNF-SD-WM-DP-301 REV. 0
Detector: CDM-1
Column: AG4A/AS4A anion column

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area Reject
External	1	1	3000	5Hz	0.00	10.00	30

********** Peak Report: All Peaks **********

Pk. Num	Ret Time	Component Name	Concentration ug/ml	Height	Area	Bl. Code	%Delta
1	1.13		0.000	23	136	1	
2	5.97	sulfate	0.164	80	1267	1	1.82
		Totals	0.164	103	1403		



SIGNATURE BELOW REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES _____ TO _____.

Sample Name: CCV 118N20-D
Data File : C:\DX\DATA\98030301.D06
Method : C:\DX\METHOD\KIT.MET
ACI Address: 1 System: 1 Inject#: 6
Analyst : Valerie Mosier 03-03-98

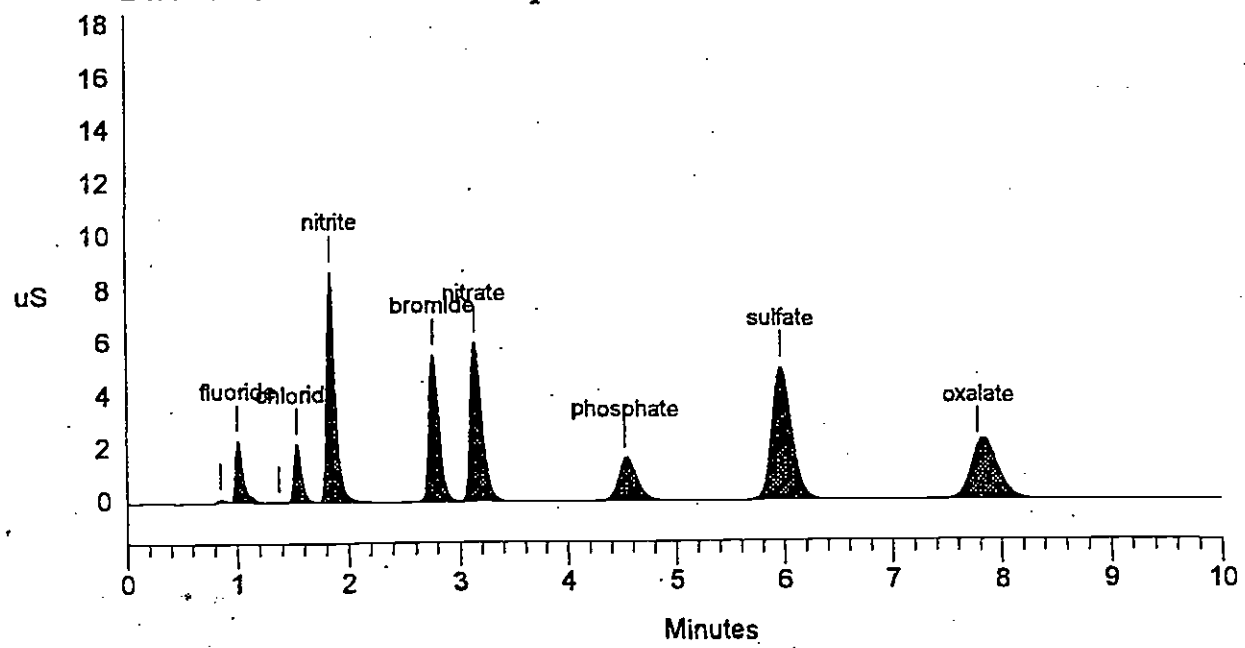
Date: 03/03/1998 14:19:51
HNF-SD-WM-DP-301 REV. 0
Detector:CDM-1
Column: AG4A/AS4A anion column

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area Reject
External	1	101	3000	5Hz	0.00	10.00	30

********** Peak Report: All Peaks **********

Pk. Num	Ret Time	Component Name	Concentration ug/ml	Height	Area	Bl. Code	%Delta
1	0.85		0.000	104	479	2	
2	1.01	fluoride	59.738	2325	11229	2	0.33
3	1.38		0.000	15	62	1	
4	1.54	chloride	81.511	2207	10168	1	0.00
5	1.84	nitrite	530.103	8696	46487	1	-1.43
6	2.77	bromide	587.486	5561	34011	1	1.97
7	3.14	nitrate	579.381	6035	43981	1	-1.57
8	4.53	phosphate	524.821	1600	19439	1	1.19
9	5.97	sulfate	637.779	5018	64122	1	1.82
10	7.79	oxalate	526.074	2103	39998	1	2.10
		Totals	3526.893	33664	269976		

File: 98030301.D06 Sample: CCV 118N20-D



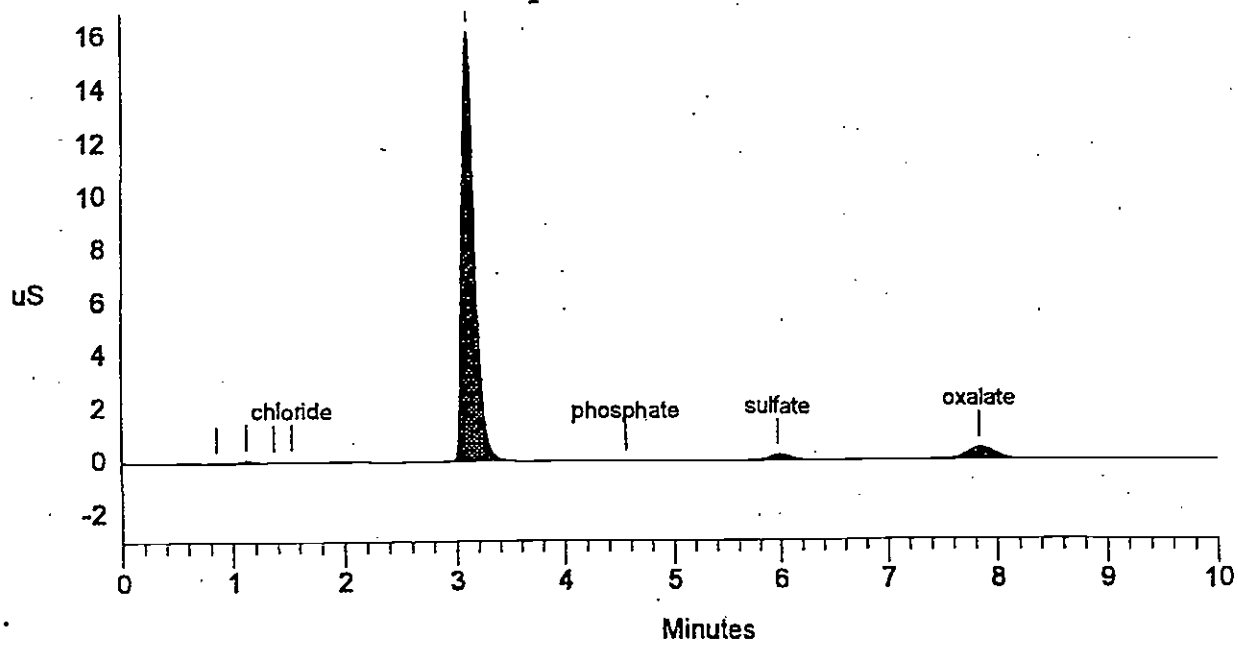
Sample Name: S98B000061 Date: 03/03/1998 15:08:40
Data File : C:\DX\DATA\98030301.D09
Method : C:\DX\METHOD\KIT.MET HNF-SD-WM-DP-301 REV. 0
ACI Address: 1 System: 1 Inject#: 9 Detector:CDM-1
Analyst : Valerie Maccue Column: AG4A/AS4A anion column
03-03-98

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area Reject
External	1	1111	3000	5Hz	0.00	10.00	30

********** Peak Report: All Peaks **********

Pk. Num	Ret Time	Component Name	Concentration ug/ml	Height	Area	Bl. Code	%Delta
2	1.13		0.000	88	478	1	
3	1.37		0.000	31	188	2	
4	1.53	chloride	36.654	60	259	2	-0.43
5	3.09	nitrate	18099.384	16197	130009	1	-3.03
6	4.56	phosphate	222.311	21	243	1	1.79
7	5.97	sulfate	361.371	204	2893	1	1.82
8	7.84	oxalate	1255.645	456	7876	1	2.80
		Totals	19975.366	17056	141945		

File: 98030301.D09 Sample: S98B000061



Sample Name: S98B000061 DUP
Data File : C:\DX\DATA\98030301.D10
Method : C:\DX\METHOD\KIT.MET
ACI Address: 1 System: 1 Inject#: 10
Analyst : Valerie Moore 03-03-98

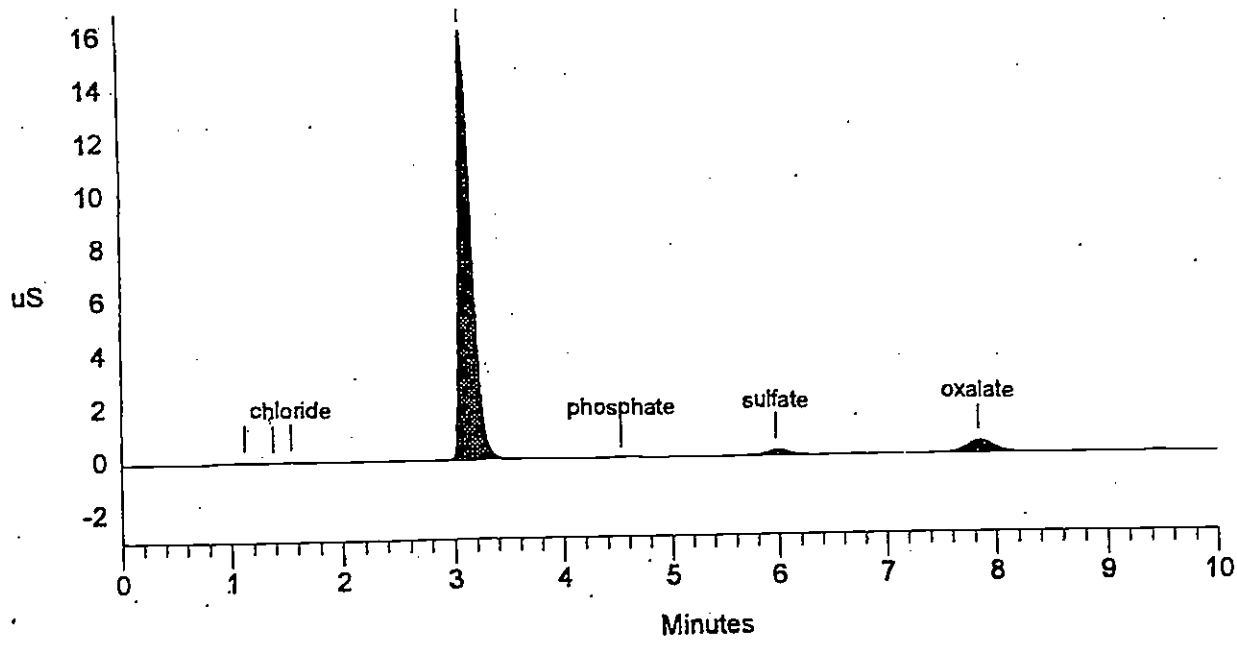
Date: 03/03/1998 15:19:40
HNF-SD-WM-DP-301 REV. 0
Detector:CDM-1
Column: AG4A/AS4A anion column

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area Reject
External	1	1111	3000	5Hz	0.00	10.00	30

********** Peak Report: All Peaks **********

Pk. Num	Ret Time	Component Name	Concentration ug/ml	Height	Area	Bl. Code	%Delta
1	1.13		0.000	77	517	1	
2	1.38		0.000	25	137	1	
3	1.54	chloride	41.161	75	310	1	0.00
4	3.09	nitrate	17804.350	16103	127789	1	-3.03
5	4.53	phosphate	209.928	20	201	1	1.19
6	5.97	sulfate	340.364	190	2703	1	1.82
7	7.84	oxalate	1252.560	453	7854	1	2.80
		Totals	19648.362	16943	139511		

File: 98030301.D10 Sample: S98B000061 DUP



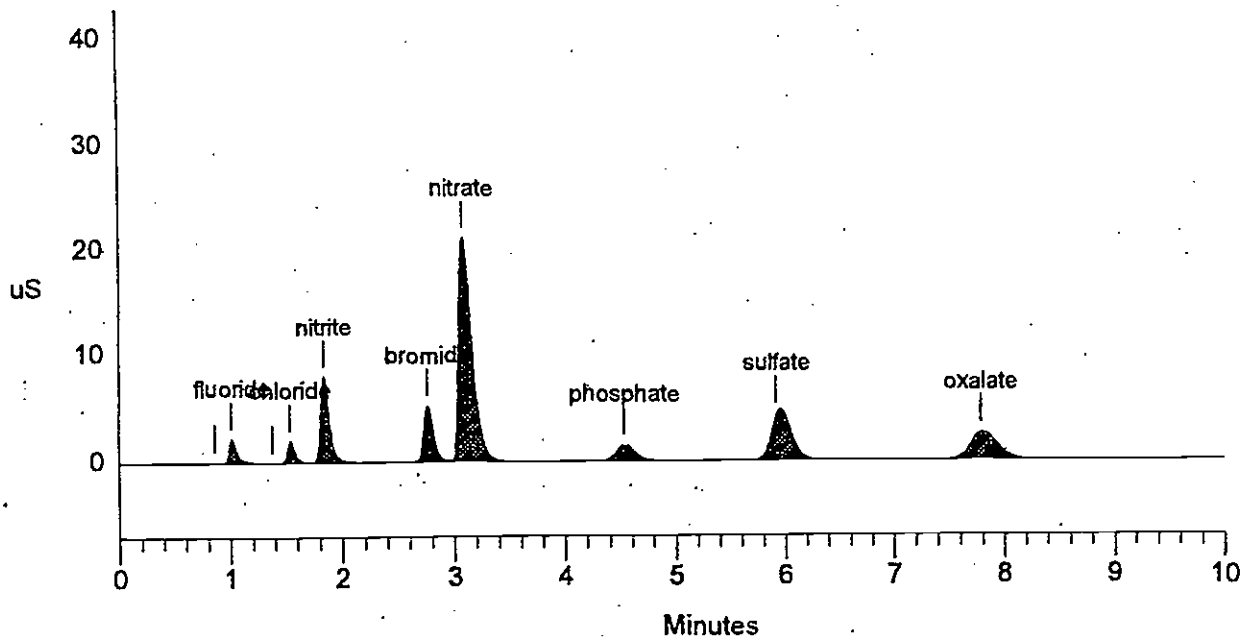
Sample Name: S98B000061 SPIKE Date: 03/03/1998 15:31:08
Data File : C:\DX\DATA\98030301.D11
Method : C:\DX\METHOD\KIT.MET HNF-SD-WM-DP-301 REV. 0
ACI Address: 1 System: 1 Inject#: 11 Detector:CDM-1
Analyst : Valerie Mascil Column: AG4A/AS4A anion column
03-03-98

Calibration	Volume	Dilution	Points	Rate	Start	Stop	Area Reject
External	1	1111	3000	5Hz	0.00	10.00	30

********** Peak Report: All Peaks **********

Pk. Num	Ret Time	Component Name	Concentration ug/ml	Height	Area	Bl. Code	%Delta
1	0.85		0.000	87	387	2	
2	1.01	fluoride	624.646	2205	10653	2	0.33
3	1.37		0.000	14	57	1	
4	1.53	chloride	822.235	2016	9299	1	-0.43
5	1.83	nitrite	5401.891	7973	42955	1	-1.79
6	2.76	bromide	5930.580	5252	31093	1	1.72
7	3.07	nitrate	23840.392	21074	173812	1	-3.66
8	4.53	phosphate	5573.956	1535	18741	1	1.19
9	5.92	sulfate	6748.472	4398	61631	1	0.91
10	7.79	oxalate	6520.033	2589	45218	1	2.10
		Totals	55462.205	47144	393845		

File: 98030301.D11 Sample: S98B000061 SPIKE



03/05/98 16:12
A-0004-1

HNF-SD-WM-DP-301 REV. 0

Page: 1

LABCORE Data Entry Template for Worklist# 22780

Analyst: Vlm **Instrument:** ICP~~01~~ 2 SP 3/5/98 **Book#** 70B48B

Method: LA-505-~~151~~/161 Rev/Mod C-2 SP 3/5/98

Worklist Comment: ICP TK 21-1 (B PLANT)

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	ICV				@ICP-QC	QC		
2	ICB				@ICP-QC	QC		
3	LLS				@ICP-QC	QC		
4	ICSA				@ICP-QC	QC		
5	ICSAB				@ICP-QC	QC		
6	SAMPLE	S98B000062	0	D	@ICP-D01	LIQUID	98000140	TK-21-1 (1)
		Analytes Requested:			AG-D-01 , AL-D-01 , AS-D-01 , B-D-01 , BA-D-01 , BE-D-01 , BI-D-01 , CA-D-01 , CD-D-01 , CE-D-01 , CO-D-01 , CR-D-01 , CU-D-01 , FE-D-01 , K-D-01 , LA-D-01 , LI-D-01 , MG-D-01 , MN-D-01 , MO-D-01 , NA-D-01 , ND-D-01 , NI-D-01 , P-D-01 , PB-D-01 , S-D-01 , SB-D-01 , SE-D-01 , SI-D-01 , SM-D-01 , SR-D-01 , TI-D-01 , TL-D-01 , U-D-01 , V-D-01 , ZN-D-01 , ZR-D-01			
7	DUP	S98B000062	0	D	@ICP-D01	LIQUID		
8	ICSA				@ICP-QC	QC		
9	ICSAB				@ICP-QC	QC		
10	CCV				@ICP-QC	QC		
11	CCB				@ICP-QC	QC		

Final page for worklist # 22780

Valerie L Massie 03-06-98
Analyst Signature **Date**

Reviewed + Validated by:
Saul M. Parong 3/5/98
Analyst Signature **Date**

Data Entry Comments:

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

Analysis Report Summary

#	Sample Name	File	Method	Date	Time	OpID	Type	Mode
				03/05/98	12:53		X	IR
1	10 ppm std	980305B	ICP2	03/05/98	12:57	VLM	Q	CONC
2	ICV	980305B	ICP2	03/05/98	13:01	VLM	Q	CONC
3	ICB	980305B	ICP2	03/05/98	13:03	VLM	Q	CONC
4	LLS	980305B	ICP2	03/05/98	13:07	VLM	Q	CONC
5	ICSA	980305B	ICP2	03/05/98	13:10	VLM	Q	CONC
6	ICSAB	980305B	ICP2	03/05/98	13:18	VLM	S	CONC
7	S98T000057_L	980305B	ICP2	03/05/98	13:22	VLM	S	CONC
~~8~~	~~S98T000057~~ 8° 3/5/98	980305B	ICP2	03/05/98	13:25	VLM	S	CONC
9	S98T000057	980305B	ICP2	03/05/98	13:28	VLM	S	CONC
~~10~~	~~S98T000057_D~~ 8°	980305B	ICP2	03/05/98	13:34	VLM	S	CONC
11	S98T000057_A	980305B	ICP2	03/05/98	13:38	VLM	S	CONC
12	S98T000057_X	980305B	ICP2	03/05/98	13:43	VLM	S	CONC
13	S98T000057_AX	980305B	ICP2	03/05/98	13:47	VLM	S	CONC
14	S98T000057_D	980305B	ICP2	03/05/98	13:51	VLM	Q	CONC
15	CCV	980305B	ICP2	03/05/98	13:55	VLM	Q	CONC
16	CCB	980305B	ICP2	03/05/98	14:00	VLM	S	CONC
17	S98T000058	980305B	ICP2	03/05/98	14:04	VLM	S	CONC
18	S98T000058_D	980305B	ICP2	03/05/98	14:08	VLM	S	CONC
19	S98T000059	980305B	ICP2	03/05/98	14:11	VLM	S	CONC
20	S98T000059_D	980305B	ICP2	03/05/98	14:15	VLM	S	CONC
21	S98T000167	980305B	ICP2	03/05/98	14:18	VLM	S	CONC
22	S98T000167_D	980305B	ICP2	03/05/98	14:22	VLM	Q	CONC
23	CCV	980305B	ICP2	03/05/98	14:26	VLM	Q	CONC
24	CCB	980305B	ICP2	03/05/98	14:31	VLM	S	CONC
25	S98T000180_L	980305B	ICP2	03/05/98	14:40	VLM	S	CONC
26	S98T000180	980305B	ICP2	03/05/98	14:45	VLM	S	CONC
27	S98T000180_D	980305B	ICP2	03/05/98	14:49	VLM	S	CONC
28	S98T000180_A	980305B	ICP2	03/05/98	14:53	VLM	S	CONC
29	S98T000180_X	980305B	ICP2	03/05/98	14:57	VLM	S	CONC
30	S98T000180_AX	980305B	ICP2	03/05/98	15:01	VLM	S	CONC
31	S98B000062	980305B	ICP2	03/05/98	15:04	VLM	S	CONC
32	S98B000062_D	980305B	ICP2	03/05/98	15:07	VLM	Q	CONC
33	ICSA	980305B	ICP2	03/05/98	15:11	VLM	Q	CONC
34	ICSAB	980305B	ICP2	03/05/98	15:15	VLM	Q	CONC
35	CCV							

Valerie L Moore 03-05-98

Ay-102 .5-5.5 — 1
.05-10 — 1

S98T000057 - 59, 167, 180
S98B000062 2 — 1 - 8 — 1
FILE # 0980305B.TXT

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES ____ TO ____.

Analysis Report Averages Thu 03-05-98 03:23:35 PM page 2

#	Sample Name	Ag	Al	As	B	Ba	Be
1	10 ppm std	5.46526	2.05419	4.21673	1.56913	20.1123	16.2895
2	ICV	4.9428	4.9806	5.0613	4.9968	4.8665	4.9784
3	ICB	.00036	.00306	.00283	.00851	.00010	.00000
4	LLS	.02115	.10693	.20166	.10556	.09837	.01054
5	ICSA	.00326	244.37	-.05600	-.00468	.00226	.00024
6	ICSAB	.95262	246.70	-.03964	-.00412	.46462	.47967
7	S98T000057_L	.56660	19.551	.14598	2.2165	.00308	.00315
~~8~~	~~S98T000057~~ 80 7/5/98	.56647	15.871	.92362	1.7048	.01467	.00649
9	S98T000057	.60490	19.284	.03354	2.0371	.00314	.00228
~~10~~	~~S98T000057_D~~ 80	.23951	6.4850	.23706	.80338	.02621	-.00984
11	S98T000057_A	12.382	39.464	21.204	22.233	19.494	20.181
12	S98T000057_X	2.2080	20.289	-.24246	1.7891	-.01213	.03195
13	S98T000057_AX	1663.1	2033.1	2013.1	2003.5	2045.5	2018.8
14	S98T000057_D	.60151	19.230	.52234	2.1992	.00242	.00128
15	CCV	4.9534	5.0715	5.0789	5.1015	4.9981	5.0720
16	CCB	.00155	.01043	.00297	.00680	.00005	.00016
17	S98T000058	.56680	19.215	.01060	2.0201	.00240	.00477
18	S98T000058_D	.58674	19.311	.24550	2.0033	.00311	.00223
19	S98T000059	.58287	19.028	.16111	2.0202	.00037	.00145
20	S98T000059_D	.59745	18.809	.28790	2.0714	.00518	.00385
21	S98T000167	.57925	18.704	.04597	2.0287	.00393	.00144
22	S98T000167_D	.56156	18.732	.17915	1.9522	.00399	.00228
23	CCV	4.9453	4.9756	5.0524	4.9738	4.8497	4.9931
24	CCB	-.00109	-.00443	.00155	.00340	-.00002	.00000
25	S98T000180_L	7.4526	45.466	8.2302	9.0953	1.5921	.13149
26	S98T000180	7.5097	39.222	1.0441	9.2686	1.4946	.01569
27	S98T000180_D	7.1806	33.091	.68551	9.2628	.30899	.02384
28	S98T000180_A	204.15	236.39	208.02	209.74	193.83	202.04
29	S98T000180_X	6.4602	37.050	1.0542	17.221	.25471	.21485
30	S98T000180_AX	19879.	19855.	19844.	19653.	19944.	19872.
31	S98B000062	.15004	4.7716	.04225	2.8171	1.9767	.00041
32	S98B000062_D	.14716	4.6981	-.02383	2.8043	1.9610	.00122
33	ICSA	.00169	246.84	-.05484	-.00202	.00209	.00028
34	ICSAB	.95608	247.93	-.06282	-.00241	.46568	.48197
35	CCV	4.9472	5.0097	5.0809	5.0330	4.9344	5.0573

#	Sample Name	Bi	Ca	Cd	Ce	Co	Cr
1	10 ppm std	1.38919	5.90759	13.7333	2.03633	6.3042	8.5228
2	ICV	4.9248	4.9795	5.0125	4.9318	5.1122	4.8326
3	ICB	.01348	.00173	-.00004	.00099	-.00126	-.00107
4	LLS	.21934	.21861	.00964	.19942	.04237	.02034
5	ICSA	.02052	251.24	.00135	.00206	.00159	-.01600
6	ICSAB	.01280	252.31	.93716	-.00146	.46697	.44545
7	S98T000057_L	.93338	.82905	.07924	-.50675	-.11336	22.712
8	S98T000057	.10070	1.4888	.16014	.51041	.04500	18.067
9	S98T000057	.19794	.85252	.12937	.04414	-.00139	22.363
10	S98T000057_D	1.1476	.90375	.14139	1.7582	.49540	8.0121
11	S98T000057_A	19.317	20.632	19.966	20.126	20.149	41.522
12	S98T000057_X	-1.4751	-.13043	.02199	-1.3047	-.06637	22.509
13	S98T000057_AX	2006.3	2004.5	1972.2	2037.5	1980.8	1999.2
14	S98T000057_D	.13362	.62314	.12778	-.14426	-.01839	22.036

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#	Sample Name	Bi	Ca	Cd	Ce	Co	Cr
15	CCV	4.9343	5.0554	5.0278	5.0475	5.1173	4.8438
16	CCB	-.00018	-.00094	-.00059	.00221	-.00233	-.00111
17	S98T000058	-.22891	.60847	.10984	-.17083	-.03746	22.219
18	S98T000058_D	-.17231	.62133	.12534	-.15651	-.01813	22.494
19	S98T000059	.22110	.63708	.11913	-.20868	-.00348	22.153
20	S98T000059_D	-.50258	.74685	.13213	.10966	-.00324	22.060
21	S98T000167	.10416	.58156	.12708	-.07182	.00522	21.847
22	S98T000167_D	-.11485	.51673	.12219	-.16274	-.01377	22.130
23	CCV	4.9099	5.0820	5.0248	4.9177	5.1064	4.8396
24	CCB	.01218	-.00295	-.00130	-.01036	.00011	-.00124
25	S98T000180_L	13.517	13.050	-.14999	-1.8906	-.00483	59.346
26	S98T000180	1.6420	18.406	.49262	1.0690	-.29793	60.572
27	S98T000180_D	-.51338	2.2325	.19222	-1.6874	-.02182	60.808
28	S98T000180_A	196.26	216.53	204.95	199.32	207.19	257.49
29	S98T000180_X	7.3111	-6.1336	-.20139	-16.609	-.53596	59.109
30	S98T000180_AX	20038.	20242.	19892.	19923.	19953.	19939.
31	S98B000062	-.06373	2.8857	.01047	.00123	.00646	.91046
32	S98B000062_D	.03711	2.9060	.01273	.02413	.00280	.90907
33	ICSA	-.00778	257.14	.00059	.00045	-.00106	-.01778
34	ICSAB	-.02097	257.53	.94899	-.00343	.46940	.44898
35	CCV	4.9218	5.0806	5.0411	4.9952	5.1175	4.8532

#	Sample Name	Cu	Fe	K	La	Li	Mg
1	10 ppm std	3.492	9.00619	.12609	15.5359	6.0412	2.1388
2	ICV	4.9048	5.0306	5.0850	4.9110	4.9006	4.8582
3	ICB	-.00039	.00365	.02461	.00008	.00044	-.00231
4	LLS	.01811	.09334	.61264	.10182	.02134	.19598
5	ICSA	-.01127	95.360	.10805	-.00398	.00221	242.17
6	ICSAB	.48281	95.844	.16943	-.00552	.97142	243.77
7	S98T000057_L	.20077	1.0064	341.79	-.05061	.84072	.05533
~~8~~	~~S98T000057~~ 8- 3/5/98	.16742	.05219	280.23	.08440	.67031	.86942
9	S98T000057	.18010	.02326	337.92	.00096	.82969	.09191
~~10~~	~~S98T000057_D~~ 8-	.25906	-.22538	150.30	.25719	.66320	1.2304
11	S98T000057_A	20.308	20.153	367.38	20.032	21.198	19.447
12	S98T000057_X	.17372	2.4631	359.73	-.18194	.61993	-.59105
13	S98T000057_AX	2055.7	2002.8	2417.2	2037.1	2092.8	2016.2
14	S98T000057_D	.15700	.14959	335.62	-.00239	.81407	.03783
15	CCV	5.0386	5.1038	5.2986	5.0350	5.1404	4.9341
16	CCB	.00000	.00423	.12413	.00029	-.00044	-.00123
17	S98T000058	.16283	-.01243	335.39	-.04020	.83856	-.13711
18	S98T000058_D	.15139	-.03203	333.62	-.02120	.81855	.05909
19	S98T000059	.15807	-.02496	329.01	-.02481	.81193	-.05084
20	S98T000059_D	.15152	.06157	327.50	.02080	.81633	.05441
21	S98T000167	.13702	-.05150	324.81	.00330	.80084	-.00170
22	S98T000167_D	.14556	-.03813	327.38	-.01807	.81857	-.00186
23	CCV	4.8988	5.0721	4.8049	4.8999	4.8648	4.8550
24	CCB	-.00044	.00309	.19384	-.00147	.00055	-.00954
25	S98T000180_L	-1.3925	15.042	542.33	8.8122	.41279	12.334
26	S98T000180	-1.2000	12.266	462.76	7.9412	.14486	10.120
27	S98T000180_D	-1.4993	-2.6655	489.06	1.2107	.03347	1.9568
28	S98T000180_A	197.43	207.45	726.07	201.77	194.69	202.32
29	S98T000180_X	-2.1716	15.759	437.15	-1.3446	1.0807	-7.8806

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#	Sample Name	Cu	Fe	K	La	Li	Mg
30	S98T000180_AX	20112.	19991.	19837.	19931.	19790.	19895.
31	S98B000062	.24791	18.246	2.2496	.42512	.00166	.81213
32	S98B000062_D	.24658	18.182	2.2976	.42378	.00331	.78848
33	ICSA	-.01199	96.834	.18671	-.00529	.00287	244.65
34	ICSAB	.48286	97.047	.08367	-.00657	.96190	245.36
35	CCV	4.9740	5.0810	5.1759	4.9875	4.9692	4.8728

#	Sample Name	Mn	Mo	Na	Nd	Ni	P
1	10 ppm std	24.0404	4.98259	1.72033	9.88106	6.661	4.01553
2	ICV	4.9176	5.0804	5.0971	4.9164	4.9107	5.0545
3	ICB	.00030	.00335	.00036	.00015	.00058	.01038
4	LLS	.01964	.10114	.18709	.20171	.03832	.40394
5	ICSA	-.00674	-.01348	191.61	.00258	-.00659	.02436
6	ICSAB	.44256	-.01561	194.34	.00084	.92982	.03632
7	S98T000057_L	.00290	.38625	7439.0	.04217	.37609	185.02
~~8~~	~~S98T000057~~	.00796	.25842	5793.1	.09838	.53064	149.97
9	S98T000057	-.00344	.24105	7283.8	.03296	.65808	187.68
~~10~~	~~S98T000057_D~~	.11806	.31371	2435.7	1.4598	.28213	63.232
11	S98T000057_A	18.994	20.610	7562.5	20.110	20.178	209.76
12	S98T000057_X	-.08615	.27159	7822.8	.18042	.71926	184.47
13	S98T000057_AX	1984.2	1994.8	9908.4	2048.4	1979.8	2199.3
14	S98T000057_D	-.01372	.28542	7378.9	-.05556	.63563	191.58
15	CCV	4.9170	5.1043	5.2982	5.0439	4.9552	5.0616
16	CCB	-.00004	.00213	.01237	-.00267	-.00149	.00466
17	S98T000058	-.00220	.24382	7261.6	-.07833	.64815	184.19
18	S98T000058_D	-.00337	.22320	7278.3	-.05334	.69199	189.31
19	S98T000059	-.00589	.22537	7189.2	.01906	.70003	187.57
20	S98T000059_D	-.00283	.25528	7048.9	-.01335	.60573	187.41
21	S98T000167	.00121	.26577	6960.0	.00132	.62391	184.69
22	S98T000167_D	.00180	.23895	7049.7	-.01793	.59404	185.57
23	CCV	4.8867	5.0829	5.0494	4.8964	4.9181	5.0263
24	CCB	.00019	.00188	-.00036	-.00160	-.00060	.00883
25	S98T000180_L	9.7492	2.3742	13432.	.57193	7.5928	216.40
26	S98T000180	7.3974	1.4361	13478.	2.1039	6.0835	221.38
27	S98T000180_D	1.3309	1.4950	13714.	.12289	5.2400	217.52
28	S98T000180_A	197.40	208.13	13486.	199.58	205.74	423.56
29	S98T000180_X	1.2602	2.2492	13541.	-4.1271	-3.3600	206.62
30	S98T000180_AX	19790.	20003.	33282.	19930.	19774.	19931.
31	S98B000062	.42699	.02048	1032.4	.14683	.78716	24.784
32	S98B000062_D	.42569	.02455	1024.8	.15559	.78664	24.454
33	ICSA	-.00689	-.01270	192.92	-.00133	-.00108	.01666
34	ICSAB	.44463	-.01416	193.12	-.00088	.92385	.03011
35	CCV	4.9064	5.1086	5.1207	4.9861	4.9355	5.0486

#	Sample Name	Pb	S	Sb	Se	Sm	Sr
1	10 ppm std	6.0384	7.018	3.00373	2.41066	1.90486	15.2879
2	ICV	4.9028	5.0746	4.7649	4.8041	4.9033	5.0043
3	ICB	.00164	-.00021	.00022	.01718	.00329	.00000
4	LLS	.20495	.19931	.10116	.21230	.20617	.02041
5	ICSA	.02783	-.00141	-.00860	.04378	-.01531	-.00269

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#	Sample Name	Pb	S	Sb	Se	Sm	Sr
6	ICSAB	.96635	-.00737	-.00950	.02231	-.01942	-.00264
7	S98T000057_L	-.52576	118.47	-.12834	1.4149	-.15385	-.00168
~~8~~	~~S98T000057~~ 8P 3/6/98	.11553	94.345	.17443	1.3874	.07305	.00727
9	S98T000057	.01556	118.40	.01287	1.0369	-.11147	-.00161
~~10~~	~~S98T000057_D~~ 8P	2.5764	39.515	.34566	3.4732	4.7612	.06763
11	S98T000057_A	19.041	137.21	19.530	22.188	19.774	20.413
12	S98T000057_X	-1.0850	118.39	.25689	-2.1171	-3.7440	-.05284
13	S98T000057_AX	1943.0	2118.2	1996.4	2024.4	2054.1	2039.0
14	S98T000057_D	-.11855	111.23	.14782	3.0183	-.59793	-.00702
15	CCV	4.8813	5.0873	4.8109	4.8776	5.0519	5.1404
16	CCB	-.00888	-.00617	-.00114	.00185	-.00734	-.00017
17	S98T000058	-.11806	117.48	-.07039	.82778	-.16727	-.00158
18	S98T000058_D	-.13027	116.91	.12263	1.8996	-.13533	-.00171
19	S98T000059	-.00756	115.31	.01495	1.4428	-.19234	-.00340
20	S98T000059_D	-.03828	114.98	.13481	2.0339	-.07823	.00002
21	S98T000167	-.21301	113.69	.23769	1.8729	-.02329	.00093
22	S98T000167_D	-.16155	115.99	-.00262	1.3584	.01474	.00181
23	CCV	4.9023	5.1032	4.7802	4.8494	4.8994	5.0074
24	CCB	-.00604	.00068	-.00595	.01602	.00378	.00000
25	S98T000180_L	-9.0971	341.31	-1.1415	19.416	-3.0522	.56079
26	S98T000180	-.68354	354.44	-.43164	2.5603	-1.4940	.63828
27	S98T000180_D	-.58982	353.13	.01297	2.1531	-2.4975	.07722
28	S98T000180_A	198.98	557.85	193.80	205.23	197.12	202.35
29	S98T000180_X	-14.058	329.58	-5.0189	32.589	-7.7258	-.05254
30	S98T000180_AX	19698.	20332.	19988.	19922.	19958.	19969.
31	S98B000062	.55616	79.973	-.01262	.13203	-.02722	.13825
32	S98B000062_D	.55971	79.545	.00179	.12606	-.00370	.13780
33	ICSA	.01516	-.00566	-.00310	.02258	-.01327	-.00271
34	ICSAB	.96803	-.01268	.00232	.02269	-.01941	-.00268
35	CCV	4.8820	5.0806	4.7948	4.8558	4.9886	5.0930

#	Sample Name	Ti	Tl	U	V	Zn	Zr
1	10 ppm std	3.12339	2.2174	10.7185	4.08926	13.8834	2.15573
2	ICV	4.8714	4.8217	9.7890	5.1024	5.3442	4.9831
3	ICB	-.00043	.01944	.01114	.00014	.00016	.00044
4	LLS	.01990	.38862	.51910	.10209	.02269	.02093
5	ICSA	.00084	-.03361	.09232	-.00059	-.00271	-.00428
6	ICSAB	.00126	-.04481	.07965	.47062	.98140	-.00510
7	S98T000057_L	-.00919	-.62405	18.779	-.00166	.08243	.00281
~~8~~	~~S98T000057~~ 8P 3/6/98	.02398	-.19078	15.892	.03254	.10770	-.01788
9	S98T000057	.00014	.05893	17.975	-.01001	.09630	-.03415
~~10~~	~~S98T000057_D~~ 8P	.25420	-.15696	24.635	.93854	.05170	.64590
11	S98T000057_A	19.797	19.434	58.470	20.430	21.213	19.956
12	S98T000057_X	-.04759	.18250	5.3778	-.90621	.12069	-.56618
13	S98T000057_AX	2012.3	1996.0	4141.7	2018.0	1962.1	2021.6
14	S98T000057_D	-.01498	-.08210	20.053	-.10281	.08263	-.08706
15	CCV	4.9554	4.8461	10.071	5.1510	5.3024	5.0541
16	CCB	-.00104	.00001	-.02646	-.00195	.00021	-.00122
17	S98T000058	-.00868	.03593	17.741	-.01263	.10960	-.02090
18	S98T000058_D	-.00535	-.22094	19.223	-.00851	.10985	-.03031
19	S98T000059	-.00912	-.03779	18.592	-.02740	.08608	-.04117
20	S98T000059_D	.00393	.03368	19.228	-.00243	.09190	-.03115

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#	Sample Name	Ti	Tl	U	V	Zn	Zr
21	S98T000167	-.00055	-.08122	18.892	.00512	.08036	-.01530
22	S98T000167_D	-.01324	-.27536	18.814	.01854	.08307	-.00934
23	CCV	4.8922	4.7874	9.7722	5.1036	5.3469	4.9757
24	CCB	-.00002	.00609	.01171	-.00066	-.00007	.00109
25	S98T000180_L	-.05343	3.2179	600.66	-1.2843	1.3079	.21112
26	S98T000180	-.06500	-1.5073	615.44	-.27295	.69158	.31844
27	S98T000180_D	.01374	-3.6896	616.84	-.59660	.22264	-.71431
28	S98T000180_A	197.44	195.40	1004.6	206.66	218.75	200.29
29	S98T000180_X	-.71139	-12.061	599.60	-2.4330	.64553	.07008
30	S98T000180_AX	19950.	19837.	40730.	20170.	19930.	20041.
31	S98B000062	.04178	.05545	.01266	-.00300	1.2870	1.0846
32	S98B000062_D	.04070	.04171	.12889	.00176	1.2815	1.0576
33	ICSA	.00065	-.03509	.05045	.00023	-.00256	-.00401
34	ICSAB	.00086	-.04181	.03995	.47355	.98775	-.00481
35	CCV	4.9353	4.8505	9.9445	5.1433	5.3223	5.0333

#	Sample Name	Eu	Si	Th	Y
1	10 ppm std				
2	ICV	.00605	4.9160	.18095	.00697
3	ICB	.00031	.00746	-.00205	.00000
4	LLS	.00078	.12276	.00437	.00040
5	ICSA	.01740	-.00432	.01649	.00709
6	ICSAB	.02016	-.00946	.01296	.00702
7	S98T000057_L	.03904	31.045	.16897	-.02365
~~8~~	~~S98T000057~~ 8 3/5/98	.00711	23.926	.56219	.00108
9	S98T000057	-.01751	29.591	.25773	-.00920
~~10~~	~~S98T000057_D~~ 8	.42882	11.904	-.14862	.25136
11	S98T000057_A	-.01443	49.149	1.0516	.00180
12	S98T000057_X	-.34248	31.160	.88060	-.25314
13	S98T000057_AX	1.9136	2055.7	78.794	2.7081
14	S98T000057_D	-.05506	28.907	.11326	-.03517
15	CCV	.00494	4.9152	.19007	.00653
16	CCB	-.00061	.00253	.00434	-.00061
17	S98T000058	-.01307	28.896	.16873	-.01224
18	S98T000058_D	-.01565	29.004	.10988	-.01287
19	S98T000059	-.02672	28.634	.17916	-.01574
20	S98T000059_D	-.01034	28.630	.28735	-.00973
21	S98T000167	-.00556	28.915	.16114	-.00489
22	S98T000167_D	-.00451	29.374	.16617	-.00172
23	CCV	.00575	4.8989	.18909	.00721
24	CCB	.00024	.00557	-.00643	-.00016
25	S98T000180_L	-.40736	35.380	11.613	-.41285
26	S98T000180	-.27383	27.412	9.9580	-.10399
27	S98T000180_D	-.37973	23.881	8.6750	-.18337
28	S98T000180_A	.13499	222.11	16.345	.28211
29	S98T000180_X	-.55766	39.112	9.4559	-.72754
30	S98T000180_AX	20.539	20157.	792.16	28.227
31	S98B000062	.00167	10.674	.05673	.00352
32	S98B000062_D	.00355	10.625	.05997	.00504
33	ICSA	.00743	-.00404	.01561	.00742
34	ICSAB	.01081	-.00734	.01629	.00719
35	CCV	.00551	4.9069	.19110	.00674

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LABCORE Data Entry Template for Worklist# 23185

Analyst: JK Seto **Instrument:** ICP01 3/27/98 **Book#** 71848

Method: LA-505-~~151~~/161 Rev/Mod C-2

3/27/98
Worklist Comment: ICP B PLANT 21-1 (LIQUID ACID DIGEST)

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	ICV				@ICP-QC	QC		
2	ICB				@ICP-QC	QC		
3	PREPSTDTJA				@ICP-B01	LIQUID		
4	PREPBLKTJA				@ICP-B01	LIQUID		
5	SAMPLE	S98B000086	0	B	@ICP-B01	LIQUID	98000140	TK-21-1 (1)

Analytes Requested: AG-B-01 , AL-B-01 , AS-B-01 , B-B-01 , BA-B-01 , BE-B-01 , BI-B-01 , CA-B-01 , CD-B-01 , CE-B-01 , CO-B-01 , CR-B-01 , CU-B-01 , FE-B-01 , K-B-01 , LA-B-01 , LI-B-01 , MG-B-01 , MN-B-01 , MO-B-01 , NA-B-01 , ND-B-01 , NI-B-01 , P-B-01 , PB-B-01 , S-B-01 , SB-B-01 , SE-B-01 , SI-B-01 , SM-B-01 , SR-B-01 , TI-B-01 , TL-B-01 , U-B-01 , V-B-01 , ZN-B-01 , ZR-B-01

6	DUP	S98B000086	0	B	@ICP-B01	LIQUID		
7	SPK	S98B000086	0	B	@ICP-B01	LIQUID		
8	CCV				@ICP-QC	QC		
9	CCB				@ICP-QC	QC		

Final page for worklist # 23185

JK Seto 03-27-98
Analyst Signature **Date**

Reviewed + Validated by:
Saul R. Parra 3/27/98
Analyst Signature **Date**

Prepstd TJG, direct, DF 1
Prepblk TJG direct 1
S98B000086 direct 1
S98B000086D direct 1
S98B000086S direct 1

Data Entry Comments:

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

Analysis Report Summary Fri 03-27-98 09:37:32 AM page 1

#	Sample Name	File	Method	Date	Time	OpID	Type	Mode
1	ICV	980327B	ICP2	03/27/98	09:08	DKS	Q	CONC
2	ICB	980327B	ICP2	03/27/98	09:11	DKS	Q	CONC
3	PREPSTDTJA	980327B	ICP2	03/27/98	09:14	DKS	Q	CONC
4	PREPBLKTJA	980327B	ICP2	03/27/98	09:17	DKS	Q	CONC
5	S98B000086	980327B	ICP2	03/27/98	09:21	DKS	S	CONC
6	S98B000086 D	980327B	ICP2	03/27/98	09:24	DKS	S	CONC
7	S98B000086_S	980327B	ICP2	03/27/98	09:27	DKS	S	CONC
8	CCV	980327B	ICP2	03/27/98	09:31	DKS	Q	CONC
9	CCB	980327B	ICP2	03/27/98	09:34	DKS	Q	CONC

DK
03-27-98
Worklist # 23185

B Plant 21-1
S98B000086

S98B000086

$Al = 0.40254 \frac{ug}{ml} \times 25 = 1.01e+1 \frac{ug}{ml}$

$Al = \frac{4.9346 - 0.40254}{5} \times 100 = 90.6\%$

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES _____TO_____.

Analysis Report Averages Fri 03-27-98 09:37:32 AM page 2

#	Sample Name	Ag	Al	As	B	Ba	Be
1	ICV	4.9731	4.9431	5.1977	5.1089	5.0333	5.1237
2	ICB	-.00061	.00061	.00432	-.00042	-.00003	-.00003
3	PREPSTDTJA	.98151	4.9246	4.9869	5.0579	4.9556	5.2660
4	PREPBLKTJA	.00096	Q.08110	.00308	.02786	.00300	.00004
5	S98B000086	.00721	.40254	-.00476	1.4646	.08784	.00008
6	S98B000086_D	.00806	.29201	-.00042	.57913	.08572	.00016
7	S98B000086_S	.39895	4.9346	4.7565	5.1930	4.8070	4.9184
8	CCV	5.0141	4.9566	5.1670	5.1194	5.0194	5.1097
9	CCB	.00134	-.00378	.00194	.00758	.00003	.00016

#	Sample Name	Bi	Ca	Cd	Ce	Co	Cr
1	ICV	4.9872	5.1118	5.0613	5.0813	5.1406	4.8831
2	ICB	.02575	-.00252	-.00129	-.00544	.00010	.00071
3	PREPSTDTJA	4.9131	5.6211	4.9424	5.0103	4.8879	4.8789
4	PREPBLKTJA	.01016	Q.63497	-.00131	-.00706	.00103	.00352
5	S98B000086	.03295	2.5553	-.00069	-.00368	.00285	.04167
6	S98B000086_D	-.00794	1.0988	-.00025	.00100	.00156	.04072
7	S98B000086_S	4.6002	8.5047	4.6585	4.7833	4.5970	4.6156
8	CCV	5.0343	5.1826	5.0727	5.0659	5.1689	4.9237
9	CCB	.00712	.00134	-.00034	-.00032	-.00064	.00073

#	Sample Name	Cu	Eu	Fe	K	La	Li
1	ICV	4.8134	.00627	4.9274	4.8689	5.0654	5.0555
2	ICB	.00077	-.00039	-.00064	-.07776	-.00094	-.00010
3	PREPSTDTJA	4.6818	.00729	4.8983	4.7661	4.9973	4.9084
4	PREPBLKTJA	.00727	-.00065	Q.16014	-.09970	-.00133	-.00082
5	S98B000086	.01864	.00172	.79095	-.05268	.01706	.00103
6	S98B000086_D	.01700	-.00025	1.0885	.02402	.01728	-.00051
7	S98B000086_S	4.4897	.01046	5.3488	4.6624	4.7817	4.7643
8	CCV	4.7798	.00740	4.9500	4.7994	5.0247	5.0483
9	CCB	.00037	.00007	.00019	-.04703	-.00079	.00031

#	Sample Name	Mg	Mn	Mo	Na	Nd	Ni
1	ICV	5.1149	4.9397	5.1068	5.1775	4.9433	4.9929
2	ICB	-.00640	.00000	.00745	.00527	.00028	-.00092
3	PREPSTDTJA	5.0776	4.8916	4.9474	5.7595	4.8815	5.0509
4	PREPBLKTJA	.06985	.00177	.00606	Q.37088	.00125	.00255
5	S98B000086	.17717	.02163	.00415	46.164	.00949	.03880
6	S98B000086_D	.22698	.02249	.00280	44.158	.00898	.03472
7	S98B000086_S	4.9612	4.6022	4.9519	49.063	4.6609	4.7597
8	CCV	5.1311	4.9791	5.1258	5.1483	4.9021	4.9946
9	CCB	.00235	.00013	.00827	-.00104	.00036	-.00031

Analysis Report Averages Fri 03-27-98 09:37:32 AM page 3

#	Sample Name	P	Pb	S	Sb	Se	Si
1	ICV	5.1232	4.9265	5.0063	4.8453	4.7270	4.8840
2	ICB	.00714	.00361	.00802	-.00319	.01161	.00015
3	PREPSTDTJA	5.1302	4.7963	5.0071	4.8950	4.6906	5.5974
4	PREPBLKTJA	.03018	.00676	Q.11133	.00124	.00827	Q.12645
5	S98B000086	1.0693	.04556	3.2032	.00391	.00852	1.1832
6	S98B000086_D	1.0866	.02998	3.1771	-.00148	.01432	.77778
7	S98B000086_S	6.1519	4.5222	8.1543	4.9295	4.4308	6.2302
8	CCV	5.1671	4.9722	5.0481	4.8736	4.7701	4.9223
9	CCB	.00539	-.00483	-.00172	.00513	.02404	.00206

#	Sample Name	Sm	Sr	Th	Ti	Tl	U
1	ICV	4.9230	5.1313	.22490	4.9675	4.8293	9.8161
2	ICB	-.00342	.00000	.00090	-.00020	.01038	-.00974
3	PREPSTDTJA	4.8454	5.0541	.21900	4.5335	4.7800	9.4964
4	PREPBLKTJA	-.01816	.00074	.00295	.00424	.00904	-.06143
5	S98B000086	-.01822	.00815	.00318	.00445	.00838	-.05265
6	S98B000086_D	-.01536	.00770	.00730	.00362	-.00838	-.05046
7	S98B000086_S	4.6337	4.8236	.21776	4.5719	4.4734	9.0998
8	CCV	4.8794	5.0972	.22957	4.9582	4.8542	9.7415
9	CCB	-.00035	.00000	.00485	.00022	.00640	.00279

#	Sample Name	V	Y	Zn	Zr
1	ICV	5.1334	.00711	5.0410	5.0182
2	ICB	-.00015	.00000	-.00003	-.00097
3	PREPSTDTJA	4.9826	.00725	4.6529	5.0431
4	PREPBLKTJA	-.00307	-.00075	Q.28688	-.00112
5	S98B000086	-.00279	-.00036	.17688	.04504
6	S98B000086_D	-.00218	-.00052	.14782	.04141
7	S98B000086_S	4.7022	.00694	4.4756	5.1230
8	CCV	5.1490	.00769	5.1076	5.0062
9	CCB	.00013	.00015	.00057	-.00036

DK LdS
03-27-98

~~HNF-SD-WM-DP-301 REV. 0~~

LABCORE Completed Worklist Report for Worklist# 22651

Analyst: rdm **Instrument:** CARB2 **Book#** 25N12B TIC 26N12D TOC

Method: LA342-100 Rev/Mod F-1

Worklist Comment: B Plant Tk21-1 TICTOC1 .200mL TOC 1mL TIC skb

Seq	Type	Sample#	R	A	Test	Matrix	Actual	Found	DL or Yield	Unit
1	BLNK		0		@TICTOC1 TIC-02	LIQUID	1	4.80E+0	4.800	ug/mL
1	BLNK		0		@TICTOC1 TOC-02	LIQUID	1	3.20E+0	3.200	ug/mL
2	STD		0		@TICTOC1 TIC-02	LIQUID	6.02E+02	6.04E+2	100.332	% Recovery
2	STD		0		@TICTOC1 TOC-02	LIQUID	3.00E+03	2.76E+3	92.000	% Recovery
3	SAMPLE	S98B000061	0		@TICTOC1 TIC-02	LIQUID	N/A	7.30E+00	5.000	ug/mL
3	SAMPLE	S98B000061	0		@TICTOC1 TOC-02	LIQUID	N/A	1.23E+03	40.000	ug/mL
4	DUP	S98B000061	0		@TICTOC1 TIC-02	LIQUID	7.30E+0	8.50E+0	15.190	RPD
4	DUP	S98B000061	0		@TICTOC1 TOC-02	LIQUID	1.23E+3	1.14E+3	7.595	RPD
5	SPK	S98B000061	0		@TICTOC1 TIC-02	LIQUID	1.00E+02	9.89E+01	98.900	% Recovery
5	SPK	S98B000061	0		@TICTOC1 TOC-02	LIQUID	1.00E+02	8.77E+01	87.700	% Recovery

Final page for worklist# 22651

Analyst Signature Date

Susan Bee 3/04/98
Analyst Signature Date

RW Schroeder 3/9/98
Reviewer Signature Date

TOC results are included as part of the analysis (included for informational purposes only.) ~~Peter~~ 4/6/98.

Units shown for QC (BLK/BKG) may not reflect the actual units.

HNF-SD-WM-DP-301 REV. 0

03/02/98 07:46
A-0004-1

LABCORE Data Entry Template for Worklist# 22651

Analyst: [signature] **Instrument:** CARB2 _____ **Book#** 25N12B 26N12D

Method: LA-342-100 Rev/Mod _____

Worklist Comment: B Plant Tk21-1 TICTOC1 .200mL TOC 1mL TIC skb

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	BLNK				@TICTOC1	LIQUID		
2	STD				@TICTOC1	LIQUID		
3	SAMPLE	S98B000061	0		@TICTOC1	LIQUID	98000140	TK-21-1 (1)
		Analytes Requested: TIC-02 , TOC-02						
4	DUP	S98B000061	0		@TICTOC1	LIQUID		
5	SPK	S98B000061	0		@TICTOC1	LIQUID		

Final page for worklist # 22651

[signature] 3/4/98
Analyst Signature **Date**

Analyst Signature **Date**

Data Entry Comments:

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0
<<< BLANK ANALYSIS >>>

HNF-SD-WM-DP-301 REV. 0

Sample: BASE Date: 03/03/98 Time: 19:16:06

Sample Size = 1 uL
Dil Factor = 1
Blank ID # = BASE
Blank Value = N/A

Analyst : RD MEYERS
Min Readings = 22
Max Readings = 22
% Difference = 10

== Reading	==== Analysis Time	==== Coulometer	==== % Difference ==
1	0.51	0.30	0.00
2	1.01	0.40	25.00
3	1.50	0.70	42.86
4	2.00	1.20	41.67
5	2.50	1.60	25.00
6	3.00	2.00	20.00
7	3.50	2.20	9.09
8	4.00	2.60	15.38
9	4.50	2.80	7.14
10	5.00	3.10	9.68
11	5.50	3.30	6.06
12	6.00	3.60	8.33
13	6.50	3.80	5.26
14	7.00	4.20	9.52
15	7.50	4.40	4.55
16	8.00	4.60	4.35
17	8.50	4.90	6.12
18	9.00	5.10	3.92
19	9.50	5.40	5.56
20	10.00	5.50	1.82
21	10.50	5.80	5.17
22	11.00	6.10	4.92

BLANK VALUE = 6.1 micrograms carbon
BLANK FACTOR = 6.1 / 10.99597 = +5.5E-01 ug/min Carbon

SIGNATURE BELOW REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES ____ TO ____.

Sample Run By: RW Schneider 3/9/98
RD MEYERS 00000

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0
<<< BLANK ANALYSIS >>>

Sample: BASE Date: 03/03/98 Time: 19:29:52

Sample Size = 1 uL
Dil Factor = 1
Blank ID # = BASE
Blank Value = N/A

Analyst : RD MEYERS
Min Readings = 22
Max Readings = 22
% Difference = 10

== Reading	==== Analysis Time	==== Coulometer	==== % Difference ==
1	0.51	0.20	0.00
2	1.01	2.00	90.00
3	1.51	6.10	67.21
4	2.00	9.30	34.41
5	2.50	11.80	21.19
6	3.00	13.50	12.59
7	3.50	14.20	4.93
8	4.00	14.70	3.40
9	4.50	15.80	6.96
10	5.00	16.60	4.82
11	5.50	17.60	5.68
12	6.00	18.20	3.30
13	6.50	18.90	3.70
14	7.00	19.30	2.07
15	7.50	19.90	3.02
16	8.00	20.30	1.97
17	8.50	20.80	2.40
18	9.00	21.00	0.95
19	9.50	21.30	1.41
20	10.00	21.60	1.39
21	10.50	21.90	1.37
22	11.00	22.20	1.35

BLANK VALUE = 22.2 micrograms carbon
BLANK FACTOR = 22.2 / 10.99695 = +2.02E+00 ug/min Carbon

<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!!>>>>

Sample Run By: _____
RD MEYERS 00000

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: 25N12-B Date: 03/03/98 Time: 19:57:09

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = .55 ug/minute C

Analyst : RD MEYERS
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.40	0.00
2	1.00	1.70	76.47
3	1.50	29.10	94.16
4	2.00	173.70	83.25
5	2.50	348.50	50.16
6	3.00	477.20	26.97
7	3.50	550.90	13.38
8	4.00	585.00	5.83
9	4.50	598.60	2.27
10	5.00	603.30	0.78
11	5.50	605.40	0.35
12	6.00	606.20	0.13
13	6.50	606.60	0.07
14	7.00	607.10	0.08
15	7.50	607.70	0.10
16	8.00	608.00	0.05
17	8.50	608.40	0.07
18	9.00	608.70	0.05
19	9.50	609.20	0.08
20	10.00	609.50	0.05
21	10.50	609.80	0.05
22	11.00	610.20	0.07

USER INPUT BLANK VALUE
BLANK VALUE = 6.048322 micrograms carbon
BLANK FACTOR = 6.048322 / 10.99695 = +5.5E-01 ug/min Carbon

SAMPLE RESULTS:
(610.2 - 6.047315)(1)/(1) = +6.042E+02 g/L Carbon
(610.2 - 6.047315)(1)/(1)(12) = +5.035E+01 Molar Carbon

Sample Run By: _____
RD MEYERS 00000

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: 26N12-D Date: 03/03/98 Time: 20:14:37

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = 2.02 ug/minute C

Analyst : RD MEYERS
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.10	0.00
2	1.01	33.00	99.70
3	1.50	162.90	79.74
4	2.00	365.20	55.39
5	2.50	498.00	26.67
6	3.00	544.90	8.61
7	3.50	558.60	2.45
8	4.00	562.60	0.71
9	4.50	565.00	0.42
10	5.00	566.30	0.23
11	5.50	567.20	0.16
12	6.00	568.10	0.16
13	6.50	568.70	0.11
14	7.00	569.40	0.12
15	7.50	569.90	0.09
16	8.00	570.70	0.14
17	8.50	571.20	0.09
18	9.00	571.40	0.04
19	9.50	571.80	0.07
20	10.00	572.40	0.10
21	10.50	572.70	0.05
22	11.00	573.20	0.09

USER INPUT BLANK VALUE
BLANK VALUE = 22.21383 micrograms carbon
BLANK FACTOR = 22.21383 / 10.99695 = +2.0E+00 ug/min Carbon

SAMPLE RESULTS:
(573.2 - 22.21753)(1)/(1) = +5.510E+02 g/L Carbon
(573.2 - 22.21753)(1)/(1)(12) = +4.592E+01 Molar Carbon
<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!!>>>>

Sample Run By: _____
RD MEYERS 00000

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: BLK Date: 03/03/98 Time: 20:30:03

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = .55 ug/minute C

Analyst : RD MEYERS
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.30	0.00
2	1.01	0.80	62.50
3	1.50	2.80	71.43
4	2.00	4.20	33.33
5	2.50	4.90	14.29
6	3.00	5.50	10.91
7	3.50	6.00	8.33
8	4.00	6.20	3.23
9	4.50	6.60	6.06
10	5.00	7.00	5.71
11	5.50	7.20	2.78
12	6.00	7.70	6.49
13	6.50	7.90	2.53
14	7.00	8.20	3.66
15	7.50	8.60	4.65
16	8.00	8.90	3.37
17	8.50	9.30	4.30
18	9.00	9.60	3.13
19	9.50	9.90	3.03
20	10.00	10.30	3.88
21	10.50	10.60	2.83
22	11.00	10.90	2.75

USER INPUT BLANK VALUE
BLANK VALUE = 6.048322 micrograms carbon
BLANK FACTOR = 6.048322 / 10.99695 = +5.5E-01 ug/min Carbon

SAMPLE RESULTS:
(10.9 - 6.049396)(1)/(1) = +4.85E+00 g/L Carbon
(10.9 - 6.049396)(1)/(1)(12) = +4.04E-01 Molar Carbon

Sample Run By: _____
RD MEYERS 00000

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: BLK Date: 03/03/98 Time: 21:52:19

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = 2.02 ug/minute C

Analyst : RD MEYERS
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.30	0.00
2	1.00	2.70	88.89
3	1.50	6.70	59.70
4	2.00	11.10	39.64
5	2.50	14.50	23.45
6	3.00	15.50	6.45
7	3.50	16.30	4.91
8	4.00	17.10	4.68
9	4.50	18.20	6.04
10	5.00	19.10	4.71
11	5.50	19.90	4.02
12	6.00	20.60	3.40
13	6.50	21.30	3.29
14	7.00	21.80	2.29
15	7.50	22.40	2.68
16	8.00	22.80	1.75
17	8.50	23.20	1.72
18	9.00	23.80	2.52
19	9.50	24.10	1.24
20	10.00	24.50	1.63
21	10.50	25.00	2.00
22	11.00	25.40	1.57

USER INPUT BLANK VALUE
BLANK VALUE = 22.21383 micrograms carbon
BLANK FACTOR = 22.21383 / 10.99695 = +2.0E+00 ug/min Carbon

SAMPLE RESULTS:
(25.4 - 22.21556)(1)/(1) = +3.18E+00 g/L Carbon
(25.4 - 22.21556)(1)/(1)(12) = +2.65E-01 Molar Carbon
<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!!>>>>

Sample Run By: _____
RD MEYERS 00000

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S98B000061 Date: 03/03/98 Time: 22:31:44

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = .55 ug/minute C

Analyst : RD MEYERS
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.50	0.00
2	1.01	1.20	58.33
3	1.51	3.30	63.64
4	2.00	5.10	35.29
5	2.50	6.20	17.74
6	3.00	6.80	8.82
7	3.50	7.10	4.23
8	4.00	7.60	6.58
9	4.50	8.00	5.00
10	5.00	8.60	6.98
11	5.50	8.90	3.37
12	6.00	9.40	5.32
13	6.50	9.80	4.08
14	7.00	10.20	3.92
15	7.50	10.70	4.67
16	8.00	11.00	2.73
17	8.50	11.50	4.35
18	9.00	11.80	2.54
19	9.50	12.20	3.28
20	10.00	12.70	3.94
21	10.50	13.00	2.31
22	11.00	13.40	2.99

USER INPUT BLANK VALUE
BLANK VALUE = 6.048322 micrograms carbon
BLANK FACTOR = 6.048322 / 10.99695 = +5.5E-01 ug/min Carbon

SAMPLE RESULTS:
(13.4 - 6.048389)(1)/(1) = +7.35E+00 g/L Carbon
(13.4 - 6.048389)(1)/(1)(12) = +6.13E-01 Molar Carbon

Sample Run By: _____
RD MEYERS 00000

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S98B000061 Date: 03/03/98 Time: 22:44:31

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = 2.02 ug/minute C

Analyst : RD MEYERS
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	4.20	0.00
2	1.01	146.40	97.13
3	1.51	423.80	65.46
4	2.01	855.70	50.47
5	2.51	1116.80	23.38
6	3.01	1199.30	6.88
7	3.50	1224.30	2.04
8	4.00	1233.20	0.72
9	4.50	1236.70	0.28
10	5.00	1238.80	0.17
11	5.50	1240.70	0.15
12	6.00	1241.60	0.07
13	6.50	1242.70	0.09
14	7.00	1243.60	0.07
15	7.50	1244.40	0.06
16	8.00	1245.50	0.09
17	8.50	1246.00	0.04
18	9.00	1246.70	0.06
19	9.50	1247.40	0.06
20	10.00	1248.10	0.06
21	10.50	1248.60	0.04
22	11.00	1249.00	0.03

USER INPUT BLANK VALUE
BLANK VALUE = 22.21383 micrograms carbon
BLANK FACTOR = 22.21383 / 10.99695 = +2.0E+00 ug/min Carbon

SAMPLE RESULTS:
(1249 - 22.21581)(1)/(1) = +1.2268E+03 g/L Carbon
(1249 - 22.21581)(1)/(1)(12) = +1.0223E+02 Molar Carbon
<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!!>>>>

Sample Run By: _____
RD MEYERS 00000

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S98B000061DUP Date: 03/03/98 Time: 23:08:54

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = .55 ug/minute C

Analyst : RD MEYERS
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.40	0.00
2	1.01	1.40	71.43
3	1.50	3.70	62.16
4	2.00	5.20	28.85
5	2.50	6.20	16.13
6	3.00	7.10	12.68
7	3.51	7.50	5.33
8	4.00	8.00	6.25
9	4.50	8.70	8.05
10	5.00	9.00	3.33
11	5.50	9.50	5.26
12	6.00	10.10	5.94
13	6.50	10.50	3.81
14	7.00	11.00	4.55
15	7.50	11.60	5.17
16	8.00	11.90	2.52
17	8.50	12.40	4.03
18	9.00	12.90	3.88
19	9.50	13.30	3.01
20	10.00	13.70	2.92
21	10.50	14.10	2.84
22	11.00	14.60	3.42

USER INPUT BLANK VALUE
BLANK VALUE = 6.048322 micrograms carbon
BLANK FACTOR = 6.048322 / 10.99695 = +5.5E-01 ug/min Carbon

SAMPLE RESULTS:
(14.6 - 6.049798)(1)/(1) = +8.55E+00 g/L Carbon
(14.6 - 6.049798)(1)/(1)(12) = +7.13E-01 Molar Carbo

Sample Run By: _____
RD MEYERS 00000

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S98B000061 DUP Date: 03/03/98 Time: 23:22:56

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = 2.02 ug/minute C

Analyst : RD MEYERS
Min Readings = 22
Max Readings = 22
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	2.00	0.00
2	1.01	101.60	98.03
3	1.51	350.70	71.03
4	2.00	763.60	54.07
5	2.50	1027.30	25.67
6	3.00	1111.30	7.56
7	3.50	1139.70	2.49
8	4.00	1148.60	0.77
9	4.50	1152.60	0.35
10	5.00	1154.80	0.19
11	5.50	1156.40	0.14
12	6.00	1157.80	0.12
13	6.50	1159.00	0.10
14	7.00	1159.90	0.08
15	7.50	1160.80	0.08
16	8.00	1161.90	0.09
17	8.50	1162.70	0.07
18	9.00	1163.50	0.07
19	9.50	1164.00	0.04
20	10.00	1164.60	0.05
21	10.50	1165.20	0.05
22	11.00	1166.00	0.07

USER INPUT BLANK VALUE
BLANK VALUE = 22.21383 micrograms carbon
BLANK FACTOR = 22.21383 / 10.99695 = +2.0E+00 ug/min Carbon

SAMPLE RESULTS:
(1166 - 22.21038)(1)/(1) = +1.1438E+03 g/L Carbon
(1166 - 22.21038)(1)/(1)(12) = +9.5316E+01 Molar Carbon
<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!!>>>>

Sample Run By: _____
RD MEYERS 00000

TIC- TOTAL INORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S98B000061SPK Date: 03/03/98 Time: 23:40:12

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = .55 ug/minute C

Analyst : RD MEYERS
Min Readings = 22
Max Readings = 22
% Difference = 10

== Reading	Analysis Time	Coulometer	% Difference ==
1	0.51	0.10	0.00
2	1.01	3.60	97.22
3	1.51	54.40	93.38
4	2.00	140.20	61.20
5	2.50	215.90	35.06
6	3.00	262.20	17.66
7	3.50	285.60	8.19
8	4.00	296.60	3.71
9	4.50	301.70	1.69
10	5.00	303.60	0.63
11	5.50	304.90	0.43
12	6.00	305.60	0.23
13	6.50	306.20	0.20
14	7.00	307.00	0.26
15	7.50	307.70	0.23
16	8.00	308.10	0.13
17	8.50	308.70	0.19
18	9.00	309.20	0.16
19	9.50	309.70	0.16
20	10.00	310.10	0.13
21	10.50	310.50	0.13
22	11.00	311.00	0.16

USER INPUT BLANK VALUE
BLANK VALUE = 6.048322 micrograms carbon
BLANK FACTOR = 6.048322 / 10.99695 = +5.5E-01 ug/min Carbon

SAMPLE RESULTS:
(311 - 6.047852)(1)/(1) = +3.050E+02 g/L Carbon
(311 - 6.047852)(1)/(1)(12) = +2.541E+01 Molar Carbon

Sample Run By: _____
RD MEYERS 00000

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: S98B000061 ~~DUP~~ SPK from 3/4/98 Date: 03/04/98 Time: 00:01:01

Sample Size = 1 uL
Dil Factor = 1
Blank ID # =
Blank Value = 2.02 ug/minute C

Analyst : RD MEYERS
Min Readings = 22
Max Readings = 22
% Difference = 10

== Reading	==== Analysis Time	==== Coulometer	==== % Difference ==
1	0.51	3.50	0.00
2	1.00	150.00	97.67
3	1.50	487.10	69.21
4	2.00	991.70	50.88
5	2.50	1327.10	25.27
6	3.00	1442.90	8.03
7	3.50	1479.80	2.49
8	4.00	1492.70	0.86
9	4.50	1498.10	0.36
10	5.00	1500.70	0.17
11	5.50	1502.90	0.15
12	6.00	1503.90	0.07
13	6.50	1505.10	0.08
14	7.00	1506.20	0.07
15	7.50	1507.30	0.07
16	8.00	1507.90	0.04
17	8.50	1508.90	0.07
18	9.00	1509.50	0.04
19	9.50	1510.20	0.05
20	10.00	1510.90	0.05
21	10.50	1511.50	0.04
22	11.00	1512.00	0.03

USER INPUT BLANK VALUE
BLANK VALUE = 22.21383 micrograms carbon
BLANK FACTOR = 22.21383 / 10.99695 = +2.0E+00 ug/min Carbon

SAMPLE RESULTS:
(1512 - 22.21605)(1)/(1) = +1.4898E+03 g/L Carbon
(1512 - 22.21605)(1)/(1)(12) = +1.2415E+02 Molar Carbon
<<<< WARNING - BLANK VALUE EXCEEDS 1.5 ug/min Carbon!!!!!>>>>

Sample Run By: _____
RD MEYERS 00000

WORKBOOK PAGE: BLANK1

TIC/TOC : LA-342-100 (F-1) LIQUIDS

Type	Sample Size in mL	(SS)	TIC: 1.0000	TOC: 1.0000
BLNK	Dilution Factor	(DF)	1	1
Work List	µg of Carbon in Sample	(C1)	10.9	25.4
22651	µg of Carbon from Baseline	(C2)	6.1	22.2

Test Code	@TICTOC1
Matrix	LIQUID
Batch Number	98000990
Rerun	0
Sample Prep	N/A
Sample #	BLANK
Instrument Code	CARB2
Prepared By	SKB
Chemist	RWS
Analyst	RDM
Date Complete	03/04/98
Analysis Date	03/04/98
Analysis Time	04:30 AM
Sample Point	TK21-1

µg of Carbon = |C1-C2|

	TIC	TOC
Method Detection Limit in µg/mL	5	40
µg of Carbon	4.80E+00	3.20E+00

Data Entered By: SKB Date: 03/04/98

Signature of Chemist: RW Schroeder Date: 3/9/98

BLANK.WB1 REV 1.0 342100ML

WORKBOOK PAGE: STD2

TIC/TOC : LA-342-100 (F-1) LIQUIDS

Type	Sample Size in mL	(SS)	TIC: 1.0000	TOC: 0.2000
STD	Dilution Factor	(DF)	1	1
Work List	Final Coulometer Reading in µg	(C1)	610.2	573.2
22651	µg of Carbon from Baseline	(C2)	6.1	22.2
Test Code	Standard Book Number		25N12B	26N12D
@TICTOC1	Standard Value (µg/ml)		602	3000

Matrix	Batch Number	Rerun	Sample Prep	Sample #	Instrument Code	Prepared By	Chemist	Analyst	Date Complete	Analysis Date	Analysis Time	Sample Point
LIQUID	98000990	0	N/A	STANDARD	CARB2	SKB	RWS	RDM	03/04/98	03/04/98	04:30 AM	TK21-1

QC Actual in µg/mL = Standard Value (µg/mL)

QC Found in µg/mL = (C1 - C2) * DF / SS

QC Found in µg/mL for TIC = 5 if C1 < C2

QC Found in µg/mL for TOC = 40 if C1 < C2

% Recovery = QC Found / QC Actual * 100

	TIC	TOC
Method Detection Limit in µg/mL	5	40
QC Actual in µg/mL	6.02E+02	3.00E+03
QC Found in µg/mL	6.04E+02	2.76E+03
Percent Standard Recovery	100.3	91.8

Data Entered By: SKB Date: 03/04/98

Signature of Chemist: RW Schroeder Date: 3/9/98

STANDARD.WB1 REV 1.0 342100ML

WORKBOOK PAGE: SAM3

TIC/TOC : LA-342-100 (F-1) LIQUIDS

Type			TIC	TOC
SAMPLE	Sample Size in mL	(SS)	1.0000	1.0000
	Dilution Factor	(DF)	1	1
Work List	µg of Carbon in Sample	(C1)	13.4	1249
22651	µg of Carbon from Baseline	(C2)	6.1	22.2
Test Code				
@TICTOC1				

Matrix
LIQUID
Batch Number
98000990
Rerun
0
Sample Prep
N/A
Sample #
S98B000061
Instrument Code
CARB2
Prepared By
SKB
Chemist
RWS
Analyst
RDM
Date Complete
03/04/98
Analysis Date
03/04/98
Analysis Time
04:30 AM
Sample Point
TK21-1

µg of Carbon/mL = (C1-C2) * DF / SS
µg of Carbon/mL for TIC = 5 if C1 < C2
µg of Carbon/mL for TOC = 40 if C1 < C2

	TIC	TOC
Method Detection Limit in µg/mL	5	40
µg of Carbon/mL	7.30E+00	1.23E+03

Data Entered By:	SKB	Date:	03/04/98
Signature of Chemist:	RW Schroeder	Date:	3/9/98

SAMPLE.WB1 REV 1.0 342100ML

WORKBOOK PAGE: DUP4

TIC/TOC : LA-342-100 (F-1) LIQUIDS

Type			TIC	TOC
DUP	Sample Size in mL	(SS)	1.0000	1.0000
	Dilution Factor	(DF)	1	1
Work List	µg of Carbon in Sample	(C1)	14.6	1166
22651	µg of Carbon from Baseline	(C2)	6.1	22.2
Test Code	Known µg of C from Original Sample		7.30E+0	1.23E+3
@TICTOC1				
Matrix				
LIQUID				
Batch Number				
98000990				
Rerun	µg of Carbon/mL = (C1-C2) * DF / SS			
0	µg of Carbon/mL for TIC = 5 if C1 < C2			
Sample Prep	µg of Carbon/mL for TOC = 40 if C1 < C2			
N/A				
Sample #				
S98B000061				
Instrument Code				
CARB2				
Prepared By				
SKB				
Chemist				
RWS				
Analyst				
RDM				
Date Complete				
03/04/98				
Analysis Date				
03/04/98				
Analysis Time	Method Detection Limit in µg/mL		5	40
04:30 AM				
Sample Point	µg of Carbon/mL		8.50E+00	1.14E+03
TK21-1				

Data Entered By:	SKB	Date:	03/04/98
Signature of Chemist:	RW Schroeder	Date:	3/9/98

WORKBOOK PAGE: SPIKE5

TIC/TOC : LA-342-100 (F-1) LIQUIDS

Type	Sample Vial Data		TIC	TOC
SPK	Sample Volume in mL	(SS)	1.0000	1.0000
Work List	Final Coulometer Reading in µg	(C1)	13.4	1249
22651	Spiked Vial Data			
Test Code	Sample Volume in mL	(SPK SS)	1.0000	1.0000
@TICTOC1	Amount of Spike Std. in mL	(SPK VOL)	0.500	0.100
Matrix	Final Coulometer Reading in µg	(C2)	311	1512
LIQUID	Spike Book Number		25N12B	26N12D
Batch Number	Spike Standard Value in µg/ml	(SPK CONC)	602	3000
98000990				
Rerun				
0				
Sample Prep				
N/A				
Sample #				
S98B000061				
Instrument Code				
CARB2				
Prepared By				
SKB				
Chemist				
RWS				
Analyst				
RDM				
Date Complete				
03/04/98				
Analysis Date				
03/04/98				
Analysis Time				
04:30 AM				
Sample Point				
TK21-1				

Percent Spike Recovery = (C2 - C1 * (SPK SS) / SS) / ((SPK CONC) * (SPK VOL)) * 1

QC Actual in µg/mL = Spike Value (µg/mL)
QC Found in µg/mL = (Percent Spike Recovery)*(QC Actual) / 100

	TIC	TOC
QC Actual in µg/mL	6.02E+02	3.00E+03
QC Found in µg/mL	5.95E+02	2.63E+03
Percent Spike Recovery	98.9	87.7

Data Entered By:	SKB	Date:	03/04/98
Signature of Chemist:	Rw Schroeder	Date:	3/9/98

worklistdata Version 1.0 05/15/96
03/04/98 18:41

LABCORE Completed Worklist Report for Worklist# 22653

Analyst: pjm **Instrument:** TOC01 **Book#** 26N12D

Method: LA344105 Rev/Mod E-0

Worklist Comment: B Plant Tk21-1 TOC-01 .200mL-2-.200mL TOCSTD skb

Seq	Type	Sample#	R	A	Test	Matrix	Actual	Found	DL or Yield	Unit
1	BLNK			0	TOC-01	LIQUID	1	1.00E+0	1.000	ug/mL
2	STD			0	TOC-01	LIQUID	3.00E+03	2.87E+3	95.667	% Recovery
3	SAMPLE	S98B000061		0	TOC-01	LIQUID	N/A	1.31E+03	5.500	ug/mL
4	DUP	S98B000061		0	TOC-01	LIQUID	1.31E+3	1.30E+3	0.766	RPD
5	SPK	S98B000061		0	TOC-01	LIQUID	1.00E+02	~~1.07E+02~~ 91.7	~~107.000~~	% Recovery

PWS 3/9/98

Final page for worklist# 22653

Analyst Signature Date

3-4-98
Analyst Signature Date

RW Schroeder 3/9/98
Reviewer Signature Date

Units shown for QC (BLK/BKG) may not reflect the actual units.

Mar. 4. 1998 4:19PM WHC 222S LAB ROOM 2F BACKSIDE

LABCORE Data Entry Template for Worklist# 22653

Analyst: RJM **Instrument:** CARB2 _____ **Book#** 26N12D

Method: LA-344-105 Rev/Mod E-0

Worklist Comment: B Plant Tk21-1 TOC-01 .200mL-2-.200mL TOCSTD skb

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	BLNK				TOC-01	LIQUID		
2	STD				TOC-01	LIQUID		
3	SAMPLE	S98B000061	0		TOC-01	LIQUID	98000140	TK-21-1 (1)
		Analytes Requested: TOC-01						
4	DUP	S98B000061	0		TOC-01	LIQUID		
5	SPK	S98B000061	0		TOC-01	LIQUID		

Final page for worklist # 22653

RJ McCown 3/4/98
Analyst Signature **Date**

_____
Analyst Signature **Date**

Data Entry Comments:

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0
<<< BLANK ANALYSIS >>> HNF-SD-WM-DP-301 REV. 0

Sample: BASE Date: 03/04/98 Time: 08:26:13

Sample Size = 200 uL
Dil Factor = 1
Blank ID # = BASE
Blank Value = N/A

Analyst : PJ MCCOWN
Min Readings = 14
Max Readings = 14
% Difference = 10

== Reading	==== Analysis Time	==== Coulometer	==== % Difference ==
1	0.51	0.60	0.00
2	1.01	0.70	14.29
3	1.51	1.00	30.00
4	2.01	1.30	23.08
5	2.51	1.70	23.53
6	3.01	1.70	0.00
7	3.51	1.90	10.53
8	4.01	2.00	5.00
9	4.51	2.10	4.76
10	5.01	2.20	4.55
11	5.51	2.20	0.00
12	6.01	2.30	4.35
13	6.51	2.40	4.17
14	7.01	2.40	0.00

BLANK VALUE = 2.4 micrograms carbon
BLANK FACTOR = 2.4 / 7.005829 = +3.4E-01 ug/min Carbon

SIGNATURE BELOW REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES _____ TO _____.

Sample Run By: PJ MCCOWN 00000

.200 mL .5M H_2SO_4 inject

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

HNF-SD-WM-DP-301 REV. 0

Sample: 26N12D Date: 03/04/98 Time: 08:35:09

Sample Size = 200 uL
Dil Factor = 11
Blank ID # = BASE
Blank Value = .3425719 ug/minute C

Analyst : PJ MCCOWN
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.00	0.00
2	1.01	4.60	100.00
3	1.51	34.70	86.74
4	2.01	47.60	27.10
5	2.51	51.70	7.93
6	3.01	53.00	2.45
7	3.51	53.50	0.93
8	4.01	53.80	0.56
9	4.50	54.00	0.37
10	5.00	54.10	0.18
11	5.51	54.20	0.18
12	6.01	54.30	0.18
13	6.51	54.40	0.18
14	7.00	54.50	0.18

BLANK VALUE = 2.4 micrograms carbon
BLANK FACTOR = 2.4 / 7.005829 = +3.4E-01 ug/min Carbon

SAMPLE RESULTS:
(54.5 - 2.399676)(11)/(200) = +2.87E+00 g/L Carbon
(54.5 - 2.399676)(11)/(200)(12) = +2.39E-01 Molar Carbon

Sample Run By: PJ McCown 3/4/98
PJ MCCOWN 00000

.200mL 26N12D in 5mL Atm & 2m H_2SO_4
.200mL inject

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

HNF-SD-WM-DP-301 REV. 0

Sample: BLNK Date: 03/04/98 Time: 08:43:46

Sample Size = 200 uL
Dil Factor = 1
Blank ID # = BASE
Blank Value = .3425719 ug/minute C

Analyst : PJ MCCOWN
Min Readings = 14
Max Readings = 14
% Difference = 10

== Reading	Analysis Time	Coulometer	% Difference ==
1	0.51	0.00	0.00
2	1.01	0.00	0.00
3	1.51	0.30	100.00
4	2.01	0.40	25.00
5	2.51	0.60	33.33
6	3.01	0.60	0.00
7	3.51	0.70	14.29
8	4.01	0.90	22.22
9	4.51	1.00	10.00
10	5.01	1.00	0.00
11	5.51	1.10	9.09
12	6.01	1.20	8.33
13	6.51	1.30	7.69
14	7.00	1.40	7.14

BLANK VALUE = 2.4 micrograms carbon
BLANK FACTOR = 2.4 / 7.005829 = +3.4E-01 ug/min Carbon

SAMPLE RESULTS:
(1.4 - 2.399655)(1)/(200) = < 5.00 E-3 g/L Carbon
(1.4 - 2.399655)(1)/(200)(12) = < 4.17 E-4 Molar Carbon

Sample Run By: PJ MCCOWN 00000

.200 mL 2.5 M H_2SO_4 inject

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

HNF-SD-WM-DP-901 REV. 0

Sample: S98B000061 Date: 03/04/98 Time: 10:15:22

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BASE
Blank Value = .3425719 ug/minute C

Analyst : PJ MCCOWN
Min Readings = 14
Max Readings = 14
% Difference = 10

== Reading	Analysis Time	Coulometer	% Difference ==
1	0.51	0.20	0.00
2	1.01	43.50	99.54
3	1.50	164.20	73.51
4	2.01	214.20	23.34
5	2.51	230.20	6.95
6	3.01	235.60	2.29
7	3.51	237.60	0.84
8	4.01	238.70	0.46
9	4.50	239.30	0.25
10	5.00	239.90	0.25
11	5.50	240.20	0.12
12	6.00	240.60	0.17
13	6.50	240.90	0.12
14	7.00	241.20	0.12

BLANK VALUE = 2.4 micrograms carbon
BLANK FACTOR = 2.4 / 7.005829 = +3.4E-01 ug/min Carbon

SAMPLE RESULTS:
(241.2 - 2.399028)(1.1)/(200) = +1.313E+00 g/L Carbon
(241.2 - 2.399028)(1.1)/(200)(12) = +1.095E-01 Molar Carbon

Sample Run By: PJ MCCOWN 00000

2.0mL in .200mL .5M H_2SO_4
.200mL inject

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

HNF-SD-WM-DP-301 REV. 0

Sample: 61 DUP Date: 03/04/98 Time: 10:24:42

Sample Size = 200 uL Analyst : PJ MCCOWN
Dil Factor = 1.1 Min Readings = 14
Blank ID # = BASE Max Readings = 14
Blank Value = .3425719 ug/minute C % Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.30	0.00
2	1.01	27.90	98.92
3	1.51	144.40	80.68
4	2.01	207.20	30.31
5	2.51	226.80	8.64
6	3.01	233.20	2.74
7	3.51	235.20	0.85
8	4.01	236.20	0.42
9	4.50	237.00	0.34
10	5.00	237.50	0.21
11	5.50	237.90	0.17
12	6.00	238.40	0.21
13	6.50	238.80	0.17
14	7.00	239.20	0.17

BLANK VALUE = 2.4 micrograms carbon
BLANK FACTOR = 2.4 / 7.005829 = +3.4E-01 ug/min Carbon

SAMPLE RESULTS:
(239.2 - 2.39932)(1.1)/(200) = +1.302E+00 g/L Carbon
(239.2 - 2.39932)(1.1)/(200)(12) = +1.085E-01 Molar Carbon

Sample Run By: PJM
PJ MCCOWN 00000

2.0mL in .200mL .5M H_2SO_4
.200mL inject

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

HNF-SD-WM-DP-301 REV. 0

Sample: 61 SPK Date: 03/04/98 Time: 10:35:13

Sample Size = 200 uL
Dil Factor = 2.5
Blank ID # = BASE
Blank Value = .3425719 ug/minute C

Analyst : PJ MCCOWN
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.30	0.00
2	1.01	17.80	98.31
3	1.51	99.50	82.11
4	2.01	141.30	29.58
5	2.51	154.70	8.66
6	3.01	158.80	2.58
7	3.51	160.40	1.00
8	4.01	161.40	0.62
9	4.50	161.90	0.31
10	5.00	162.40	0.31
11	5.50	162.90	0.31
12	6.00	163.10	0.12
13	6.51	163.50	0.24
14	7.00	163.90	0.24

BLANK VALUE = 2.4 micrograms carbon
BLANK FACTOR = 2.4 / 7.005829 = +3.4E-01 ug/min Carbon

SAMPLE RESULTS:
(163.9 - 2.399655)(2.5)/(200) = +2.019E+00 g/L Carbon
(163.9 - 2.399655)(2.5)/(200)(12) = +1.682E-01 Molar Carbon

Sample Run By: PJ MCCOWN 00000

.400mL in .200mL .5M H_2SO_4 + .400mL 23012D
.200mL inject

WORKBOOK PAGE: BLANK1

TOC : LA-344-105 (E-0) LIQUIDS

Type			BLNK
BLNK	Sample Volume in mL	(SS)	0.200
	H2SO4 Volume in mL	(VR)	0.000
Work List	Volume Injected in mL	(VI)	0.200
22653	Dilution Factor (calculated)	(DF)	1.000
Test Code	Digest Dilution Factor	(DDF)	1
TOC-01	µg of Carbon in Blank	(C1)	1.4
Matrix	µg of Carbon from Baseline	(C2)	2.4
LIQUID			
Batch Number			
98000992	µg of Carbon = |C1-C2|		
Rerun			
0	Method Detection Limit (µg/mL) = 1 µg C * DF * DDF / VI		
Sample Prep			
N/A			
Sample #			
BLANK			
Instrument Code			
TOC01			
Prepared By			
RCJ			
Chemist			
RWS			
Analyst			
PJM			
Date Complete			
03/04/98			
Analysis Date			
03/04/98			
Analysis Time	Method Detection Limit in µg/mL		5.00E+00
08:25 AM			
Sample Point	µg of Carbon		1.00E+00
TK-21-1			

Data Entered By:	RCJ	Date:	03/04/98
Signature of Chemist:	Dan Schmidt	Date:	3/9/98

BLANK.WB1 REV 2.0 344105ML

WORKBOOK PAGE: STD2

TOC : LA-344-105 (E-0) LIQUIDS

			STD
Type	Sample Volume in mL	(SS)	0.200
STD	H2SO4 Volume in mL	(VR)	2.000
Work List	Volume Injected in mL	(VI)	0.200
22653	Dilution Factor (calculated)	(DF)	11.000
Test Code	Digest Dilution Factor	(DDF)	1
TOC-01	µg of Carbon Found	(C1)	54.5
Matrix	µg of Carbon from Baseline	(C2)	2.4
LIQUID	Standard Book Number		26N12D
Batch Number	Standard Value (µg/ml)		3000
98000992			
Rerun			
0	µg of Carbon/mL = (C1-C2) * DF * DDF / VI		
Sample Prep			
N/A	Method Detection Limit (µg/mL) = 1 µg C * DF * DDF / VI		
Sample #			
STANDARD			
Instrument Code			
TOC01			
Prepared By			
RCJ			
Chemist			
RWS			
Analyst			
PJM			
Date Complete			
03/04/98			
Analysis Date			
03/04/98			
Analysis Time	Method Detection Limit in µg/mL		5.50E+01
08:25 AM	QC Actual in µg/mL		3.00E+03
Sample Point	QC Found in µg/mL		2.87E+03
TK-21-1	Percent Standard Recovery		95.5

Data Entered By:	RCJ	Date:	03/04/98
Signature of Chemist:	RW Schroeder	Date:	3/9/98

STANDARD.WB1 REV 2.0 344105ML

WORKBOOK PAGE: SAM3

TOC : LA-344-105 (E-0) LIQUIDS

Type	Sample Volume in mL	(SS)	SAMPLE
SAMPLE	H2SO4 Volume in mL	(VR)	2.000
Work List	Volume Injected in mL	(VI)	0.200
22653	Dilution Factor (calculated)	(DF)	0.200
Test Code	Digest Dilution Factor	(DDF)	1.100
TOC-01	µg of Carbon in Sample	(C1)	1
Matrix	µg of Carbon from Baseline	(C2)	241.2
LIQUID			2.4
Batch Number			
98000992			
Rerun	µg of Carbon/mL = (C1-C2) * DF * DDF / VI		
0			
Sample Prep	Method Detection Limit = 1 µg C * DF * DDF / VI		
N/A			
Sample #			
S98B000061			
Instrument Code			
TOC01			
Prepared By			
RCJ			
Chemist			
RWS			
Analyst			
PJM			
Date Complete			
03/04/98			
Analysis Date			
03/04/98			
Analysis Time	Method Detection Limit in µg/mL		5.50E+00
08:25 AM			
Sample Point	µg of Carbon/mL		1.31E+03
TK-21-1			

Data Entered By:	RCJ	Date:	03/04/98
Signature of Chemist:	R W Schroeder	Date:	3/9/98

SAMPLE.WB1 REV 2.0 344105ML

WORKBOOK PAGE: DUP4

TOC : LA-344-105 (E-0) LIQUIDS

Type			DUP
DUP	Sample Volume in mL	(SS)	2.000
	H2SO4 Volume in mL	(VR)	0.200
Work List	Volume Injected in mL	(VI)	0.200
22653	Dilution Factor (calculated)	(DF)	1.100
Test Code	Digest Dilution Factor	(DDF)	1
TOC-01	µg of Carbon in Sample	(C1)	239.2
Matrix	µg of Carbon from Baseline	(C2)	2.4
LIQUID	Result from Sample Page		1.31E+3
Batch Number			
98000992			
Rerun	µg of Carbon/mL = (C1-C2) * DF * DDF / VI		
0			
Sample Prep	Method Detection Limit = 1 µg C * DF * DDF / VI		
N/A			
Sample #			
S98B000061			
Instrument Code			
TOC01			
Prepared By			
RCJ			
Chemist			
RWS			
Analyst			
PJM			
Date Complete			
03/04/98			
Analysis Date			
03/04/98			
Analysis Time	Method Detection Limit in µg/mL		5.50E+00
08:25 AM			
Sample Point	µg of Carbon/mL		1.30E+03
TK-21-1			

Data Entered By:	RCJ	Date:	03/04/98
Signature of Chemist:	Rus Schroeder	Date:	3/9/98

SAMPLE.WB1 REV 2.0 344105ML

WORKBOOK PAGE: SPIKE5

TOC : LA-344-105 (E-0) LIQUIDS

SPIKE

Type	Sample Vial Data		Spiked Vial Data	
SPK	Sample Volume in mL (SS)	2.000	Was the sample dilution used? (yes/no)	~~YES~~ NO
Work List	H2SO4 Volume in mL (VR)	0.200	Sample Volume in mL (SPK SS)	0.400
22653	Volume Injected in mL (VI)	0.200	H2SO4 Volume in mL (SPK VR)	0.200
Test Code	µg of Carbon in Sample (C1)	241.2	Amount of Spike Std. in mL (SPK VOL)	0.400
TOC-01	µg of Carbon from Baseline (C2)	2.4	Volume Injected in mL (SPK VI)	0.200
Matrix			µg C in Sample + Spike (C3)	163.9
LIQUID			Pre-Spike Dilution Factor (PDF)	1.0 ~~4.10~~
Batch Number			Spike Book Number	23N12D
98000992			Spike Value in µg/ml	769
Rerun				
0				
Sample Prep				
N/A				
Sample #				
S98B000061				
Instrument Code				
TOC01				
Prepared By				
RCJ				
Chemist				
RWS				
Analyst				
PJM				
Date Complete				
03/04/98				
Analysis Date				
03/04/98				
Analysis Time				
08:25 AM				
Sample Point				
TK-21-1				

Spike Correction Factor (SPK CF) = (SPK SS + SPK VOL + SPK VR) / SPK VI

Sample Correction Factor (SAM CF) = (SS + VR) / (VI)

Sample Size Correction Factor (SS CF) = (SPK SS) / (SS)

QC Actual in µg/mL = Spike Value (µg/mL)

QC Found in µg/mL = [(C3 - C2)(SPK CF) - (C1-C2)(SAM CF)(SS CF)/(PDF)] / (SPK VOL)

Percent Spike Recovery = (QC Found) / (QC Actual) * 100

QC Actual in µg/mL		7.69E+02
QC Found in µg/mL	7.05e2	~~8.25E+02~~
Percent Spike Recovery	91.7	~~107.2~~

RWS 3/9/98

worklistrpt Version 2.1 05/15/95
04/07/98 06:40

LABCORE Data Entry Template for Worklist# 23353

Analyst: VLM **Instrument:** GFAA1 _____ **Book #** 57W10A

Method: LA-505-102 Rev/Mod A-Ø

Worklist Comment: 21-1 GFAA Se

GROUP	PROJECT	S TYPE	SAMPLE#	R	A	TEST	MATRIX	ACTUAL	FOUND	DL	UNIT
		1 ICV				GF-SE-01	LIQUID	100	101	N/A	ug/L
		2 BLNK-PREP				GF-SE-01	LIQUID	1	<1	N/A	ug/L
		3 ICB				GF-SE-01	LIQUID	1	<1	N/A	ug/L
		4 STD-PREP				GF-SE-01	LIQUID	~~100~~ 10	~~120~~ 12	~~N/A~~ Hea	ug/L 4-7-98
98000140	TK-21-1 (1)	5 SERDIL	S98B000085	0	G	GF-SE-01	LIQUID	<1	Ø	N/A	ug/L
98000140	TK-21-1 (1)	6 SAMPLE	S98B000085	0	G	GF-SE-01	LIQUID	N/A	<1	<1	ug/L
98000140	TK-21-1 (1)	7 DUP	S98B000085	0	G	GF-SE-01	LIQUID	<1	<1	N/A	ug/L
98000140	TK-21-1 (1)	8 SPK	S98B000085	0	G	GF-SE-01	LIQUID	100	110	N/A	ug/L
		9 CCV				GF-SE-01	LIQUID	100	98	N/A	ug/L
		10 CCB				GF-SE-01	LIQUID	1	<1	N/A	ug/L

Final page for worklist # 23353

Hla for Valerie Massie
Analyst Signature **Date** 4-6-98

Theresa Mij 4-7-98
Analyst Signature **Date**

Validated by SL Anastos 4-7-98

Data Entry Comments: Post-Spk of S98B000085 was 110%.

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

HNF-SD-WM-DP-301 REV. 0

Analytical Report

Date: 04/07/98

Hill for VLMassie 4-7-98

Element File: SE_MED.GEL
Date: 04/06/98
Data File: 21_1498.DAT
Technique: HGA

Element: Se
Time: 15:50
ID/Wt File: UNTITLED
Calib. Type: Linear

Wavelength: 196.0
Slit: 2.00 L
Energy: 68

Se ID: BLK Seq. No.: 00001 A/S Pos.: 79 Date: 04/06/98

Replicate 1
Time: 15:52
Peak Area (A-s): 0.002
Peak Height (A): 0.004
Background Pk Area (A-s): 0.162
Background Pk Height (A): 0.074
Blank Corrected Pk Area (A-s): 0.000

Auto-zero performed.

Se ID: 56W10A 15 Seq. No.: 00002 A/S Pos.: 78 Date: 04/06/98

Replicate 1
Time: 15:55
Peak Area (A-s): 0.034
Peak Height (A): 0.031
Background Pk Area (A-s): 0.191
Background Pk Height (A): 0.091
Blank Corrected Pk Area (A-s): 0.031

Standard number 1 applied. [15.000]
Correlation coefficient: 1.00000 Slope: 0.0021

Se ID: 56W10A 30 Seq. No.: 00003 A/S Pos.: 78 Date: 04/06/98

Replicate 1
Time: 15:58
Peak Area (A-s): 0.064
Peak Height (A): 0.056
Background Pk Area (A-s): 0.187
Background Pk Height (A): 0.089
Blank Corrected Pk Area (A-s): 0.062

Standard number 2 applied. [30.000]
Correlation coefficient: 0.99994 Slope: 0.0021

Se ID: 56W10A 45 Seq. No.: 00004 A/S Pos.: 78 Date: 04/06/98

Replicate 1
Time: 16:01
Peak Area (A-s): 0.096
Peak Height (A): 0.086
Background Pk Area (A-s): 0.173
Background Pk Height (A): 0.082
Blank Corrected Pk Area (A-s): 0.093

Standard number 3 applied. [45.000]
Correlation coefficient: 0.99998 Slope: 0.0021

Se ID: 56W10A 75 Seq. No.: 00005 A/S Pos.: 78 Date: 04/06/98

Replicate 1
Time: 16:03
Peak Area (A-s): 0.155
Peak Height (A): 0.137
Background Pk Area (A-s): 0.178
Background Pk Height (A): 0.089
Blank Corrected Pk Area (A-s): 0.153

Analytical Report Date: 04/07/98

Standard number 4 applied. [75.000]
Correlation coefficient: 0.99983 Slope: 0.0021

~~~~~~

Se ID: 56W10A 90 Seq. No.: 00006 A/S Pos.: 78 Date: 04/06/98

Replicate 1 Time: 16:06
Peak Area (A-s): 0.185 Peak Height (A): 0.157
Background Pk Area (A-s): 0.180 Background Pk Height (A): 0.084
Blank Corrected Pk Area (A-s): 0.183

Standard number 5 applied. [90.000]
Correlation coefficient: 0.99987 Slope: 0.0020

~~~~~~

Se ID: 56W10A 120 Seq. No.: 00007 A/S Pos.: 78 Date: 04/06/98

Replicate 1 Time: 16:09
Peak Area (A-s): 0.229 Peak Height (A): 0.201
Background Pk Area (A-s): 0.164 Background Pk Height (A): 0.077
Blank Corrected Pk Area (A-s): 0.227

Standard number 6 applied. [120.000]
Correlation coefficient: 0.99682 Slope: 0.0020

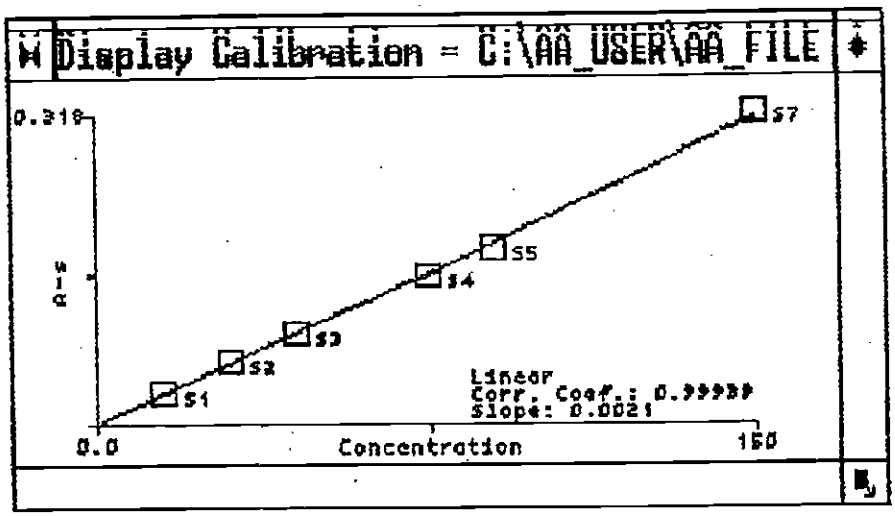
~~~~~~

Se ID: 56W10A 150 Seq. No.: 00008 A/S Pos.: 78 Date: 04/06/98

Replicate 1 Time: 16:12
Peak Area (A-s): 0.321 Peak Height (A): 0.268
Background Pk Area (A-s): 0.194 Background Pk Height (A): 0.093
Blank Corrected Pk Area (A-s): 0.318

Standard number 7 applied. [150.000]
Correlation coefficient: 0.99589 Slope: 0.0020

~~~~~~



Se ID: AS Position 042 Seq. No.: 00009 A/S Pos.: 42 Date: 04/06/98

Replicate 1 Time: 16:17
Peak Area (A-s): 0.002 Peak Height (A): 0.004
Background Pk Area (A-s): 0.183 Background Pk Height (A): 0.081
Blank Corrected Pk Area (A-s): -0.000
Concentration (ug/L): -0.

Se ID: AS Position 042 Seq. No.: 00010 A/S Pos.: 42 Date: 04/06/98

Replicate 1 Time: 16:21
Peak Area (A-s): 0.002 Peak Height (A): 0.005
Background Pk Area (A-s): 0.192 Background Pk Height (A): 0.082
Blank Corrected Pk Area (A-s): 0.000
Concentration (ug/L): 0.

Se ID: AS Position 042 Seq. No.: 00011 A/S Pos.: 42 Date: 04/06/98

Replicate 1 Time: 16:24
Peak Area (A-s): 0.002 Peak Height (A): 0.004
Background Pk Area (A-s): 0.224 Background Pk Height (A): 0.085
Blank Corrected Pk Area (A-s): -0.000
Concentration (ug/L): -0.

Analytical Report Date: 04/07/98

Element File: SE_MED.GEL
Date: 04/06/98
Data File: 21_1498.DAT
Technique: HGA

Element: Se
Time: 16:33
ID/Wt File: UNTITLED
Calib. Type: Linear

Wavelength: 196.0
Slit: 2.00 L
Energy: 68

Se ID: BLANK Seq. No.: 00012 A/S Pos.: 1 Date: 04/06/98

Replicate 1
Time: 16:35
Peak Area (A-s): 0.001
Peak Height (A): 0.004
Background Pk Area (A-s): 0.147
Background Pk Height (A): 0.071
Blank Corrected Pk Area (A-s): -0.001
Concentration (ug/L): -0.

Se ID: ICV 57W10A 100 Seq. No.: 00013 A/S Pos.: 2 Date: 04/06/98

Replicate 1
Time: 16:38
Peak Area (A-s): 0.210
Peak Height (A): 0.171
Background Pk Area (A-s): 0.192
Background Pk Height (A): 0.087
Blank Corrected Pk Area (A-s): 0.207
Concentration (ug/L): 99.

Replicate 2
Time: 16:41
Peak Area (A-s): 0.222
Peak Height (A): 0.177
Background Pk Area (A-s): 0.199
Background Pk Height (A): 0.098
Blank Corrected Pk Area (A-s): 0.220
Concentration (ug/L): 105.

Replicate 3
Time: 16:43
Peak Area (A-s): 0.210
Peak Height (A): 0.174
Background Pk Area (A-s): 0.188
Background Pk Height (A): 0.085
Blank Corrected Pk Area (A-s): 0.208
Concentration (ug/L): 99.

Mean Conc (ug/L): 101. SD: 3.3 RSD(%): 3.27

$\frac{101}{100} \times 100 = 101\%$

Se ID: ICB Seq. No.: 00014 A/S Pos.: 3 Date: 04/06/98

Replicate 1
Time: 16:46
Peak Area (A-s): 0.002
Peak Height (A): 0.004
Background Pk Area (A-s): 0.140
Background Pk Height (A): 0.069
Blank Corrected Pk Area (A-s): -0.001
Concentration (ug/L): -0.

Replicate 2
Time: 16:49
Peak Area (A-s): 0.002
Peak Height (A): 0.004
Background Pk Area (A-s): 0.139
Background Pk Height [illegible]
Blank Corrected Pk Area (A-s): -0.000
Concentration (ug/L): -0.

Replicate 3
Peak Area (A-s): 0.003
Peak Height (A): 0.004
Background Pk Area [illegible]
Background Pk Height (A): 0.069

-4-

Analytical Report Date: 04/07/98

Blank Correction Pk Area (A-s): 0.000
Concentration (ug/L): 0.

Mean Conc (ug/L): -0. SD: 0.3 RSD(%): 619.8

Se ID: PREP BLK Seq. No.: 00015 A/S Pos.: 4 Date: 04/06/98

Replicate 1 Time: 16:54
Peak Area (A-s): 0.002 Peak Height (A): 0.004
Background Pk Area (A-s): 0.179 Background Pk Height (A): 0.069
Blank Corrected Pk Area (A-s): 0.000
Concentration (ug/L): 0.

Replicate 2 Time: 16:57
Peak Area (A-s): 0.002 Peak Height (A): 0.004
Background Pk Area (A-s): 0.181 Background Pk Height (A): 0.070
Blank Corrected Pk Area (A-s): -0.000
Concentration (ug/L): -0.

Replicate 3 Time: 17:00
Peak Area (A-s): 0.003 Peak Height (A): 0.004
Background Pk Area (A-s): 0.186 Background Pk Height (A): 0.071
Blank Corrected Pk Area (A-s): 0.001
Concentration (ug/L): 0.

Mean Conc (ug/L): 0. SD: 0.1 RSD(%): 170.5

Se ID: PREP STD 10 Seq. No.: 00016 A/S Pos.: 5 Date: 04/06/98

Replicate 1 Time: 17:02
Peak Area (A-s): 0.029 Peak Height (A): 0.023
Background Pk Area (A-s): 0.203 Background Pk Height (A): 0.073
Blank Corrected Pk Area (A-s): 0.026
Concentration (ug/L): 13.

Replicate 2 Time: 17:05
Peak Area (A-s): 0.027 Peak Height (A): 0.021
Background Pk Area (A-s): 0.197 Background Pk Height (A): 0.071
Blank Corrected Pk Area (A-s): 0.025
Concentration (ug/L): 12.

Replicate 3 Time: 17:08
Peak Area (A-s): 0.029 Peak Height (A): 0.021
Background Pk Area (A-s): 0.201 Background Pk Height (A): 0.073
Blank Corrected Pk Area (A-s): 0.027
Concentration (ug/L): 13.

Mean Conc (ug/L): 12. SD: 0.4 RSD(%): 3.25

$\frac{12.}{10} \times 100 = 120\%$

Se ID: BLK Seq. No.: 00017 A/S Pos.: 79 Date: 04/06/98

Replicate 1 Time: 17:10
Peak Area (A-s): 0.002 Peak Height (A): 0.004

Analytical Report Date: 04/07/98

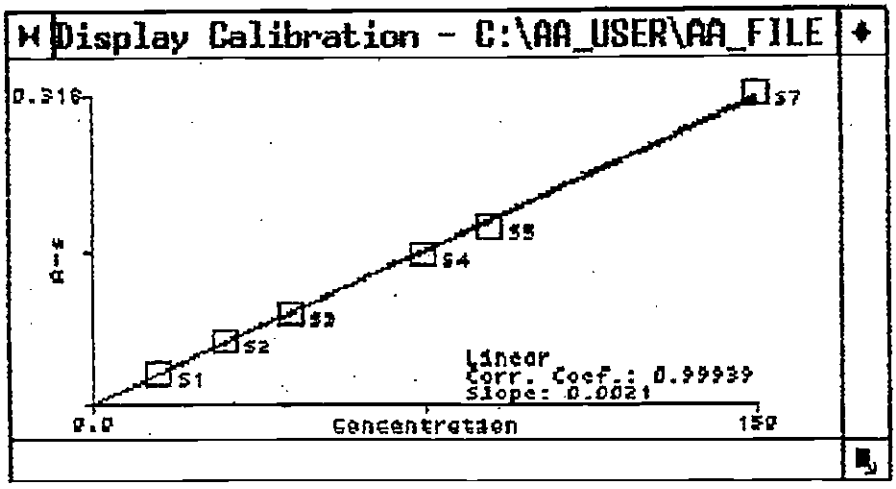
Background Pk Area (A-s): 0.147 Background Pk Height (A): 0.069
Blank Corrected Pk Area (A-s): -0.000

Auto-zero performed.

Se ID: 56W10A 105 Seq. No.: 00018 A/S Pos.: 78 Date: 04/06/98

Replicate 1 Time: 17:13
Peak Area (A-s): 0.224 Peak Height (A): 0.181
Background Pk Area (A-s): 0.199 Background Pk Height (A): 0.097
Blank Corrected Pk Area (A-s): 0.222

Reslope standard applied. [105.000]
Correlation coefficient: 0.99939 Slope: 0.0021



Se ID: S98B000085 SD Seq. No.: 00019 A/S Pos.: 6 Date: 04/06/98

Replicate 1 Time: 17:16
Peak Area (A-s): 0.001 Peak Height (A): 0.003
Background Pk Area (A-s): 0.191 Background Pk Height (A): 0.085
Blank Corrected Pk Area (A-s): -0.001
Concentration (ug/L): -0.

Replicate 2 Time: 17:19
Peak Area (A-s): 0.003 Peak Height (A): 0.004
Background Pk Area (A-s): 0.191 Background Pk Height (A): 0.086
Blank Corrected Pk Area (A-s): 0.001
Concentration (ug/L): 0.

Replicate 3 Time: 17:21
Peak Area (A-s): 0.002 Peak Height (A): 0.004
Background Pk Area (A-s): 0.188 Background Pk Height (A): 0.083
Blank Corrected Pk Area (A-s): 0.000
Concentration (ug/L): 0.

Analytical Report Date: 04/07/98

Mean Conc (ug/L): 0. SD: 0.5 RSD(%): 4915

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Se ID: S98B000085 Seq. No.: 00020 A/S Pos.: 7 Date: 04/06/98

Replicate 1 Time: 17:24
Peak Area (A-s): 0.004 Peak Height (A): 0.004
Background Pk Area (A-s): 0.217 Background Pk Height (A): 0.082
Blank Corrected Pk Area (A-s): 0.002
Concentration (ug/L): 1.

Replicate 2 Time: 17:27
Peak Area (A-s): 0.003 Peak Height (A): 0.005
Background Pk Area (A-s): 0.230 Background Pk Height (A): 0.086
Blank Corrected Pk Area (A-s): 0.001
Concentration (ug/L): 1.

Replicate 3 Time: 17:29
Peak Area (A-s): 0.003 Peak Height (A): 0.005
Background Pk Area (A-s): 0.234 Background Pk Height (A): 0.087
Blank Corrected Pk Area (A-s): 0.001
Concentration (ug/L): 1.

Mean Conc (ug/L): 1. SD: 0.1 RSD(%): 20.92

~~~~~~

Se ID: S98B000085 DUP Seq. No.: 00021 A/S Pos.: 8 Date: 04/06/98

Replicate 1 Time: 17:32
Peak Area (A-s): 0.003 Peak Height (A): 0.005
Background Pk Area (A-s): 0.219 Background Pk Height (A): 0.086
Blank Corrected Pk Area (A-s): 0.001
Concentration (ug/L): 1.

Replicate 2 Time: 17:35
Peak Area (A-s): 0.002 Peak Height (A): 0.004
Background Pk Area (A-s): 0.219 Background Pk Height (A): 0.085
Blank Corrected Pk Area (A-s): -0.000
Concentration (ug/L): -0.

Replicate 3 Time: 17:38
Peak Area (A-s): 0.003 Peak Height (A): 0.004
Background Pk Area (A-s): 0.227 Background Pk Height (A): 0.088
Blank Corrected Pk Area (A-s): 0.001
Concentration (ug/L): 1.

Mean Conc (ug/L): 0. SD: 0.4 RSD(%): 105.2

~~~~~~

Se ID: S98B000085 SPK Seq. No.: 00022 A/S Pos.: 9 Date: 04/06/98

Replicate 1 Time: 17:40
Peak Area (A-s): 0.027 Peak Height (A): 0.020
Background Pk Area (A-s): 0.224 Background Pk Height (A): 0.090
Blank Corrected Pk Area (A-s): 0.025
Concentration (ug/L): 12.
~~~~~~

Analytical Report Date: 04/07/98

Replicate 2
Peak Area (A-s): 0.027
Background Pk Area (A-s): 0.213
Blank Corrected Pk Area (A-s): 0.026
Concentration (ug/L): 12.
Time: 17:43
Peak Height (A): 0.020
Background Pk Height (A): 0.083

Replicate 3
Peak Area (A-s): 0.028
Background Pk Area (A-s): 0.207
Blank Corrected Pk Area (A-s): 0.026
Concentration (ug/L): 12.
Time: 17:46
Peak Height (A): 0.018
Background Pk Height (A): 0.083

Mean Conc (ug/L): $\frac{12.-1}{10} \times 100 = 110\%$ SD: 0.3 RSD(%): 2.63

Se ID: S98B000085 PS Seq. No.: 00023 A/S Pos.: 10 Date: 04/06/98

Replicate 1
Peak Area (A-s): 0.025
Background Pk Area (A-s): 0.252
Blank Corrected Pk Area (A-s): 0.023
Concentration (ug/L): 11.
Time: 17:49
Peak Height (A): 0.019
Background Pk Height (A): 0.095

Replicate 2
Peak Area (A-s): 0.025
Background Pk Area (A-s): 0.247
Blank Corrected Pk Area (A-s): 0.023
Concentration (ug/L): 11.
Time: 17:51
Peak Height (A): 0.019
Background Pk Height (A): 0.094

Replicate 3
Peak Area (A-s): 0.025
Background Pk Area (A-s): 0.252
Blank Corrected Pk Area (A-s): 0.023
Concentration (ug/L): 11.
Time: 17:54
Peak Height (A): 0.019
Background Pk Height (A): 0.097

Mean Conc (ug/L): $\frac{11.-1}{9.09} \times 100 = 110\%$ SD: 0.1 RSD(%): 1.34

Se ID: BLK Seq. No.: 00024 A/S Pos.: 79 Date: 04/06/98

Replicate 1
Peak Area (A-s): 0.002
Background Pk Area (A-s): 0.186
Blank Corrected Pk Area (A-s): -0.000
Time: 17:57
Peak Height (A): 0.004
Background Pk Height (A): 0.085

Auto-zero performed.

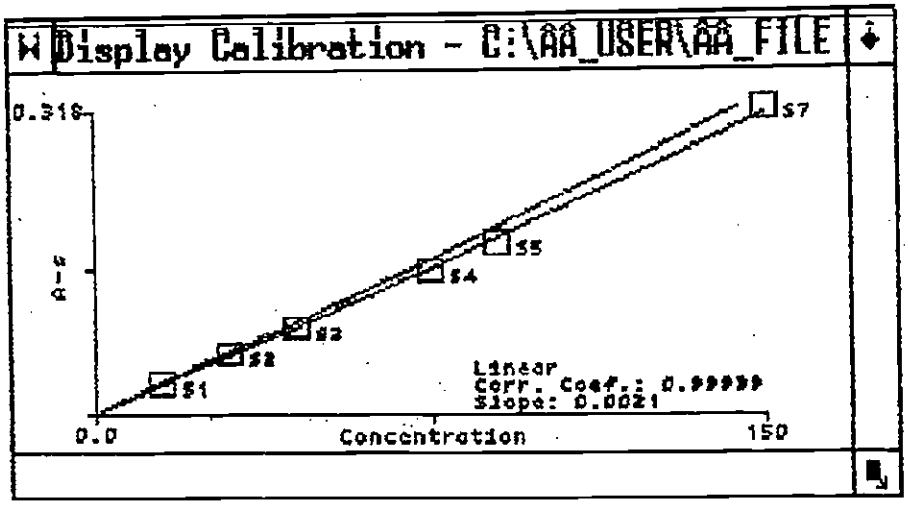
Se ID: 56W10A 105 Seq. No.: 00025 A/S Pos.: 78 Date: 04/06/98

Replicate 1
Peak Area (A-s): 0.233
Background Pk Area (A-s): 0.228
Blank Corrected Pk Area (A-s): 0.231
Time: 18:00
Peak Height (A): 0.184
Background Pk Height (A): 0.114

Analytical Report

Date: 04/07/98

Reslope standard applied. [105.000]
Correlation coefficient: 0.99939 Slope: 0.0021



Se ID: CCV 57W10A 100 Seq. No.: 00026 A/S Pos.: 11 Date: 04/06/98

Replicate 1 Time: 18:02
Peak Area (A-s): 0.211 Peak Height (A): 0.174
Background Pk Area (A-s): 0.213 Background Pk Height (A): 0.109
Blank Corrected Pk Area (A-s): 0.209
Concentration (ug/L): 95.

Replicate 2 Time: 18:05
Peak Area (A-s): 0.214 Peak Height (A): 0.172
Background Pk Area (A-s): 0.210 Background Pk Height (A): 0.099
Blank Corrected Pk Area (A-s): 0.212
Concentration (ug/L): 96.

Replicate 3 Time: 18:08
Peak Area (A-s): 0.227 Peak Height (A): 0.185
Background Pk Area (A-s): 0.214 Background Pk Height (A): 0.107
Blank Corrected Pk Area (A-s): 0.226
Concentration (ug/L): 102.

Mean Conc (ug/L): 98. SD: 4.0 RSD(%): 4.06

$\frac{98.}{100} \times 100 = 98\%$

Se ID: CCB Seq. No.: 00027 A/S Pos.: 12 Date: 04/06/98

Replicate 1 Time: 18:11
Peak Area (A-s): 0.002 Peak Height (A): 0.003
Background Pk Area (A-s): 0.164 Background Pk Height (A): 0.077
Blank Corrected Pk Area (A-s): 0.001
Concentration (ug/L): 0.

Replicate 2 Time: 18:13
Peak Area (A-s): 0.002 Peak Height (A): 0.004

Background Pk Area (A-s): 0.163 Background Pk Height (A): 0.076
Blank Corrected Pk Area (A-s): 0.001
Concentration (ug/L): 0.

Replicate 3 Time: 18:16
Peak Area (A-s): 0.003 Peak Height (A): 0.004
Background Pk Area (A-s): 0.156 Background Pk Height (A): 0.076
Blank Corrected Pk Area (A-s): 0.002
Concentration (ug/L): 1.

Mean Conc (ug/L): 0. SD: 0.3 RSD(%): 64.23

~~~~~~

Se ID: CCB Seq. No.: 00028 A/S Pos.: 13 Date: 04/06/98

Replicate 1 Time: 18:19
Peak Area (A-s): 0.003 Peak Height (A): 0.005
Background Pk Area (A-s): 0.158 Background Pk Height (A): 0.073
Blank Corrected Pk Area (A-s): 0.002
Concentration (ug/L): 1.

Replicate 2 Time: 18:22
Peak Area (A-s): 0.004 Peak Height (A): 0.004
Background Pk Area (A-s): 0.154 Background Pk Height (A): 0.071
Blank Corrected Pk Area (A-s): 0.003
Concentration (ug/L): 1.

Replicate 3 Time: 18:24
Peak Area (A-s): 0.002 Peak Height (A): 0.004
Background Pk Area (A-s): 0.149 Background Pk Height (A): 0.069
Blank Corrected Pk Area (A-s): 0.001
Concentration (ug/L): 0.

Mean Conc (ug/L): 1. SD: 0.5 RSD(%): 68.83

~~~~~~

Se ID: CCB Seq. No.: 00029 A/S Pos.: 14 Date: 04/06/98

Replicate 1 Time: 18:27
Peak Area (A-s): 0.003 Peak Height (A): 0.004
Background Pk Area (A-s): 0.153 Background Pk Height (A): 0.072
Blank Corrected Pk Area (A-s): 0.002
Concentration (ug/L): 1.

Replicate 2 Time: 18:30
Peak Area (A-s): 0.002 Peak Height (A): 0.004
Background Pk Area (A-s): 0.147 Background Pk Height (A): 0.068
Blank Corrected Pk Area (A-s): 0.001
Concentration (ug/L): 0.

Replicate 3 Time: 18:33
Peak Area (A-s): 0.001 Peak Height (A): 0.004
Background Pk Area (A-s): 0.146 Background Pk Height (A): 0.067
Blank Corrected Pk Area (A-s): -0.000
Concentration (ug/L): -0.

LABCORE Completed Worklist Report for Worklist# 23340

Analyst: krm **Instrument:** U01 **Book#** 13857

Method: LA925-009 Rev/Mod B-0

Worklist Comment: RERUN OF 22659 9@U-01 FOR TK-21-1 RTS

Seq	Type	Sample#	R	A	Test	Matrix	Actual	Found	DL or Yield	Unit
1	STD		0	@U-01	U-02	LIQUID	6.26E-02	5.75E-02	91.853	% Recovery
1	STD		0	@U-01	U-02E	LIQUID	1	3.13E+00	3.130	Ratio
2	BLNK		0	@U-01	U-02	LIQUID	1	5.38E-3	0.005	ug/mL
2	BLNK		0	@U-01	U-02E	LIQUID	1	3.35E+00	3.350	Ratio
3	SAMPLE	S98B000062	0	@U-01	U-02	LIQUID	N/A	4.87E-02	3.70e-003	ug/mL
3	SAMPLE	S98B000062	0	@U-01	U-02E	LIQUID	N/A	1.26E+00		% Inst Error
4	DUP	S98B000062	0	@U-01	U-02	LIQUID	4.87E-2	4.49E-2	8.120	RPD
4	DUP	S98B000062	0	@U-01	U-02E	LIQUID	1	1.41E+00	1.410	Ratio
5	SPK	S98B000062	0	@U-01	U-02	LIQUID	4.92E+01	4.76E+01	96.748	% Recovery

Final page for worklist# 23340

Analyst Signature Date

Analyst Signature Date

RW Schroeder 4/8/98
Reviewer Signature Date

Units shown for QC (BLK/BKG) may not reflect the actual units.

LABCORE Data Entry Template for Worklist# 23340

Analyst: KRM **Instrument:** U01 _____ **Book#** 13857

Method: LA-925-009 Rev/Mod _____

Worklist Comment: RERUN OF 22659 9@U-01 FOR TK-21-1 RTS

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	STD				@U-01	LIQUID		
2	BLNK				@U-01	LIQUID		
3	SAMPLE	S98B000062	0		@U-01	LIQUID	98000140	TK-21-1 (1)
		Analytes Requested: U-02			, U-02E			
4	DUP	S98B000062	0		@U-01	LIQUID		
5	SPK	S98B000062	0		@U-01	LIQUID		

Final page for worklist # 23340

[signature] 4-8-98
Analyst Signature **Date**

[signature] 4/8/98
Analyst Signature **Date**

Sylvia Z Cochran 4/8/98

Data Entry Comments:

_____

_____

_____

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

Sample ID Blank
Description blank
Ref. Ratio 1.101
Laser Pulses 1000
Lifetime 343 + 9.956 us
R2 .9655
Integrated 5892
Range: LOW

Date/Time 04/08/98/05:33:57
Cal Y=8.73E+09X0
Intensity 291 (t= 39 us)
Conc 5.38E-08 + 1.80E-07 G/L
Dilution Factor 1 mL/mL
FINAL RESULT 5.38E-08 + 1.80E-07 G/L

Sample ID STANDARD
Description 13337
Ref. Ratio 1.063
Laser Pulses 1000
Lifetime 366 + 1.671 us
R2 .9991
Integrated 94993
Range: HIGH

Date/Time 04/08/98/06:03:20
Cal Y=7.39E+07X+428.441
Intensity 4302 (t= 39 us)
Conc 5.73E-05 + 1.90E-06 G/L
Dilution Factor 1 mL/mL
FINAL RESULT 5.73E-05 + 1.90E-06 G/L

Sample ID 9988000862
Description SAMPLE
Ref. Ratio 1.121
Laser Pulses 1000
Lifetime 366 + 2.113 us
R2 .9985
Integrated 55837
Range: LOW

Date/Time 04/08/98/05:37:16
Cal Y=8.73E+09X0
Intensity 2606 (t= 39 us)
Conc 4.87E-07 + 6.13E-09 G/L
Dilution Factor 1 mL/mL
FINAL RESULT 4.87E-07 + 6.13E-09 G/L

Sample ID 9988000862
Description DUPLICATE
Ref. Ratio 1.129
Laser Pulses 1000
Lifetime 367 + 3.148 us
R2 .9968
Integrated 51720
Range: LOW

Date/Time 04/08/98/05:38:46
Cal Y=8.73E+09X0
Intensity 2270 (t= 39 us)
Conc 4.49E-07 + 6.35E-09 G/L
Dilution Factor 1 mL/mL
FINAL RESULT 4.49E-07 + 6.35E-09 G/L

Sample ID 9988000862
Description SPIKE
Ref. Ratio 1.111
Laser Pulses 1000
Lifetime 362 + 1.574 us
R2 .9992
Integrated 712389
Range: HIGH

Date/Time 04/08/98/05:41:30
Cal Y=7.59E+07X+428.441
Intensity 51883 (t= 39 us)
Conc 4.76E-04 + 1.49E-05 G/L
Dilution Factor 1 mL/mL
FINAL RESULT 4.76E-04 + 1.49E-05 G/L

HNF-SD-WM-DP-301 REV. 0

WORKBOOK PAGE: STD1

Uranium by Phosphorescence: LA-925-009 (B-0) LIQUID/SOLID

Type			
STD			STANDARD
Work List	STANDARD BOOK #		13B57
23340	VOLUME OF SAMPLE (mL)	(SS)	1.00
Test Code	DILUTION FACTOR OF SAMPLE	(DF)	1.00
@U-01	PREPARATION FACTOR OF SAMPLE	(PF)	1.00
Matrix	LIFETIME IN MICROSECONDS		366.00
LIQUID	R2 VALUE		0.9991
Batch Number	RANGE (HIGH OR LOW)		HIGH
98001727	INSTRUMENT UNCERTAINTY	(IU)	1.80E-06
Rerun	INSTRUMENT RESULT	(IR)	5.75E-05
0	DETECTION LEVEL (µg/mL)		3.70E-05
Sample Prep			
N/A	RESULT (µg/mL)		5.75E-02
Sample #	VALUE OF STANDARD		6.26E-02
WK23340-STD	%RECOVERY		91.85
Instrument Code	RELATIVE % UNCERTAINTY		3.1
U01			
Prepared By			
MCB	Result = DF * PF * IR * 1000		
Chemist			
RWS	Detection Level = 3.70 E-08 * DF * PF * 1000		
Analyst			
KRM	% Recovery = Result / Value of Standard * 100		
Date Complete			
04/08/98	Relative % Uncertainty = IU / IR * 100		
Analysis Date			
04/08/98			
Analysis Time			
10:00 AM			
Sample Point			
TK-21-1			

Analyst:		KRM	Date:	08-Apr-98
Signature of Chemist:	RW Schroeder	RWS	Date:	4/8/98

STANDARD.WB1 REV 2.0 925009ML

HNF-SD-WM-DP-301 REV. 0

WORKBOOK PAGE: BLANK2

Uranium by Phosphorescence: LA-925-009 (B-0) LIQUID/SOLID

Type			
BLNK			BLANK
Work List	VOLUME OF SAMPLE (mL)	(SS)	1.00
23340	DILUTION FACTOR OF SAMPLE	(DF)	1.00
Test Code	PREPARATION FACTOR OF SAMPLE	(PF)	100.00
@U-01	DIGEST DILUTION FACTOR	(DDF)	1.0000
Matrix	LIFETIME IN MICROSECONDS		345.00
LIQUID	R2 VALUE		0.9655
Batch Number	RANGE (HIGH OR LOW)		LOW
98001727	INSTRUMENT UNCERTAINTY	(IU)	1.80E-09
Rerun	INSTRUMENT RESULT	(IR)	5.38E-08
0	DETECTION LEVEL (µg/mL)		3.70E-03
Sample Prep			
N/A			
Sample #	RESULT (µg/mL)		5.38E-03
WL23340-BLNK	RELATIVE % UNCERTAINTY		3.3
Instrument Code			
U01			
Prepared By	Result = DF * PF * DDF * IR * 1000		
MCB			
Chemist	Detection Level = 3.70 E-08 * DF * PF * DDF * 1000		
RWS			
Analyst	Relative % Uncertainty = IU / IR * 100		
KRM			
Date Complete			
04/08/98			
Analysis Date			
04/08/98			
Analysis Time			
10:00 AM			
Sample Point			
TK-21-1			

Analyst:		KRM	Date:	08-Apr-98
Signature of Chemist:	RW Schroeder	RWS	Date:	4/8/98

BLANK.WB1 REV 2.0 925009ML

WORKBOOK PAGE: SAM3

Uranium by Phosphorescence: LA-925-009 (B-0) LIQUID/SOLID

Type			
SAMPLE			SAMPLE
Work List	VOLUME OF SAMPLE (mL)	(SS)	1.00
23340	DILUTION FACTOR OF SAMPLE	(DF)	1.00
Test Code	PREPARATION FACTOR OF SAMPLE	(PF)	100.00
@U-01	DIGEST DILUTION FACTOR	(DDF)	1.0000
Matrix	LIFETIME IN MICROSECONDS		366.00
LIQUID	R2 VALUE		0.9985
Batch Number	RANGE (HIGH OR LOW)		LOW
98001727	INSTRUMENT UNCERTAINTY	(IU)	6.13E-09
Rerun	INSTRUMENT RESULT	(IR)	4.87E-07
0	DETECTION LEVEL (µg/mL)		3.70E-03
Sample Prep			
N/A	CONCENTRATION IN SOLUTION (g/L)		4.87E-05
Sample #	RESULT (µg/mL)		4.87E-02
S98B000062	RELATIVE % UNCERTAINTY		1.3
Instrument Code			
U01			
Prepared By	Result = DF * PF * DDF * IR * 1000		
MCB			
Chemist	Detection Level = 3.70 E-08 * DF * PF * DDF * 1000		
RWS			
Analyst	Relative % Uncertainty = IU / IR * 100		
KRM			
Date Complete			
04/08/98			
Analysis Date			
04/08/98			
Analysis Time			
10:00 AM			
Sample Point			
TK-21-1			

Analyst:		KRM	Date:	08-Apr-98
Signature of Chemist:	RW Schroeder	RWS	Date:	4/8/98

SAMPLE.WB1 REV 2.0 925009ML

WORKBOOK PAGE: DUP4

Uranium by Phosphorescence: LA-925-009 (B-0) LIQUID/SOLID

Type			
DUP			DUP
Work List	VOLUME OF SAMPLE (mL)	(SS)	1.00
23340	DILUTION FACTOR OF SAMPLE	(DF)	1.00
Test Code	PREPARATION FACTOR OF SAMPLE	(PF)	100.00
@U-01	DIGEST DILUTION FACTOR	(DDF)	1.0000
Matrix	LIFETIME IN MICROSECONDS		367.00
LIQUID	R2 VALUE		0.9968
Batch Number	RANGE (HIGH OR LOW)		LOW
98001727	INSTRUMENT UNCERTAINTY	(IU)	6.35E-09
Rerun	INSTRUMENT RESULT	(IR)	4.49E-07
0	DETECTION LEVEL (µg/mL)		3.70E-03
Sample Prep			
N/A	CONCENTRATION IN SOLUTION (g/L)		4.49E-05
Sample #	RESULT (µg/mL)		4.49E-02
S98B000062	RELATIVE % UNCERTAINTY		1.4
Instrument Code			
U01			
Prepared By	Result = DF * PF * DDF * IR * 1000		
MCB			
Chemist	Detection Level = 3.70 E-08 * DF * PF * DDF * 1000		
RWS			
Analyst	Relative % Uncertainty = IU / IR * 100		
KRM			
Date Complete			
04/08/98			
Analysis Date			
04/08/98			
Analysis Time			
10:00 AM			
Sample Point			
TK-21-1			

Analyst:		KRM	Date:	08-Apr-98
Signature of Chemist:	RW Edwards	RWS	Date:	4/8/98

SAMPLE.WB1 REV 2.0 925009ML

WORKBOOK PAGE: SPIKE5

Uranium by Phosphorescence: LA-925-009 (B-0) LIQUID/SOLID

Type			SPIKE
SPK	SPIKE BOOK #		32B55
Work List	VOLUME OF SAMPLE + SPIKE (mL)	(SS)	1.00
23340	DILUTION FACTOR OF SAMPLE + SPIKE	(DF)	1.00
Test Code	PREPARATION FACTOR OF SAMPLE + SPIKE	(PF)	100.00
@U-01	DIGEST DILUTION FACTOR OF SAMPLE	(DDF)	1.0000
Matrix	LIFETIME IN MICROSECONDS		362.00
LIQUID	R2 VALUE		0.9992
Batch Number	RANGE (HIGH OR LOW)		HIGH
98001727	INSTRUMENT RESULT	(IR)	4.76E-04
Rerun	CONCENTRATION IN SOLUTION (g/L)	(CONC)	4.76E-02
0	SPIKE VALUE (g/L)	(SV)	4.92E-02
Sample Prep	INITIAL VOLUME OF SPIKE (mL)	(IV)	0.10
N/A	ORIGINAL SAMPLE VOLUME BEFORE PREP (mL)	(OSV)	0.10
Sample Number	CONCENTRATION IN SOLN (g/L) FROM SAMPLE FORM	(SR)	4.87E-05
S98B000062			
Instrument Code			
U01			
Prepared By			
MCB			
Chemist			
RWS			
Analyst			
KRM			
Date Complete			
04/08/98			
Analysis Date			
04/08/98			
Analysis Time			
10:00 AM			
Sample Point			
TK-21-1			

Concentration = IR * DF * PF

QC Actual (µg/mL) = SV (g/L) * 1000

QC Found (µg/mL) = (CONC - SR) * OSV / IV * 1000

% Recovery = QC FOUND / QC ACTUAL

QC ACTUAL	=	4.92E+01	µg/mL
QC FOUND	=	4.76E+01	µg/mL
% SPIKE RECOVERY	=	96.6%	

Analyst:		KRM	Date:	08-Apr-98
Signature of Chemist:	RW Schroeder	RWS	Date:	4/8/98

SPIKE.WB1 REV 2.0 925009ML

HNF-SD-WM-DP-301, REV. 0

RADIOCHEMICAL ANALYSIS

worklistrad Version 1.0 05/09/96
03/04/98 08:08

HNF-SD-WM-DP-301 REV. 0

LABCORE Completed RadChem Report for Worklist#: 22655

Analyst: crj **Instrument:** GEA02 **Book#** 86856

Method: LA-548-121 Rev/Mod F-0

Worklist Comment: B Plant Tk21-1 1mL TINKFUS std skb

Seq	Type	Sample#	R	A	Test	Matrix	Actual	Found	DL or Yield	Unit
1	STD		0		@GEA-01	CO60-02 LIQUID	5.474e-03	5.65e-03	103.215	% Recovery
1	STD		0		@GEA-01	CO60-02E LIQUID	1	2.86	2.860	% Ct Error
1	STD		0		@GEA-01	CS13702 LIQUID	5.476e-03	5.57e-03	101.717	% Recovery
1	STD		0		@GEA-01	CS13702E LIQUID	1	3.77	3.770	% Ct Error
2	BLNK		0		@GEA-01	CO60-02 LIQUID	1	<7.61e-4		uCi/mL
2	BLNK		0		@GEA-01	CS13702 LIQUID	1	<1.65e-3		uCi/mL
3	SAMPLE	S98B000062	0		@GEA-01	CO60-02 LIQUID	N/A	< 2.658e-03	265.8e-005	uCi/mL
3	SAMPLE	S98B000062	0		@GEA-01	CO60-02E LIQUID	N/A	n/a	0.0e+000	% Ct. Error
3	SAMPLE	S98B000062	0		@GEA-01	CS13702 LIQUID	N/A	1.710e+02	0.0e+000	uCi/mL
3	SAMPLE	S98B000062	0		@GEA-01	CS13702E LIQUID	N/A	0.130	0.0e+000	% Ct. Error
4	DUP	S98B000062	0		@GEA-01	CO60-02 LIQUID	<2.66e-3	<2.60e-3		RPD
4	DUP	S98B000062	0		@GEA-01	CO60-02E LIQUID	1	n/a		% Ct Error
4	DUP	S98B000062	0		@GEA-01	CS13702 LIQUID	1.71e+02	1.68e+02	1.770	RPD
4	DUP	S98B000062	0		@GEA-01	CS13702E LIQUID	1	0.130	0.130	% Ct Error

Comments Section:

Comments for sample# S98B000062 and test @GEA-01 .
DL=0 => n/a.

Final page for worklist# 22655

Analyst Signature Date

Analyst Signature Date

R A Jones 3-4-98
Reviewer Signature Date

Units shown for QC (BLK/BKG) may not reflect the actual units.

HNF-SD-WM-DP-301 REV. 0

03/02/98 09:18
A-0004-1

LABCORE Data Entry Template for Worklist# 22655

Analyst: CRJ **Instrument:** GEA00 2 **Book#** 86B56

Method: LA-548-121 Rev/Mod F-0

Worklist Comment: B Plant Tk21-1 1mL TINKFUS std skb

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	STD				@GEA-01	LIQUID		
2	BLNK				@GEA-01	LIQUID		
3	SAMPLE	S98B000062	0		@GEA-01	LIQUID	98000140	TK-21-1 (1)
		Analytes Requested: CO60-02 , CO60-02E, CS13702 , CS13702E						
4	DUP	S98B000062	0		@GEA-01	LIQUID		

Final page for worklist # 22655

C Johnson 3/3/98
Analyst Signature Date

[signature] 3/4/98
Analyst Signature Date

Data Entry Comments:

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

```
*****************************************************************************
* 222-S Laboratory Counting Room    3-MAR-1998 10:36:11.03                  *
*****************************************************************************
      >>>>>>>>>> SAMPLE INFORMATION <<<<<<<<<<
Worklist #:              22655
Sample ID:               WL22655-STD
Sample Size:             1.00000E-03 L
Dilution Factor:         1.00000E+00

      >>>>>>>>>> COUNT INFORMATION <<<<<<<<<<
Detector ID:             GEA2
File Number:             dka300:[spec.GEA2]2g2291.cnf
Geometry:                42
Count Time:              0 00:50:00.00 sec
Real Time:               0 00:50:34.78 sec
Dead Time:               1.1%

      >>>>>>>>>> ANALYSIS INFORMATION <<<<<<<<<<
Sample Count Time:       3-MAR-1998 09:44:59.60
Decayed to:              3-MAR-1998 09:44:59.60
Standard Deviations:     2
Analysis Library:        ENVGEA
Analyst:                 SSEH
Background Subtract:     DKA300:[SPEC.GEA2]2GBACK

      >>>>>>>>>> CALIBRATION INFORMATION <<<<<<<<<<
 Date of last energy calibration:      16-DEC-1997 11:02:19.60
 Date of last efficiency calibration:  10-NOV-1997 10:04:32.95
*****************************************************************************
```

HNF-SD-WM-DP-301 REV. 0

Removed by:

C.J. Quinn

Verified by:

John Relyea 4 Mar 98

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/L
0	661.58*	3829	1.46	1323.18	1316	15	3.8		CS-137	5.57
0	1173.02	2845	1.88	2346.21	2338	14	4.0		CO-60	5.64
0	1332.22	2570	1.97	2664.67	2655	19	4.1		CO-60	5.66

Total number of lines in spectrum	3	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	3	100.00%

Nuclide Type :

Nuclide	Hlife	Decay	Wtd Mean Uncorrected uCi/L	Wtd Mean Decay Corr uCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CO-60	5.27Y	1.00	5.651E+00	5.651E+00	0.161E+00	2.86	
CS-137	30.00Y	1.00	5.570E+00	5.570E+00	0.210E+00	3.77	
Total Activity :			1.122E+01	1.122E+01			
Grand Total Activity :			1.122E+01	1.122E+01			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Minimum Detectable Activity Report
Sample ID : WL22655-STD Acquisition date : 3-MAR-1998 09:44:59

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
BE-7	213.	477.59	6.3061E-01
NA-22	43.	1274.53	7.0165E-02
NA-24	9.	1368.55	3.9036E-02
K-40	117.	1460.75	1.1856E+00
SC-46	128.	1120.55	1.0568E-01
CR-51	252.	320.08	4.8356E-01
MN-54	148.	834.83	8.9247E-02
CO-56	156.	846.76	9.2674E-02
CO-57	301.	122.06	4.1550E-02
CO-58	142.	810.78	8.5920E-02
FE-59	135.	1099.25	1.8851E-01
ZN-65	133.	1115.55	2.1102E-01
SE-75	292.	264.66	7.5811E-02
KR-85	192.	514.00	1.5309E+01
SR-85	192.	514.01	6.9195E-02
Y-88	5.	1836.06	3.9446E-02
Y-91	45.	1204.67	2.2962E+01
NB-94	158.	871.09	9.5561E-02
NB-95	104.	765.78	7.0380E-02
ZR-95	129.	756.73	1.4160E-01
ZRNB-95	106.	724.18	3.1116E-01
RU-103	190.	497.08	7.0429E-02
RURH-106	131.	621.93	1.3248E+00
AG-108m	101.	722.94	7.2744E-02
CD-109	250.	88.03	1.2773E+00
AG-110M	222.	657.76	9.3823E-02
SN-113	210.	391.69	8.4041E-02
TE-123m	348.	159.00	4.3696E-02
SB-124	125.	602.73	6.3907E-02
SB-125	223.	427.89	2.0450E-01
TE-125m	302.	109.27	1.3649E+01
I-129	274.	39.60	1.5378E+01
I-131	233.	364.48	6.5145E-02
XE-131m	292.	163.93	1.7330E+00
BA-133	221.	356.02	8.1226E-02
CS-134	145.	604.70	6.8955E-02
CS-136	133.	818.51	8.3882E-02
CS-138	11.	1435.86	8.9965E-02
CE-139	288.	165.85	4.2299E-02
BA-140	122.	537.31	2.2892E-01
LA-140	4.	1596.21	3.2836E-02
CE-141	347.	145.44	7.5656E-02
CE-144	279.	133.51	2.9950E-01
CEPR-144	279.	133.51	5.9848E-01
EU-152	312.	121.78	1.2791E-01
EU-154	297.	123.07	8.7316E-02
EU-155	262.	86.54	1.4802E-01
HF-181	220.	482.18	8.3013E-02
TA-182	251.	67.75	2.0561E-01
HG-203	279.	279.20	5.5721E-02
BI-207	136.	569.70	6.3179E-02

Minimum Detectable Activity Report (continued) HNF-SD-WM-DP-301 REV. 0 Page : 4
Sample ID : WL22655-STD Acquisition date : 3-MAR-1998 09:44:59

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
TL-208	297.	277.36	7.3725E-01
PB-210	266.	46.50	1.0433E+01
BI-212	119.	727.18	1.0784E+00
PB-212	355.	238.63	1.0333E-01
BI-214	171.	609.31	1.6332E-01
PB-214	251.	351.92	2.6537E-01
RA-224	340.	240.99	1.1218E+00
RA-226	342.	186.10	1.0899E+00
AC-228	187.	911.21	4.0292E-01
TH-228	272.	84.37	4.0949E+00
TH-229	252.	88.47	1.8591E-01
U-232	247.	57.78	7.3097E+01
PA-233	255.	312.17	1.2419E-01
UTH-233	299.	245.34	3.8460E+01
PA-234M	136.	1001.03	1.1837E+01
TH-234	295.	92.60	8.2304E-01
U-235	347.	185.71	6.6711E-02
NP-237	261.	86.48	3.9126E-01
U-237	278.	59.54	3.9995E-01
NP-238	145.	984.45	3.6519E-01
NP-239	261.	106.12	1.6175E-01
PU-239	299.	129.30	5.4139E+02
AM-241	278.	59.54	3.8363E-01
AM-243	283.	74.67	1.1487E-01

```
**********************************************************************
* 222-S Laboratory Counting Room    3-MAR-1998 13:56:06.56           *
**********************************************************************
      >>>>>>>>>> SAMPLE INFORMATION <<<<<<<<<<
Worklist #:              22655
Sample ID:               WL22655-BLK
Sample Size:             1.00000E-03 L
Dilution Factor:         4.10000E+01

      >>>>>>>>>> COUNT INFORMATION <<<<<<<<<<
Detector ID:             GEA2
File Number:             ~~NI3AF:1.cnf~~ 292293.cnf2
Geometry:                42
Count Time:              0 02:30:00.00 sec
Real Time:               0 02:31:08.86 sec
Dead Time:               0.8%

      >>>>>>>>>> ANALYSIS INFORMATION <<<<<<<<<<
Sample Count Time:       3-MAR-1998 11:20:43.68
Decayed to:              3-MAR-1998 11:20:43.68
Standard Deviations:     2
Analysis Library:        ENVGEA
Analyst:                 SEH
Background Subtract:     DKA300:[SPEC.GEA2]2GBACK

      >>>>>>>>>> CALIBRATION INFORMATION <<<<<<<<<<
 Date of last energy calibration:       16-DEC-1997 11:02:19.60
 Date of last efficiency calibration:   10-NOV-1997 10:04:32.95
**********************************************************************
```

HNF-SD-WM-DP-301 REV. 0

Removed by: Sue Hogan

Verified by: John Relyea 4 Mar 98

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/L
0	33.74	227	2.69	67.43	63	10	39.8			
0	1446.10	20	1.35	2892.47	2888	9	58.5			
0	1460.51*	20	1.93	2921.31	2914	14206.1			K-40	6.07

Summary of Nuclide Activity
Sample ID : WL22655-BLK
Acquisition date : 3-MAR-1998 11:20:43

Total number of lines in spectrum	3	
Number of unidentified lines	2	
Number of lines tentatively identified by NID	1	33.33%

Nuclide Type :

Nuclide	Hlife	Decay	Wtd Mean Uncorrected uCi/L	Wtd Mean Decay Corr uCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.28E+09Y	1.00	6.069E+00	6.069E+00	12.51E+00	206.12	
	Total Activity :		6.069E+00	6.069E+00			
	Grand Total Activity :		6.069E+00	6.069E+00			

Flags: "K" = Keyline not found
"E" = Manually edited
"M" = Manually accepted
"A" = Nuclide specific abn. limit

Minimum Detectable Activity Report
Sample ID : WL22655-BLK Acquisition date : 3-MAR-1998 11:20:43

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
BE-7	73.	477.59	5.1807E+00
NA-22	29.	1274.53	7.9906E-01
NA-24	26.	1368.55	8.5789E-01
SC-46	59.	1120.55	1.0023E+00
CR-51	149.	320.08	5.1390E+00
MN-54	44.	834.83	6.9351E-01
CO-56	40.	846.76	6.6654E-01
CO-57	204.	122.06	4.7071E-01
CO-58	51.	810.78	7.2333E-01
FE-59	36.	1099.25	1.3873E+00
CO-60	24.	1332.50	7.6118E-01
ZN-65	30.	1115.55	1.4533E+00
SE-75	168.	264.66	7.9566E-01
KR-85	106.	514.00	1.5788E+02
SR-85	106.	514.01	7.1328E-01
Y-88	9.	1836.06	6.9875E-01
Y-91	40.	1204.67	2.9657E+02
NB-94	35.	871.09	6.4030E-01
NB-95	38.	765.78	6.0641E-01
ZR-95	54.	756.73	1.2808E+00
ZRNB-95	62.	724.18	3.2980E+00
RU-103	78.	497.08	6.2962E-01
RURH-106	44.	621.93	1.0909E+01
AG-108m	57.	722.94	7.5979E-01
CD-109	183.	88.03	1.5043E+01
AG-110M	70.	657.76	7.4295E-01
SN-113	121.	391.69	8.8151E-01
TE-123m	194.	159.00	4.5078E-01
SB-124	61.	602.73	6.2408E-01
SB-125	115.	427.89	2.0371E+00
TE-125m	195.	109.27	1.5102E+02
I-129	144.	39.60	1.5442E+02
I-131	105.	364.48	6.1008E-01
XE-131m	214.	163.93	2.0421E+01
BA-133	140.	356.02	8.9309E-01
CS-134	61.	604.70	6.2682E-01
CS-136	41.	818.51	6.5831E-01
CS-137	299.	661.66	1.6516E+00
CS-138	17.	1435.86	3.0798E+00
CE-139	212.	165.85	4.9909E-01
BA-140	76.	537.31	2.5027E+00
LA-140	14.	1596.21	7.5686E-01
CE-141	184.	145.44	7.6243E-01
CE-144	184.	133.51	3.3528E+00
CEPR-144	184.	133.51	6.7019E+00
EU-152	198.	121.78	1.4042E+00
EU-154	205.	123.07	9.9857E-01
EU-155	215.	86.54	1.8399E+00
HF-181	82.	482.18	7.1132E-01
TA-182	184.	67.75	2.4250E+00
HG-203	154.	279.20	5.7294E-01

Minimum Detectable Activity Report (continued) HNF-SD-WM-DP-301 Rev. 0 Page : 4
Sample ID : WL22655-BLK Acquisition date : 3-MAR-1998 11:20:43

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
BI-207	55.	569.70	5.6290E-01
TL-208	174.	277.36	7.7820E+00
PB-210	156.	46.50	1.1066E+02
BI-212	61.	727.18	1.0803E+01
PB-212	222.	238.63	1.1257E+00
BI-214	138.	609.31	2.0164E+00
PB-214	167.	351.92	6.6492E+00
RA-224	205.	240.99	1.2106E+01
RA-226	205.	186.10	1.1622E+01
AC-228	62.	911.21	3.2618E+00
TH-228	190.	84.37	4.7016E+01
TH-229	177.	88.47	2.1429E+00
U-232	122.	57.78	7.1356E+02
PA-233	143.	312.17	1.2885E+00
UTH-233	153.	245.34	3.8071E+02
PA-234M	44.	1001.03	9.5456E+01
TH-234	199.	92.60	9.3146E+00
U-235	208.	185.71	7.1239E-01
NP-237	216.	86.48	4.8844E+00
U-237	157.	59.54	4.1766E+00
NP-238	40.	984.45	2.7538E+00
NP-239	181.	106.12	1.8723E+00
PU-239	180.	129.30	5.7976E+03
AM-241	157.	59.54	3.9919E+00
AM-243	198.	74.67	1.3210E+00

```
**************************************************
* 222-S Laboratory Counting Room    3-MAR-1998 20:47:28.85 *
**************************************************
      >>>>>>>>>> SAMPLE INFORMATION <<<<<<<<<<
Worklist #:              22655
Sample ID:               S98B000062-SAM
Sample Size:             1.00000E-03 L
Dilution Factor:         4.10000E+01

      >>>>>>>>>> COUNT INFORMATION <<<<<<<<<<
Detector ID:             GEA2
File Number:             dka300:[spec.GEA2]2g2295.cnf
Geometry:                43
Count Time:              0 02:30:00.00 sec
Real Time:               0 02:42:48.06 sec
Dead Time:               7.9%

      >>>>>>>>>> ANALYSIS INFORMATION <<<<<<<<<<
Sample Count Time:       3-MAR-1998 18:04:05.75
Decayed to:              3-MAR-1998 18:04:05.75
Standard Deviations:     2
Analysis Library:        ENVGEA
Analyst:                 GL
Background Subtract:     DKA300:[SPEC.GEA2]2GBACK

      >>>>>>>>>> CALIBRATION INFORMATION <<<<<<<<<<
 Date of last energy calibration:       16-DEC-1997 11:02:19.60
 Date of last efficiency calibration:   10-NOV-1997 10:09:16.15
**************************************************
```

Removed by: [signature]

Verified by: John Relyea 9 Mar 98

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/L
0	661.39*	2336670	1.49	1322.82	1315	16	0.1		CS-137	1.708E+05
0	1322.34	265	1.77	2644.90	2638	13	16.2			

Summary of Nuclide Activity
Sample ID : S98B000062-SAM

Acquisition date : 3-MAR-1998 18:04:05

Total number of lines in spectrum	2	
Number of unidentified lines	1	
Number of lines tentatively identified by NID	1	50.00%

Nuclide Type :

Nuclide	Hlife	Decay	Wtd Mean Uncorrected uCi/L	Wtd Mean Decay Corr uCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CS-137	30.00Y	1.00	1.708E+05	1.708E+05	0.002E+05	0.13	
	Total Activity :		1.708E+05	1.708E+05			
	Grand Total Activity :		1.708E+05	1.708E+05			

Flags: "K" = Keyline not found
"E" = Manually edited
"M" = Manually accepted
"A" = Nuclide specific abn. limit

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
BE-7	68657.	477.59	5.5337E+02
NA-22	33.	1274.53	3.0526E+00
NA-24	13.	1368.55	2.2535E+00
K-40	325.	1460.75	9.3656E+01
SC-46	87.	1120.55	4.3444E+00
CR-51	63774.	320.08	3.8478E+02
MN-54	104.	834.83	3.7770E+00
CO-56	103.	846.76	3.8092E+00
CO-57	71191.	122.06	3.4558E+01
CO-58	129.	810.78	4.0995E+00
FE-59	58.	1099.25	6.2573E+00
CO-60	22.	1332.50	2.6580E+00
ZN-65	68.	1115.55	7.6206E+00
SE-75	71256.	264.66	6.0190E+01
KR-85	35776.	514.00	1.0172E+04
SR-85	35772.	514.01	4.6013E+01
Y-88	7.	1836.06	2.1668E+00
Y-91	42.	1204.67	1.0908E+03
NB-94	96.	871.09	3.7641E+00
NB-95	155.	765.78	4.2754E+00
ZR-95	185.	756.73	8.4331E+00
ZRNB-95	235.	724.18	2.2811E+01
RU-103	43504.	497.08	5.1965E+01
RURH-106	15235.	621.93	6.8703E+02
AG-108m	243.	722.94	5.5483E+00
CD-109	59180.	88.03	1.0730E+03
AG-110M	68982.	657.76	8.0181E+01
SN-113	65064.	391.69	7.2905E+01
TE-123m	73458.	159.00	3.3767E+01
SB-124	15358.	602.73	3.4074E+01
SB-125	74743.	427.89	1.8403E+02
TE-125m	65528.	109.27	1.0952E+04
I-129	53297.	39.60	1.0271E+04
I-131	62945.	364.48	5.3267E+01
XE-131m	73330.	163.93	1.4544E+03
BA-133	62361.	356.02	6.7637E+01
CS-134	15374.	604.70	3.4237E+01
CS-136	126.	818.51	4.0932E+00
CS-138	15.	1435.86	1.1083E+01
CE-139	73786.	165.85	3.5745E+01
BA-140	26116.	537.31	1.6141E+02
LA-140	9.	1596.21	2.2153E+00
CE-141	73721.	145.44	5.9141E+01
CE-144	73576.	133.51	2.6146E+02
CEPR-144	73573.	133.51	5.2244E+02
EU-152	71153.	121.78	1.0462E+02
EU-154	71638.	123.07	7.3362E+01
EU-155	59083.	86.54	1.2153E+02
HF-181	55912.	482.18	6.4785E+01
TA-182	54249.	67.75	1.6349E+02
HG-203	69541.	279.20	4.4483E+01

Sample ID : S98B000062-SAM Acquisition date : 3-MAR-1998 18:04:05

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
BI-207	16967.	569.70	3.4079E+01
TL-208	69467.	277.36	5.7060E+02
PB-210	52770.	46.50	7.4579E+03
BI-212	248.	727.18	7.6906E+01
PB-212	76867.	238.63	7.8035E+01
BI-214	15483.	609.31	7.5335E+01
PB-214	62534.	351.92	4.9670E+02
RA-224	76290.	240.99	8.6857E+02
RA-226	93524.	186.10	9.4466E+02
AC-228	134.	911.21	1.7129E+01
TH-228	58863.	84.37	3.2913E+03
TH-229	59301.	88.47	1.5568E+02
U-232	52537.	57.78	5.6460E+04
PA-233	64309.	312.17	9.8812E+01
UTH-233	75241.	245.34	3.1167E+04
PA-234M	51.	1001.03	3.7106E+02
TH-234	60553.	92.60	6.4552E+02
U-235	92178.	185.71	5.7047E+01
NP-237	59071.	86.48	3.2186E+02
U-237	52574.	59.54	2.9464E+02
NP-238	73.	984.45	1.3252E+01
NP-239	63419.	106.12	1.3870E+02
PU-239	72763.	129.30	4.5514E+05
AM-241	52575.	59.54	2.8150E+02
AM-243	56171.	74.67	8.8129E+01

****
* 222-S Laboratory Counting Room 3-MAR-1998 23:34:59.65 *
****

>>>>>>>>>> SAMPLE INFORMATION <<<<<<<<<<

Worklist #: 22655
Sample ID: S98B000062-DUP
Sample Size: 1.00000E-03 L
Dilution Factor: 4.10000E+01

Removed by:

>>>>>>>>>> COUNT INFORMATION <<<<<<<<<<

Detector ID: GEA2
File Number: dka300:[spec.GEA2]2g2296.cnf
Geometry: 43
Count Time: 0 02:30:00.00 sec
Real Time: 0 02:42:38.18 sec
Dead Time: 7.8%

Verified by:

>>>>>>>>>> ANALYSIS INFORMATION <<<<<<<<<<

Sample Count Time: 3-MAR-1998 20:51:43.58
Decayed to: 3-MAR-1998 20:51:43.58
Standard Deviations: 2
Analysis Library: ENVGEA
Analyst: GL
Background Subtract: DKA300:[SPEC.GEA2]2GBACK

>>>>>>>>>> CALIBRATION INFORMATION <<<<<<<<<<

Date of last energy calibration: 16-DEC-1997 11:02:19.60
Date of last efficiency calibration: 10-NOV-1997 10:09:16.15

****

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/L
0	189.29	10853	5.84	378.53	371	19	22.6			
0	661.40*	2305457	1.49	1322.83	1315	16	0.1		CS-137	1.685E+05
0	1322.64	288	2.16	2645.52	2637	21	18.4			

Summary of Nuclide Activity
Sample ID : S98B000062-DUP Acquisition date : 3-MAR-1998 20:51:43

Total number of lines in spectrum	3	
Number of unidentified lines	2	
Number of lines tentatively identified by NID	1	33.33%

Nuclide Type :

Nuclide	Hlife	Decay	Wtd Mean Uncorrected uCi/L	Wtd Mean Decay Corr uCi/L	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CS-137	30.00Y	1.00	1.685E+05	1.685E+05	0.002E+05	0.13	
Total Activity :			1.685E+05	1.685E+05			
Grand Total Activity :			1.685E+05	1.685E+05			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Minimum Detectable Activity Report
Sample ID : S98B000062-DUP

Acquisition date : 3-MAR-1998 20:51:43

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
BE-7	67897.	477.59	5.5031E+02
NA-22	30.	1274.53	2.9294E+00
NA-24	17.	1368.55	2.5486E+00
K-40	292.	1460.75	8.8969E+01
SC-46	93.	1120.55	4.4953E+00
CR-51	62868.	320.08	3.8204E+02
MN-54	120.	834.83	4.0431E+00
CO-56	97.	846.76	3.6911E+00
CO-57	70267.	122.06	3.4333E+01
CO-58	97.	810.78	3.5860E+00
FE-59	48.	1099.25	5.7429E+00
CO-60	21.	1332.50	2.6015E+00
ZN-65	56.	1115.55	6.9687E+00
SE-75	70727.	264.66	5.9966E+01
KR-85	35328.	514.00	1.0109E+04
SR-85	35323.	514.01	4.5724E+01
Y-88	11.	1836.06	2.5805E+00
Y-91	48.	1204.67	1.1618E+03
NB-94	92.	871.09	3.6804E+00
NB-95	172.	765.78	4.4878E+00
ZR-95	153.	756.73	7.7008E+00
ZRNB-95	237.	724.18	2.2866E+01
RU-103	43177.	497.08	5.1770E+01
RURH-106	15012.	621.93	6.8199E+02
AG-108m	238.	722.94	5.4945E+00
CD-109	59032.	88.03	1.0717E+03
AG-110M	67423.	657.76	7.9272E+01
SN-113	64475.	391.69	7.2575E+01
TE-123m	72176.	159.00	3.3472E+01
SB-124	15444.	602.73	3.4168E+01
SB-125	73315.	427.89	1.8227E+02
TE-125m	64137.	109.27	1.0835E+04
I-129	52738.	39.60	1.0217E+04
I-131	61498.	364.48	5.2652E+01
XE-131m	72777.	163.93	1.4490E+03
BA-133	61650.	356.02	6.7252E+01
CS-134	15135.	604.70	3.3971E+01
CS-136	123.	818.51	4.0490E+00
CS-138	16.	1435.86	1.1592E+01
CE-139	72262.	165.85	3.5374E+01
BA-140	25618.	537.31	1.5987E+02
LA-140	12.	1596.21	2.4679E+00
CE-141	73042.	145.44	5.8869E+01
CE-144	72721.	133.51	2.5994E+02
CEPR-144	72721.	133.51	5.1941E+02
EU-152	70204.	121.78	1.0392E+02
EU-154	70297.	123.07	7.2674E+01
EU-155	58407.	86.54	1.2084E+02
HF-181	55188.	482.18	6.4365E+01
TA-182	53466.	67.75	1.6231E+02
HG-203	67611.	279.20	4.3863E+01

Minimum Detectable Activity Report (continued)
Sample ID : S98B000062-DUP
Acquisition date : 3-MAR-1998 20:51:43

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/L)
BI-207	16941.	569.70	3.4053E+01
TL-208	68476.	277.36	5.6652E+02
PB-210	51790.	46.50	7.3885E+03
BI-212	231.	727.18	7.4349E+01
PB-212	76093.	238.63	7.7641E+01
BI-214	15081.	609.31	7.4355E+01
PB-214	61453.	351.92	4.9193E+02
RA-224	75695.	240.99	8.6518E+02
RA-226	91826.	186.10	9.3607E+02
AC-228	124.	911.21	1.6531E+01
TH-228	58060.	84.37	3.2689E+03
TH-229	59304.	88.47	1.5568E+02
U-232	51925.	57.78	5.6130E+04
PA-233	63566.	312.17	9.8240E+01
UTH-233	74033.	245.34	3.0916E+04
PA-234M	62.	1001.03	4.0635E+02
TH-234	59197.	92.60	6.3827E+02
U-235	90453.	185.71	5.6511E+01
NP-237	58391.	86.48	3.2001E+02
U-237	52168.	59.54	2.9350E+02
NP-238	63.	984.45	1.2402E+01
NP-239	62660.	106.12	1.3787E+02
PU-239	71719.	129.30	4.5187E+05
AM-241	52169.	59.54	2.8041E+02
AM-243	55300.	74.67	8.7445E+01

LABCORE Completed Worklist Report for Worklist# 22658

Analyst: scl **Instrument:** AB12 **Book#** _____

Method: _____ Rev/Mod _____

Worklist Comment: B Plant Tk21-1 SR90-01 1mL TINKFUS skb

Seq	Type	Sample#	R	A	Test	Matrix	Actual	Found	DL or Yield	Unit
1	STD		0		@SR90-01 SR90-01	LIQUID	2.35E-03	2.52E-3	107.234	% Recovery
1	STD		0		@SR90-01 SR90-01C	LIQUID	100	8.57E+01	85.700	% Recovery
1	STD		0		@SR90-01 SR90-01E	LIQUID	1.00	1.36E+00	1.360	% Ct. Erro
2	BLNK		0		@SR90-01 SR90-01	LIQUID	1	1.97E-2	0.020	uCi/mL
2	BLNK		0		@SR90-01 SR90-01C	LIQUID	100	8.30E+01	83.000	% Recovery
2	BLNK		0		@SR90-01 SR90-01E	LIQUID	1.00	9.28E+01	92.800	uCi/mL
3	BLNK/BKG		0		@SR90-01 SR90-01	LIQUID	1	1.61E+00	1.610	BLNK/BKG
4	SAMPLE	S98B000062	0		@SR90-01 SR90-01	LIQUID	N/A	4.57E+00	2.38e-002	uCi/mL
4	SAMPLE	S98B000062	0		@SR90-01 SR90-01C	LIQUID	N/A	7.97E+01		% Recovery
4	SAMPLE	S98B000062	0		@SR90-01 SR90-01E	LIQUID	N/A	3.03E+00		% Ct. Error
5	DUP	S98B000062	0		@SR90-01 SR90-01	LIQUID	4.57E+0	4.60E+0	0.654	RPD
5	DUP	S98B000062	0		@SR90-01 SR90-01C	LIQUID	100	8.17E+01	81.700	% Recovery
5	DUP	S98B000062	0		@SR90-01 SR90-01E	LIQUID	1.00	2.98E+00	2.980	% Cnt Err

Final page for worklist# 22658

_____ _____
Analyst Signature Date

Susan Bee 3/03/98
Analyst Signature Date

S C Catts 4 Mar 98
Reviewer Signature Date

Units shown for QC (BLK/BKG) may not reflect the actual units.

LABCORE Data Entry Template for Worklist# 22658

Analyst: S. L **Instrument:** AB00 _____ **Book#** 81856

Method: LA-220-101 Rev/Mod E-3

Worklist Comment: B Plant Tk21-1 . SR90-01 1mL TINKFUS skb

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	STD				@SR90-01	LIQUID		
2	BLNK				@SR90-01	LIQUID		
3	BLNK/BKG				@SR90-01	LIQUID		
4	SAMPLE	S98B000062	0		@SR90-01	LIQUID	98000140	TK-21-1 (1)
		Analytes Requested: SR90-01 , SR90-01C, SR90-01E						
5	DUP	S98B000062	0		@SR90-01	LIQUID		

Final page for worklist # 22658

Sue Lai 3-3-98

Analyst Signature Date

_____

Analyst Signature Date

Data Entry Comments:

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

HNF-SD-WM-DP-901 REV. 0

WORKBOOK PAGE: STD1

Sr-89/90 : LA-220-101 (E-3), 102 (INACTIVE), 104 (E-5) LIQUIDS

Type	DETECTOR NUMBER		12	CARRIER ADDED in mL	(CVA)	STANDARD 1.000
STD	TOTAL COUNTS	(TC)	20796	GROSS WEIGHT	(W2)	7.6090
Work List	COUNT TIME in MINUTES	(CT)	10	TARE WEIGHT	(W1)	7.5233
22658	BACKGROUND in cpm	(BKG)	3.1	NET WEIGHT	(W3)	0.0857
Test Code	SAMPLE VOLUME in mL	(SS)	1.000	DELTA TIME (HOURS)	(DT)	2.92
@SR90-01	DILUTION FACTOR	(DF)	1			
Matrix	DIGEST DILUTION FACTOR	DDF	1			
LIQUID	SAMPLE COUNT RATE	(Rs)	2076.50	SR-90 EFFICIENCY FACTO	(C1)	0.4180
Batch Number	CRITICAL LEVEL	(Lc)	1.06	Y-90 EFFICIENCY FACTOR	(C2)	0.4660
98000997	TIME OF SEPARATION	(ST)	10:20	Rmax		N/A
Rerun	DATE OF SEPARATION	(SD)	03/03/98	DETECTION LIMIT	(Ld)	2.21
0	TIME OF COUNT	(TOC)	13:15	Sr-89/90 CONC. in µCi/L		2.5239E+00
Sample Prep	DATE OF COUNT	(DOC)	03/03/98			
N/A	STANDARD BOOK #		86B56			
Sample #	STANDARD VALUE in µCi/mL		2.3548E-03			
STANDARD						
Instrument Code						
WB27811	Sample Count Rate (Rs) = (Total Counts (TC) / Count Time (CT)) - Background in cpm (BKG)					
Prepared By	Sr-89/90 CONC in µCi/mL REPLACE RS WITH RMAX IF RS<=LcAND RS>=0 OR REPLACE RS WITH Lc IF RS<0					
SKB	RS*DF*DDF*1000/((C1+C2*(1-e to the power of ((-natural log 2)/64.2*DT)))*SS*REC*2220000)					
Chemist	NOTE: 64.2 = Half Life for Y-90 and Rec. = Fractional Carrier Recovery ((W2-W1) / (CVA * 0.1000))					
SAC	Relative Counting Error = The Square Root of ((TC + BKG * CT) / (TC - BKG * CT)*1.96)					
Analyst	Percent Carrier Recovery = (Net Weight / Expected weight) * 100					
SCL	NOTE: Expected weight = CVA * 0.1					
Date Complete	Detection Levels and Less Than Values are determined from Procedure LA-508-002.					
03/03/98	Delta Time (hours) = ((DOC - SD) * 24) + (TOC - ST) / 100					
Analysis Date						DETECTION LEVEL
03/03/98	Sr-89/90 CONCENTRATION		2.52E-03	µCi/mL		
Analysis Time						
01:00 PM	RELATIVE COUNTING ERROR		1.4%			2.69E-06 µCi/L
Sample Point						
TK21-1	PERCENT CARRIER RECOVERY		85.7%			

Analyst:	SCL	Date:	03-Mar-98
Signature of Chemist:	SAC	Date:	

STANDARD.WB1 REV 2.0 22010NML

~~HNF-SD-WM-DP-301~~ REV. 0

WORKBOOK PAGE: BLANK2

LA-220-101 / E-3 Sr-89/90 : LA-220-101 (E-3), 102 (INACTIVE), 104 (E-5)

						BLNK
Type	DETECTOR NUMBER		12	CARRIER ADDED in mL	(CVA)	1.000
BLNK	TOTAL COUNTS	(TC)	50	GROSS WEIGHT	(W2)	7.6184
Work List	COUNT TIME in MINUTES	(CT)	10	TARE WEIGHT	(W1)	7.5354
22658	BACKGROUND in cpm	(BKG)	3.1	NET WEIGHT	(W3)	0.0830
Test Code	SAMPLE VOLUME in mL	(SS)	0.500	DELTA TIME (HOURS)	(DT)	3.08
@SR90-01	DILUTION FACTOR	DF	4141			
Matrix	DIGEST DILUTION FACTOR	(DDF)	1			
LIQUID	SAMPLE COUNT RATE	(Rs)	1.90	SR-90 EFFICIENCY FACTOR	(C1)	0.4180
Batch Number	CRITICAL LEVEL	(Lc)	1.06	Y-90 EFFICIENCY FACTOR	(C2)	0.4660
98000997	TIME OF SEPARATION	(ST)	10:20	Rmax		N/A
Rerun	DATE OF SEPARATION	(SD)	03/03/98	DETECTION LIMIT	(Ld)	2.21
0	TIME OF COUNT	(TOC)	13:25	Sr-89/90 CONC in µCi/L		1.9711E+01
Sample Prep	DATE OF COUNT	(DOC)	03/03/98			
N/A						
Sample #						
BLANK						

Instrument Code	Sample Count Rate (Rs) = (Total Counts (TC) / Count Time (CT)) - Background in cpm (BKG)
WB27811	Sr-89/90 CONC in µCi/L Replace RS with RMAX if RS<=Lc and RS>=0 or Replace RS with Lc if RS<0
Prepared By	RS*DF*DDF/((C1+C2*(1-e to the power of ((-natural log 2)/64.2*DT)))*SS*REC*2220000)
SKB	NOTE: 64.2 = Half Life for Y-90 and Rec. = Fractional Carrier Recovery ((W2-W1) / (CVA * 0.1000))
Chemist	Relative Counting Error = (The Square Root of (TC + BKG * CT) / (TC - BKG * CT))*1.96
SAC	Percent Carrier Recovery = (Net Weight / Expected weight) * 100
Analyst	NOTE: Expected weight = CVA * 0.1
SCL	Detection Levels and Less Than Values are determined from Procedure LA-508-002.
Date Complete	Delta Time (hours) = ((DOC - SD) * 24) + (TOC - ST) / 100
03/03/98	

Analysis Date				DETECTION LEVEL
03/03/98	Sr-89/90 CONCENTRATION	1.97E-02	µCi/mL	
Analysis Time				
01:00 PM	RELATIVE COUNTING ERROR	92.8%		2.30E-02 µCi/mL
Sample Point				
TK21-1	PERCENT CARRIER RECOVERY	83.0%		

Analyst:	SCL	Date:	03-Mar-98
Signature of Chemist:	SAC	Date:	

BLANK.WB1 REV 2.0 22010NML

HNF-SD-WM-DP-901 REV. 0

WORKBOOK PAGE: SAM4

Sr-89/90 : LA-220-101 (E-3), 102 (INACTIVE), 104 (E-5)

						SAMPLE
Type	DETECTOR NUMBER		12	CARRIER ADDED in mL	(CVA)	1.000
SAMPLE	TOTAL COUNTS	(TC)	4270	GROSS WEIGHT	(W2)	7.6143
Work List	COUNT TIME in MINUTES	(CT)	10	TARE WEIGHT	(W1)	7.5346
22658	BACKGROUND in cpm	(BKG)	3.1	NET WEIGHT	(W3)	0.0797
Test Code	SAMPLE VOLUME in mL	(SS)	0.500	DELTA TIME (HOURS)	(DT)	3.33
@SR90-01	DILUTION FACTOR	DF	4141			
Matrix	DIGEST DILUTION FACTOR	(DDF)	1			
LIQUID	SAMPLE COUNT RATE	(Rs)	423.90	SR-90 EFFICIENCY FACTOR	(C1)	0.4180
Batch Number	CRITICAL LEVEL	(Lc)	1.06	Y-90 EFFICIENCY FACTOR	(C2)	0.4660
98000997	TIME OF SEPARATION	(ST)	10:20	Rmax		N/A
Rerun	DATE OF SEPARATION	(SD)	03/03/98	DETECTION LIMIT	(Ld)	2.21
0	TIME OF COUNT	(TOC)	13:40	Sr-89/90 CONC in µCi/L		4.5669E+03
Sample Prep	DATE OF COUNT	(DOC)	03/03/98			
N/A						
Sample #						
S98B000062						

Instrument Code	Sample Count Rate (Rs) = (Total Counts (TC) / Count Time (CT)) - Background in cpm (BKG)
WB27811	Sr-89/90 CONC in µCi/L Replace RS with RMAX if RS<=Lc and RS>=0 or Replace RS with Lc if RS<0
Prepared By	RS*DF*DDF/((C1+C2*(1-e to the power of ((-natural log 2)/64.2*DT)))*SS*REC*2220000)
SKB	NOTE: 64.2 = Half Life for Y-90 and Rec. = Fractional Carrier Recovery ((W2-W1) / (CVA * 0.1000))
Chemist	Relative Counting Error = (The Square Root of (TC + BKG * CT) / (TC - BKG * CT))*1.96
SAC	Percent Carrier Recovery = (Net Weight / Expected weight) * 100
Analyst	NOTE: Expected weight = CVA * 0.1
SCL	Detection Levels and Less Than Values are determined from Procedure LA-508-002.
Date Complete	Delta Time (hours) = ((DOC - SD) * 24) + (TOC - ST) / 100
03/03/98	

Analysis Date				DETECTION LEVEL
03/03/98	Sr-89/90 CONCENTRATION	4.57E+00	µCi/mL	
Analysis Time				
01:00 PM	RELATIVE COUNTING ERROR	3.0%		2.38E-02 µCi/mL
Sample Point				
TK21-1	PERCENT CARRIER RECOVERY	79.7%		

Analyst:	SCL	Date:	03-Mar-98
Signature of Chemist:	SAC	Date:	

SAMPLE.WB1 REV 2.0 22010NML

HNF-SD-WM-DP-301 REV. 0

WORKBOOK PAGE: DUP5

Sr-89/90 : LA-220-101 (E-3), 102 (INACTIVE), 104 (E-5)

							DUP
Type	DETECTOR NUMBER		12	CARRIER ADDED in mL	(CVA)	1.000
DUP	TOTAL COUNTS	(TC)	4413	GROSS WEIGHT	(W2)	7.6253
Work List	COUNT TIME in MINUTES	(CT)	10	TARE WEIGHT	(W1)	7.5436
22658	BACKGROUND in cpm	(BKG)	3.1	NET WEIGHT	(W3)	0.0817
Test Code	SAMPLE VOLUME in mL	(SS)	0.500	DELTA TIME (HOURS)	(DT)	3.50
@SR90-01	DILUTION FACTOR	DF	4141			
Matrix	DIGEST DILUTION FACTOR	(DDF)	1			
LIQUID	SAMPLE COUNT RATE	(Rs)	438.20	SR-90 EFFICIENCY FACTOR	(C1)	0.4180
Batch Number	CRITICAL LEVEL	(Lc)	1.06	Y-90 EFFICIENCY FACTOR	(C2)	0.4660
98000997	TIME OF SEPARATION	(ST)	10:20	Rmax		N/A
Rerun	DATE OF SEPARATION	(SD)	03/03/98	DETECTION LIMIT	(Ld)	2.21
0	TIME OF COUNT	(TOC)	13:50	Sr-89/90 CONC in µCi/L		4.5969E+03
Sample Prep	DATE OF COUNT	(DOC)	03/03/98			
N/A						
Sample #						
S98B000062						

Instrument Code	Sample Count Rate (Rs) = (Total Counts (TC) / Count Time (CT)) - Background in cpm (BKG)
WB27811	Sr-89/90 CONC in µCi/L Replace RS with RMAX if RS<=Lc and RS>=0 or Replace RS with Lc if RS<0
Prepared By	RS*DF*DDF/((C1+C2*(1-e to the power of ((-natural log 2)/64.2*DT)))*SS*REC*2220000)
SKB	NOTE: 64.2 = Half Life for Y-90 and Rec. = Fractional Carrier Recovery ((W2-W1) / (CVA * 0.1000))
Chemist	Relative Counting Error = (The Square Root of (TC + BKG * CT) / (TC - BKG * CT))*1.96
SAC	Percent Carrier Recovery = (Net Weight / Expected weight) * 100
Analyst	NOTE: Expected weight = CVA * 0.1
SCL	Detection Levels and Less Than Values are determined from Procedure LA-508-002.
Date Complete	Delta Time (hours) = ((DOC - SD) * 24) + (TOC - ST) / 100
03/03/98	

Analysis Date				DETECTION LEVEL
03/03/98	Sr-89/90 CONCENTRATION	4.60E+00	µCi/mL	
Analysis Time				
01:00 PM	RELATIVE COUNTING ERROR	3.0%		2.32E-02 µCi/mL
Sample Point				
TK21-1	PERCENT CARRIER RECOVERY	81.7%		

Analyst:	SCL	Date:	03-Mar-98
Signature of Chemist:	SAC	Date:	

SAMPLE.WB1 REV 2.0 22010NML

worklistdata Version 1.0 05/15/96
03/05/98 11:43

LABCORE Completed Worklist Report for Worklist# 22657

Analyst: jmv **Instrument:** AB15 **Book#** 75856

Method: LA-953-104 Rev/Mod B-0

Worklist Comment: B Plant Tk21-1 AM24101 1mL TINKFUS .200 Tracer skb

Seq	Type	Sample#	R	A	Test	Matrix	Actual	Found	DL or Yield	Unit
1	STD		0		@AM24101	AM24101 LIQUID	1.03E-04	1.13E-4	109.709	% Recovery
1	STD		0		@AM24101	AM24101T LIQUID	100.	7.89E+01	78.900	% Recovery
1	STD		0		@AM24101	AM24101E LIQUID	1.0	1.95E+00	1.950	% Ct Error
2	BLNK		0		@AM24101	AM24101 LIQUID	1	<6.94E-5		uCi/mL
2	BLNK		0		@AM24101	AM24101T LIQUID	100.0	8.01E+01	80.100	% Recovery
2	BLNK		0		@AM24101	AM24101E LIQUID	1.0	9.81E+00	9.810	% Ct Error
3	SAMPLE	S98B000062	0		@AM24101	AM24101 LIQUID	N/A	3.68E-04	8.90e-005	uCi/mL
3	SAMPLE	S98B000062	0		@AM24101	AM24101E LIQUID	N/A	2.71E+00		% Ct. Error
3	SAMPLE	S98B000062	0		@AM24101	AM24101T LIQUID	N/A	8.14E+01		% Recovery
4	DUP	S98B000062	0		@AM24101	AM24101 LIQUID	3.68E-4	3.73E-4	1.350	RPD
4	DUP	S98B000062	0		@AM24101	AM24101T LIQUID	100.0	8.57E+01	85.700	% Recovery
4	DUP	S98B000062	0		@AM24101	AM24101E LIQUID	1.0	2.72E+00	2.720	% Ct Error

Final page for worklist# 22657

Analyst Signature Date

Susan Bee 3/05/98
Analyst Signature Date

John Relyea 5 Mar 98
Reviewer Signature Date

PJCD

Units shown for QC (BLK/BKG) may not reflect the actual units.

03/02/98 09:35
A-0004-1

LABCORE Data Entry Template for Worklist# 22657

Analyst: JmU **Instrument:** AM01 _____ **Book#** 75856

Method: LA-953-104 Rev/Mod _____

Worklist Comment: B Plant Tk21-1 AM24101 1mL TINKFUS .200 Tracer skb

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	STD				@AM24101	LIQUID		
2	BLNK				@AM24101	LIQUID		
3	SAMPLE	S98B000062	0		@AM24101	LIQUID	98000140	TK-21-1 (1)
	Analytes Requested: AM24101 , AM24101E, AM24101T							
4	DUP	S98B000062	0		@AM24101	LIQUID		

Final page for worklist # 22657

Jm Umbach 3-3-98
Analyst Signature **Date**

_____
Analyst Signature **Date**

Data Entry Comments:

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

WORKBOOK PAGE: STD1

Am 241 and Cm 243/244: LA-953-103 (VOID) or LA-953-104(B-0)) LIQUID

Type	Date Counted		MAR-04-98	Am 241 AEA Frac.	(C241)	STD	0.467
STD	Sample Volume in mL	(SS)	1.000	Am 243 AEA Frac.	(C243)		0.384
Work List	Sample D.F.	(DF)	1	Cm 243/244 AEA Frac.	(Cm)		0
22657	Tracer Volume in mL	(SPKV)	0.200	Total AT Counts			3688
Test Code	Digest D.F.	(DDF)	1.000	AT Count Time (min)	(TC)		30
@AM24101	Tracer Book No.		140B43	Background in cpm	(Bkg)		0.03
Matrix	Am-243 Tracer Value	(dpm/mL)	1034	Am 241 cpm			46.77
LIQUID	Detector Number		15	Am 243 cpm			38.45
Batch Number	Detector Efficiency	(DetEff)	0.2894	Cm 243/244 cpm			0
98000996	Standard Book No		75B56	AEA Count Time	(min)		480
Rerun	Standard Value in µCi/mL		1.030E-04	Am 241 µCi/L =			1.1329E-01
0				Cm 243/244 µCi/L =	<		1.5381E-02

Sample Prep: N/A

Sample Number: STANDARD

Instrument Code: AM01

Prepared By: SKB

Chemist: JFR

Analyst: JMV

Date Complete: 03/05/98

Analysis Date: 03/04/98

Analysis Time: 10:15 AM

Sample Point: TK21-1

Am-241 µCi/L = (C241 * Am-243 Tracer Value * SPKV * DF * DDF * (1000mL/L)) / (C243 * SS * (2220000dpm/µCi))

Cm-243/244 µCi/L = (Cm * Am-243 Tracer Value * SPKV * DF * DDF * (1000mL/L)) / (C243 * SS * (2220000dpm/µCi))

Relative Counting Error = Square Root of [(1/(Am-243 cpm * min)) + (1 / (Am-241 or Cm-243/244 cpm * min))] * 1.96 * 100

Am 243 Tracer Recovery = (Total AT Counts / TC - Bkg) * (1/DetEff) * C243 * 100 / Am-243 Tracer Value * SPKV

Am 241 µCi/mL =	1.13E-04	
Relative Counting Error =	1.9%	

NOTE: Cm-243/244 Result is a LESS THAN Value.

Cm 243/244 µCi/mL	< 1.54E-05	
Relative Counting Error =	100.0%	
Am 243 Tracer Recovery =	78.9%	

DETECTION LEVELS in µCi/mL	
Am 241	1.54E-05
Cm 243/244	1.54E-05

Analyst:		JMV	Date:	03/05/98
Signature of Chemist:	John Rolyea	JFR	Date:	5 Mar 98

STANDARD.WB1 REV 1.2 953103ML

WORKBOOK PAGE: BLANK2

Am 241 and Cm 243/244: LA-953-103 (VOID) or LA-953-104(B-0))

LIQUID / SO

BLNK

Type	Date Counted		MAR-04-98	Am 241 AEA Frac.	(C241)	0.019
BLNK	Sample Volume in mL	(SS)	0.100	Am 243 AEA Frac.	(C243)	0.838
Work List	Sample D.F.	(DF)	1	Cm 243/244 AEA Frac.	(Cm)	0
22657	Tracer Volume in mL	(SPKV)	0.200	Total AT Counts		1716
Test Code	Digest D.F.	(DDF)	1.000	AT Count Time (min)	(TC)	30
@AM24101	Tracer Book No.		140B43	Background in cpm	(Bkg)	0.03
Matrix	Am-243 Tracer Value	(dpm/mL)	1034	Am 241 cpm		0.85
LIQUID	Detector Number		15	Am 243 cpm		37.63
Batch Number	Detector Efficiency	(DetEff)	0.2894	Cm 243/244 cpm		0
98000996				AEA Count Time	(min)	480
Rerun				Am 241 µCi/L =	<	6.9432E-02
0				Cm 243/244 µCi/L =	<	6.9432E-02
Sample Prep						
N/A						
Sample Number						
BLANK						
Instrument Code						
AM01						
Prepared By						
SKB						
Chemist						
JFR						
Analyst						
JMV						
Date Complete						
03/05/98						
Analysis Date						
03/04/98						
Analysis Time						
10:15 AM						
Sample Point						
TK21-1						

Am-241 µCi/L = (C241 * Am-243 Tracer Value * SPKV * DF * DDF * (1000mL/L)) / (C243 * SS * (2220000dpm/µCi))

Cm-243/244 µCi/L = (Cm * Am-243 Tracer Value * SPKV * DF * DDF * (1000mL/L)) / (C243 * SS * (2220000dpm/µCi))

Relative Counting Error = Square Root of [(1/(Am-243 cpm * min)) + (1 / (Am-241 or Cm-243/244 cpm * min))] * 1.96 * 100

Am 243 Tracer Recovery = (Total AT Counts / TC - Bkg) * (1/DetEff) * C243 * 100 / Am-243 Tracer Value * SPKV

NOTE: Am-241 Result is a LESS THAN Value.

Am 241 µCi/mL	=	< 6.94E-05
Relative Counting Error	=	9.8%

NOTE: Cm-243/244 Result is a LESS THAN Value.

Cm 243/244 µCi/mL		< 6.94E-05
Relative Counting Error	=	100.0%
Am 243 Tracer Recovery	=	80.1%

DETECTION LEVELS in µCi/mL
Am 241
6.94E-05
Cm 243/244
6.94E-05

Analyst:		JMV	Date:	03/05/98
Signature of Chemist:	John Relyea	JFR	Date:	5 Mar 98

BLANK.WB1 REV 1.2 953103ML

30-Dec-1899

Am 241 and Cm 243/244: LA-953-103 (VOID) or LA-953-104(B-0)) LIQUID / SO

Type	Date Counted		MAR-04-98	Am 241 AEA Frac.	(C241)	SAMPLE 0.254
SAMPLE	Sample Volume in mL	(SS)	0.100	Am 243 AEA Frac.	(C243)	0.643
Work List	Sample D.F.	(DF)	1	Cm 243/244 AEA Frac.	(Cm)	0
22657	Tracer Volume in mL	(SPKV)	0.200	Total AT Counts		2273
Test Code	Digest D.F.	(DDF)	1.000	AT Count Time (min)	(TC)	30
@AM24101	Tracer Book No.		140B43	Background in cpm	(Bkg)	0.03
Matrix	Am-243 Tracer Value	(dpm/mL)	1034	Am 241 cpm		15.21
LIQUID	Detector Number		15	Am 243 cpm		38.46
Batch Number	Detector Efficiency	(DetEff)	0.2894	Cm 243/244 cpm		0
98000996				AEA Count Time	(min)	480
Rerun				Am 241 µCi/L =		3.6798E-01
0				Cm 243/244 µCi/L =	<	8.9020E-02
Sample Prep						
N/A						
Sample Number	Am-241 µCi/L = (C241 * Am-243 Tracer Value * SPKV * DF * DDF * (1000mL/L)) / (C243 * SS * (2220000dpm/µCi))					
S98B000062	Cm-243/244 µCi/L = (Cm * Am-243 Tracer Value * SPKV * DF * DDF * (1000mL/L)) / (C243 * SS * (2220000dpm/µCi))					
Instrument Code						
AM01	Relative Counting Error = Square Root of [(1/(Am-243 cpm * min)) + (1 / (Am-241 or Cm-243/244 cpm * min))] * 1.96 * 100					
Prepared By	Am 243 Tracer Recovery = (Total AT Counts / TC - Bkg) * (1/DetEff) * C243 * 100 / Am-243 Tracer Value * SPKV					
SKB						
Chemist						

JFR	Am 241 µCi/mL =	3.68E-04	DETECTION LEVELS in µCi/mL
Analyst	Relative Counting Error =	2.7%	
JMV			
Date Complete	NOTE: Cm-243/244 Result is a LESS THAN Value.		Am 241
03/05/98	Cm 243/244 µCi/mL	< 8.90E-05	8.90E-05
Analysis Date	Relative Counting Error =	100.0%	Cm 243/244
03/04/98	Am 243 Tracer Recovery =	81.4%	8.90E-05
Analysis Time			
10:15 AM			
Sample Point			
TK21-1			

Analyst:		JMV	Date:	03/05/98
Signature of Chemist:	John Relyea	JFR	Date:	5 Mar 98

SAMPLE.WB1 REV 1.2 953103ML

WORKBOOK PAGE: DUP4

Am 241 and Cm 243/244: LA-953-103 (VOID) or LA-953-104(B-0)) LIQUID / SO

						DUP
Type	Date Counted		MAR-04-98	Am 241 AEA Frac.	(C241)	0.258
DUP	Sample Volume in mL	(SS)	0.100	Am 243 AEA Frac.	(C243)	0.645
Work List	Sample D.F.	(DF)	1	Cm 243/244 AEA Frac.	(Cm)	0
22657	Tracer Volume in mL	(SPKV)	0.200	Total AT Counts		2387
Test Code	Digest D.F.	(DDF)	1.000	AT Count Time (min)	(TC)	30
@AM24101	Tracer Book No.		140B43	Background in cpm	(Bkg)	0.03
Matrix	Am-243 Tracer Value	(dpm/mL)	1034	Am 241 cpm		15.09
LIQUID	Detector Number		15	Am 243 cpm		37.72
Batch Number	Detector Efficiency	(DetEff)	0.2894	Cm 243/244 cpm		0
98000996				AEA Count Time	(min)	480
Rerun				Am 241 µCi/L =		3.7261E-01
0				Cm 243/244 µCi/L =	<	8.4242E-02
Sample Prep						
N/A						
Sample Number						
S98B000062						
Instrument Code						
AM01						
Prepared By						
SKB						
Chemist						
JFR						
Analyst						
JMV						
Date Complete						
03/05/98						
Analysis Date						
03/04/98						
Analysis Time						
10:15 AM						
Sample Point						
TK21-1						

Am-241 µCi/L = (C241 * Am-243 Tracer Value * SPKV * DF * DDF * (1000mL/L)) / (C243 * SS * (2220000dpm/µCi))

Cm-243/244 µCi/L = (Cm * Am-243 Tracer Value * SPKV * DF * DDF * (1000mL/L)) / (C243 * SS * (2220000dpm/µCi))

Relative Counting Error = Square Root of [(1/(Am-243 cpm * min)) + (1 / (Am-241 or Cm-243/244 cpm * min))] * 1.96 * 100

Am 243 Tracer Recovery = (Total AT Counts / TC - Bkg) * (1/DetEff) * C243 * 100 / Am-243 Tracer Value * SPKV

Am 241 µCi/mL =	3.73E-04	DETECTION LEVELS in µCi/mL
Relative Counting Error =	2.7%	
NOTE: Cm-243/244 Result is a LESS THAN Value.		Am 241
Cm 243/244 µCi/mL	< 8.42E-05	8.42E-05
Relative Counting Error =	100.0%	Cm 243/244
Am 243 Tracer Recovery =	85.7%	8.42E-05

Analyst:		JMV	Date:	03/05/98
Signature of Chemist:	John R. Lyon	JFR	Date:	5 Mar 98

SAMPLE.WB1 REV 1.2 953103ML

222-S Analytical Laboraratory
G E N E R A L A L P H A E N E R G Y A N A L Y S I S
Rev. 2.10

DATA REDUCTION REPORT

SAMPLE
WL22657-STD
File ID: 1a1029.CNF

Counted on: 3/ 4/98 @13:28
Detector: AEA1
Geometry number: 1
Count time: 28802. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1	149.9	149.9	478.406	478.406	12.000	4.097	6.000	3.466
2	134.3	134.3	445.674	445.672	10.000	4.037	5.000	3.207
3	1937.8	1937.8	302.045	302.045	12.000	4.613	6.000	3.462
4	1797.8	1797.8	256.287	256.287	10.000	3.295	5.000	2.528

PEAK RESULTS
Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	%err @95	d/m	Activity uCi/ea
1		0.034		6.293	0.02		3.35	4.9	13.7	0.616E-05
2		0.030		6.142	0.02		3.04	5.1	12.4	0.559E-05
3	~~Pu238~~	0.467	5.487	5.481	0.006	0.02	46.77	1.3	264.9	0.119E-03
	Am241		5.479	5.481	-.002				202.9	0.914E-04
4	Am243	0.384	5.266	5.271	-.005	0.02	38.45	1.4	158.4	0.713E-04
Totals:		0.916	<--valid peaks only-->				91.61			

JTR
5Mar98

DETECTOR CALIBRATION
Energy(MEV) = 4.092 + (0.0046)*Channel
Energy range (MeV): 4.092 TO 6.447
Efficiency = 0.2452 CPM/DPM
(Data reduction compression factor: 1.)

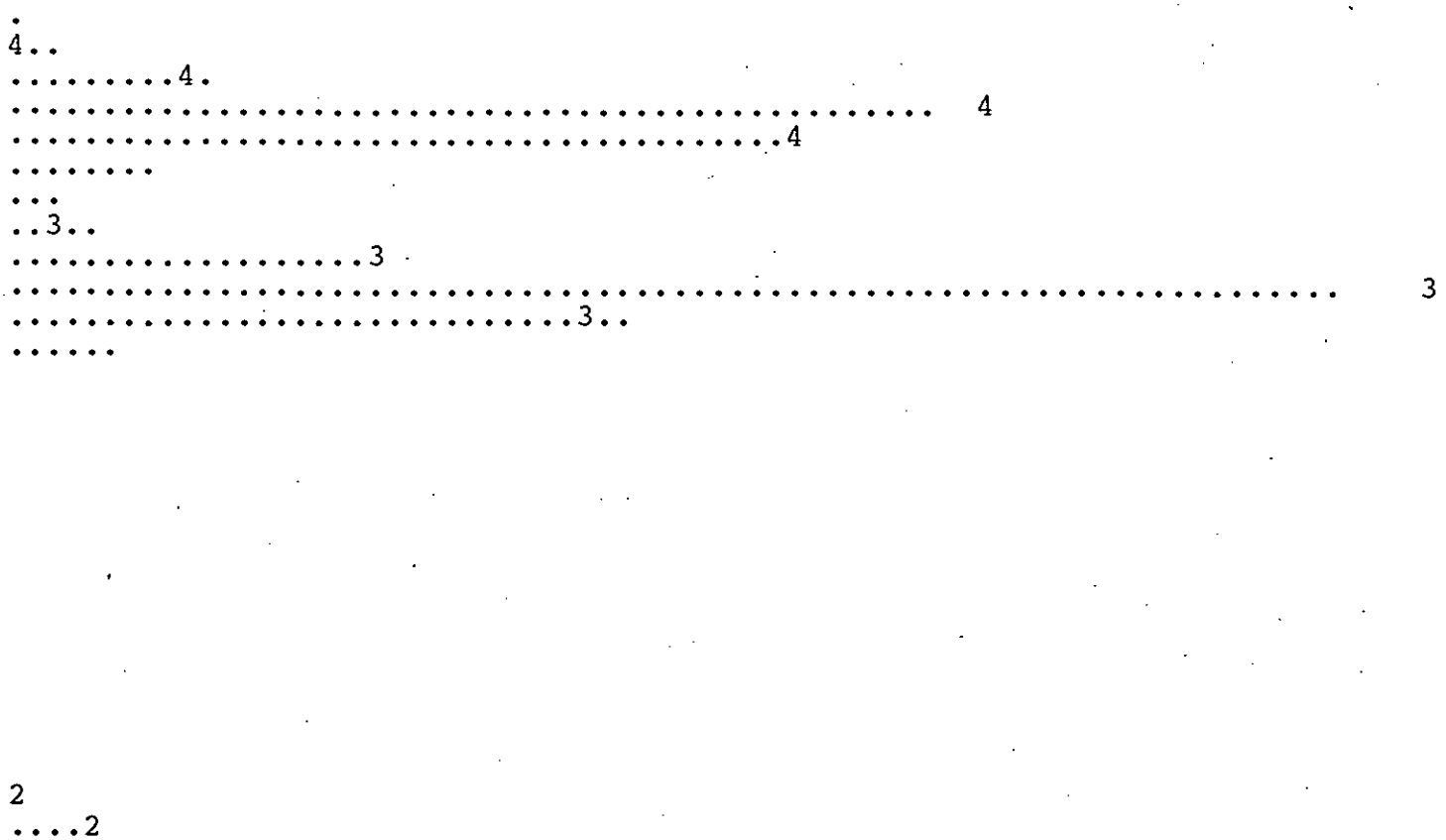
TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	48027.0	100.000
Smoothed	48026.9	100.000
Composite fit	43974.4	91.562
Residuals	4052.6	8.438

Analyzed by: SEH

Spectrum 1a1029.CNF

1 Legend: Raw = ... Modeled Peaks = 1,2,.., etc Display Max.: 11909.5



Raw Data Dump for AEA Spectrum: la1029.CNF HN.

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.
21	0.	0.	0.	0.	1.	2.	0.	0.	2.	1.
31	1.	1.	1.	0.	1.	1.	1.	1.	0.	5.
41	1.	0.	2.	2.	0.	1.	1.	3.	1.	2.
51	1.	0.	0.	0.	2.	1.	0.	4.	1.	1.
61	2.	2.	2.	1.	2.	1.	0.	1.	1.	1.
71	0.	3.	0.	2.	0.	2.	0.	0.	1.	0.
81	3.	1.	2.	1.	0.	2.	2.	2.	0.	2.
91	2.	3.	3.	2.	1.	0.	2.	0.	0.	1.
101	0.	1.	1.	2.	0.	0.	3.	3.	5.	0.
111	0.	1.	1.	1.	3.	4.	4.	3.	1.	0.
121	3.	2.	4.	0.	4.	0.	1.	3.	2.	1.
131	2.	1.	2.	0.	1.	1.	2.	0.	4.	2.
141	3.	3.	1.	2.	3.	3.	2.	1.	3.	5.
151	5.	3.	3.	2.	2.	1.	4.	3.	3.	1.
161	1.	3.	2.	1.	4.	4.	3.	2.	3.	3.
171	2.	4.	5.	2.	9.	3.	7.	3.	4.	3.
181	2.	5.	7.	2.	5.	8.	2.	8.	5.	3.
191	3.	5.	8.	5.	1.	5.	9.	11.	9.	5.
201	10.	12.	8.	8.	9.	8.	16.	7.	9.	10.
211	14.	9.	8.	18.	17.	16.	11.	16.	9.	15.
221	22.	24.	21.	21.	21.	25.	23.	21.	25.	29.
231	43.	41.	49.	62.	68.	72.	98.	92.	85.	88.
241	138.	160.	202.	217.	280.	368.	396.	500.	527.	539.
251	729.	828.	1188.	1495.	1955.	2289.	2265.	1791.	1070.	492.
261	300.	178.	186.	151.	147.	127.	158.	150.	131.	125.
271	98.	78.	80.	53.	46.	44.	51.	54.	57.	74.
281	81.	110.	95.	116.	118.	132.	147.	193.	255.	287.
291	351.	419.	490.	565.	621.	746.	870.	1098.	1374.	1756.
301	2192.	2461.	2304.	1683.	1108.	705.	579.	444.	379.	333.
311	282.	255.	191.	155.	122.	64.	29.	24.	9.	11.
321	14.	10.	13.	8.	5.	8.	8.	2.	13.	9.
331	6.	9.	7.	12.	8.	9.	8.	6.	4.	5.
341	3.	3.	2.	3.	0.	4.	8.	1.	1.	5.
351	2.	5.	4.	4.	4.	7.	7.	4.	6.	3.
361	2.	1.	6.	3.	4.	2.	3.	2.	2.	2.
371	2.	2.	3.	4.	3.	3.	1.	2.	5.	1.
381	3.	1.	3.	2.	3.	3.	3.	1.	8.	0.
391	6.	7.	2.	2.	4.	3.	4.	0.	3.	0.
401	2.	3.	6.	1.	3.	3.	1.	1.	5.	2.
411	2.	2.	2.	1.	1.	0.	2.	7.	9.	10.
421	5.	6.	8.	5.	1.	6.	8.	10.	7.	10.
431	9.	18.	15.	18.	20.	23.	27.	31.	44.	59.
441	73.	91.	105.	143.	157.	169.	143.	110.	76.	33.
451	22.	13.	11.	19.	20.	15.	12.	11.	3.	7.
461	3.	7.	7.	16.	16.	17.	22.	22.	33.	24.
471	35.	52.	69.	64.	119.	117.	174.	188.	181.	152.
481	116.	52.	50.	33.	20.	15.	13.	4.	2.	2.
491	1.	0.	0.	0.	0.	0.	2.	0.	0.	1.
511	0.	0.								

HNF-SD-WM-DP-301 REV. 0

222-S Analytical Laboraratory
G E N E R A L A L P H A E N E R G Y A N A L Y S I S
Rev. 2.10

DATA REDUCTION REPORT

SAMPLE
WL22657-BLK
File ID: 2a2029.CNF

Counted on: 3/ 4/98 @13:29
Detector: AEA2
Geometry number: 1
Count time: 28801. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1	123.3	123.3	443.351	443.351	12.000	4.198	6.000	3.005
2	12.3	12.3	300.785	300.785	10.000	8.848	5.000	1.264
3	1562.6	1562.6	255.739	255.739	10.000	3.984	5.000	2.602

PEAK RESULTS
Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	%err @95	d/m	Activity uCi/ea
1	~~Cm242~~	~~0.065~~	~~6.101~~	~~6.117~~	~~-.016~~	~~0.02~~	~~2.92~~	~~5.2~~	~~15.7~~	~~0.707E-05~~
2	Am241	0.019	5.479	5.461	0.018	0.04	0.85	9.7	3.6	0.161E-05
	~~Pu238~~		5.487	5.461	0.026				4.7	0.210E-05
3	Am243	0.838	5.266	5.254	0.012	0.02	37.63	1.5	151.0	0.680E-04
Totals:		0.922	<--valid peaks only-->				41.40			

JFR
5 Mar 98

DETECTOR CALIBRATION
Energy(MEV) = 4.077 + (0.0046)*Channel
Energy range (MeV): 4.077 TO 6.433
Efficiency = 0.2518 CPM/DPM
(Data reduction compression factor: 1.)

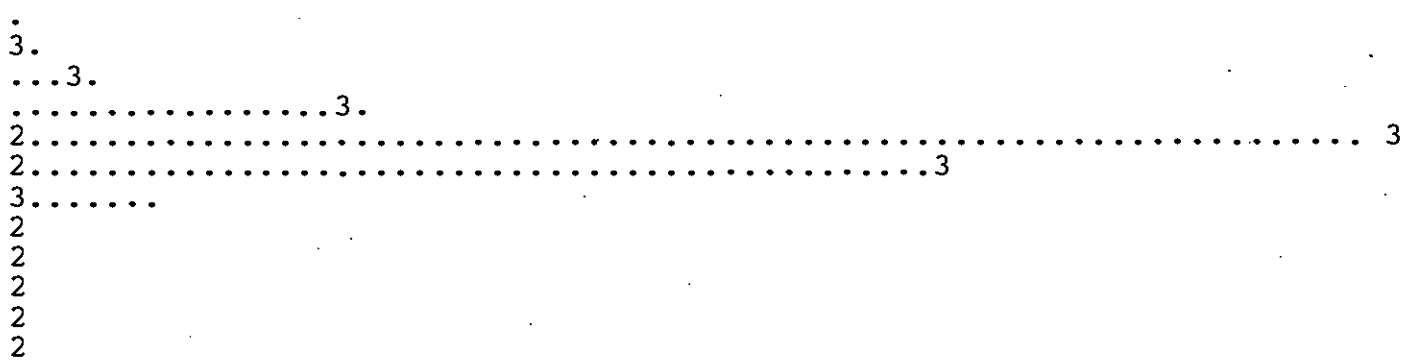
TOTAL COUNT DATA:

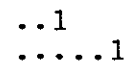
Item	Total	% Recovery
Raw spectrum	21559.0	100.000
Smoothed	21558.9	100.000
Composite fit	19874.8	92.188
Residuals	1684.2	7.812

Analyzed by: SEH

Spectrum 2a2029.CNF

1 Legend: Raw = ... Modeled Peaks = 1,2,.., etc Display Max.: 8592.8





Raw Data Dump for AEA Spectrum: 2a2029.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
21	0.	0.	2.	0.	0.	0.	0.	0.	0.	1.
31	0.	1.	1.	0.	2.	0.	2.	1.	0.	0.
41	0.	0.	0.	0.	2.	0.	0.	0.	1.	0.
51	1.	1.	0.	1.	0.	0.	0.	4.	2.	1.
61	1.	1.	1.	1.	1.	0.	1.	0.	0.	0.
71	1.	0.	0.	0.	2.	4.	0.	0.	1.	1.
81	0.	2.	0.	1.	0.	0.	0.	1.	0.	0.
91	3.	0.	1.	2.	0.	0.	0.	0.	0.	1.
101	1.	1.	0.	3.	0.	0.	1.	2.	0.	2.
111	1.	0.	0.	3.	1.	0.	2.	1.	0.	1.
121	0.	0.	2.	2.	1.	0.	0.	0.	3.	2.
131	1.	1.	1.	1.	2.	0.	1.	0.	1.	3.
141	0.	0.	2.	0.	1.	1.	3.	2.	0.	2.
151	1.	3.	1.	4.	0.	3.	2.	2.	2.	2.
161	0.	3.	1.	1.	1.	2.	1.	1.	1.	2.
171	1.	2.	2.	4.	2.	0.	5.	4.	5.	0.
181	2.	0.	2.	2.	3.	2.	4.	3.	2.	1.
191	2.	1.	5.	5.	3.	7.	4.	5.	4.	6.
201	4.	7.	6.	5.	6.	5.	4.	3.	9.	8.
211	7.	12.	5.	11.	8.	12.	3.	21.	14.	12.
221	21.	18.	32.	25.	23.	22.	36.	26.	26.	32.
231	43.	36.	66.	72.	78.	68.	85.	95.	120.	127.
241	180.	185.	212.	318.	331.	389.	483.	521.	594.	707.
251	862.	993.	1285.	1555.	1857.	1896.	1778.	1292.	861.	444.
261	256.	178.	130.	127.	119.	103.	129.	98.	89.	80.
271	67.	47.	45.	13.	19.	10.	2.	10.	6.	2.
281	13.	10.	4.	4.	5.	6.	4.	6.	10.	4.
291	5.	10.	8.	3.	9.	6.	11.	12.	9.	11.
301	16.	14.	9.	7.	2.	3.	4.	6.	6.	6.
311	3.	6.	2.	2.	1.	1.	5.	1.	3.	3.
321	0.	0.	0.	3.	1.	1.	0.	0.	2.	1.
331	1.	4.	1.	1.	0.	2.	0.	1.	0.	0.
341	0.	1.	1.	1.	3.	2.	0.	3.	4.	0.
351	2.	2.	4.	1.	0.	3.	0.	2.	1.	1.
361	1.	1.	0.	0.	1.	1.	2.	2.	1.	1.
371	1.	0.	2.	1.	1.	0.	1.	4.	0.	0.
381	0.	1.	0.	3.	0.	0.	0.	0.	0.	1.
391	0.	2.	0.	1.	0.	1.	3.	3.	2.	2.
401	3.	0.	2.	2.	2.	0.	0.	1.	5.	2.
411	2.	1.	1.	4.	5.	2.	3.	4.	3.	3.
421	4.	6.	4.	9.	12.	8.	9.	17.	9.	11.
431	15.	15.	22.	31.	40.	39.	47.	55.	69.	90.
441	116.	136.	148.	152.	120.	98.	56.	27.	17.	16.
451	11.	10.	8.	13.	5.	2.	2.	0.	2.	2.
461	0.	0.	1.	0.	0.	0.	1.	0.	1.	1.
471	0.	2.	1.	0.	1.	0.	0.	2.	1.	0.
481	0.	0.	0.	0.	0.	0.	1.	1.	0.	0.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.								

222-S Analytical Laboraratory
G E N E R A L A L P H A E N E R G Y A N A L Y S I S
Rev. 2.10

DATA REDUCTION REPORT

SAMPLE
S98B62-SAM
File ID: 3a3128.CNF

Counted on: 3/ 4/98 @13:29
Detector: AEA3
Geometry number: 1
Count time: 28801. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1?	15.2	15.2	466.334	466.334	14.000	4.686	7.000	2.679
2	42.3	42.3	433.841	433.834	12.000	4.872	6.000	3.378
3	568.8	568.8	300.447	300.447	12.000	5.565	6.000	3.691
4	1607.7	1607.7	254.398	254.398	12.000	3.928	6.000	2.582

PEAK RESULTS
Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	%err @95	d/m	Activity uCi/ea
1		????		6.242			0.40	14.1		
2	Cm242	0.018	6.101	6.093	0.0080	.02	1.06	8.7	24.0	0.108E-04
3	~~Pu238~~ Am241	0.254	5.487	5.479	0.0080	.03	15.21	2.3	352.2	0.159E-03
			5.479	5.479	0.000				269.8	0.122E-03
4	Am243	0.643	5.266	5.267	-.0010	.02	38.46	1.4	647.5	0.292E-03
Totals:		0.915	<--valid peaks only-->				54.74			

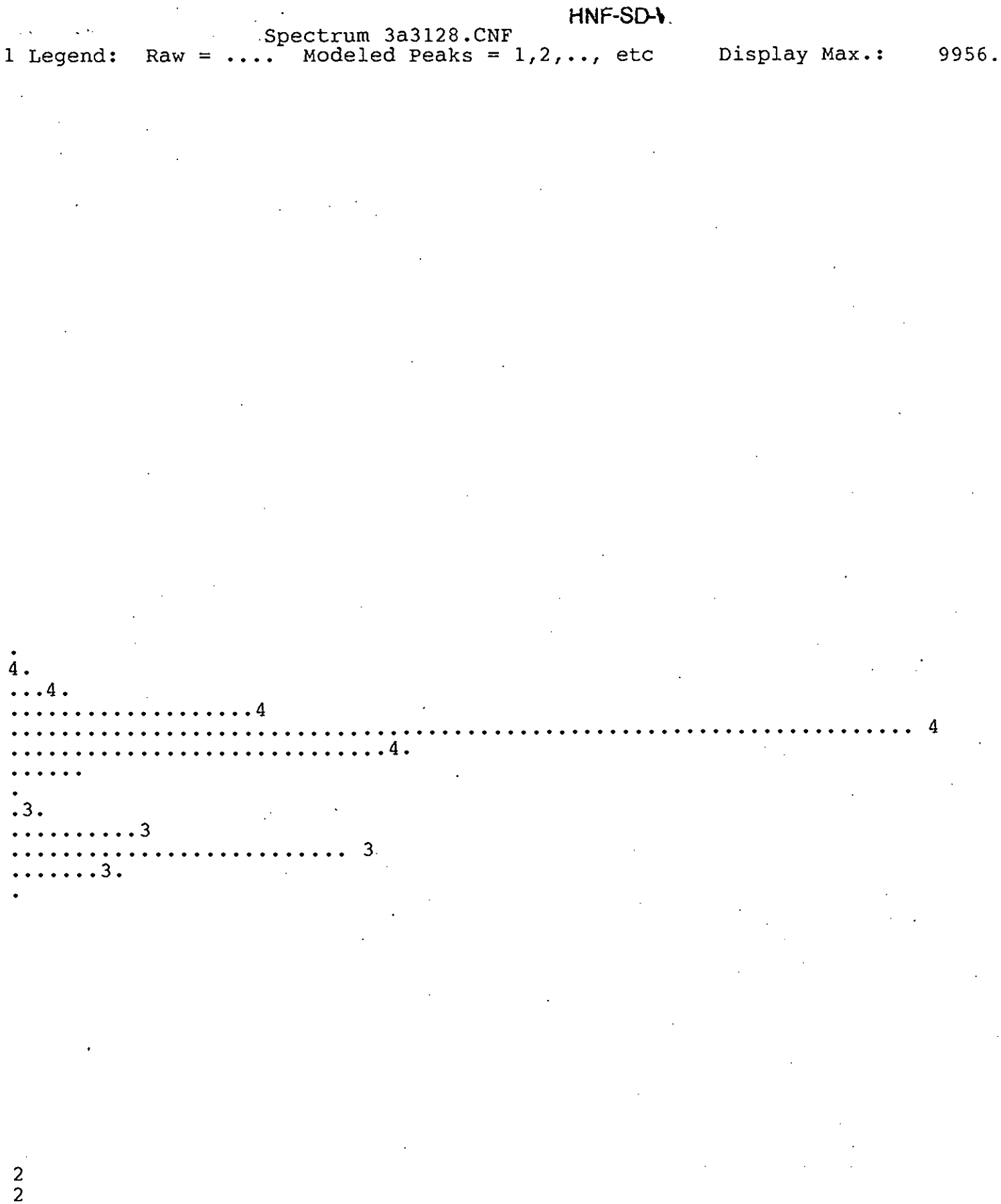
JTR
5 Mar 98

DETECTOR CALIBRATION
Energy(MEV) = 4.097 + (0.0046)*Channel
Energy range (MeV): 4.097 TO 6.452
Efficiency = 0.0600 CPM/DPM
(Data reduction compression factor: 1.)

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	28714.0	100.000
Smoothed	28714.0	100.000
Composite fit	26470.6	92.187
Residuals	2243.4	7.813

Analyzed by: _____
SEH


Spectrum 3a3128.CNF
1 Legend: Raw = ... Modeled Peaks = 1,2,.., etc Display Max.: 9956.8
4
4
4
4
4
3
3
3
2
2

Raw Data Dump for AEA Spectrum: 3a3128.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
21	0.	1.	1.	0.	0.	0.	1.	1.	1.	0.
31	0.	0.	0.	0.	0.	1.	1.	0.	1.	0.
41	0.	0.	1.	0.	0.	0.	0.	0.	0.	1.
51	0.	0.	1.	1.	3.	0.	0.	0.	0.	1.
61	2.	1.	0.	0.	1.	0.	2.	2.	0.	0.
71	0.	2.	2.	0.	1.	0.	0.	0.	1.	0.
81	1.	1.	0.	1.	2.	3.	1.	0.	0.	3.
91	1.	0.	2.	0.	1.	2.	2.	1.	0.	0.
101	1.	0.	2.	0.	0.	1.	3.	1.	2.	2.
111	1.	2.	2.	1.	1.	0.	1.	2.	2.	1.
121	0.	1.	2.	2.	1.	0.	5.	3.	0.	2.
131	2.	1.	3.	1.	3.	1.	1.	1.	1.	3.
141	2.	3.	3.	1.	2.	2.	2.	2.	2.	4.
151	2.	0.	4.	2.	0.	0.	2.	1.	1.	3.
161	3.	3.	2.	3.	3.	3.	2.	2.	2.	2.
171	4.	2.	3.	2.	1.	2.	5.	2.	1.	6.
181	4.	4.	3.	2.	5.	4.	2.	1.	5.	8.
191	5.	5.	6.	3.	4.	3.	6.	5.	3.	10.
201	7.	7.	7.	9.	9.	8.	8.	12.	5.	7.
211	11.	8.	12.	8.	15.	20.	13.	15.	19.	14.
221	16.	27.	18.	27.	31.	23.	30.	40.	34.	43.
231	52.	81.	73.	81.	81.	88.	108.	109.	132.	184.
241	212.	253.	302.	348.	424.	489.	589.	634.	763.	897.
251	1115.	1406.	1662.	2010.	1953.	1647.	1160.	698.	358.	211.
261	162.	143.	127.	105.	117.	125.	116.	102.	80.	68.
271	52.	34.	21.	32.	19.	24.	23.	25.	32.	39.
281	31.	39.	42.	46.	53.	65.	93.	95.	112.	127.
291	150.	183.	211.	243.	283.	316.	407.	536.	604.	668.
301	708.	566.	451.	298.	199.	144.	154.	141.	96.	64.
311	63.	46.	26.	27.	17.	8.	8.	4.	6.	6.
321	4.	0.	6.	6.	2.	3.	8.	3.	4.	4.
331	7.	5.	2.	7.	3.	4.	4.	3.	1.	1.
341	3.	6.	2.	2.	4.	3.	3.	2.	1.	2.
351	2.	0.	1.	2.	2.	3.	4.	4.	2.	6.
361	4.	1.	4.	5.	3.	7.	8.	12.	12.	12.
371	9.	6.	5.	2.	3.	1.	1.	2.	0.	1.
381	2.	1.	2.	0.	1.	5.	1.	2.	4.	4.
391	1.	3.	1.	2.	1.	3.	2.	1.	1.	1.
401	3.	1.	0.	2.	5.	5.	0.	2.	4.	4.
411	3.	3.	3.	2.	4.	1.	1.	5.	7.	4.
421	4.	10.	9.	4.	12.	15.	14.	18.	26.	26.
431	34.	42.	51.	52.	46.	37.	27.	18.	9.	6.
441	6.	7.	9.	10.	2.	5.	1.	3.	2.	1.
451	5.	1.	3.	3.	7.	4.	3.	4.	3.	6.
461	7.	7.	12.	14.	11.	23.	15.	14.	10.	7.
471	6.	7.	2.	1.	1.	2.	2.	0.	1.	1.
481	0.	1.	0.	1.	0.	0.	0.	0.	0.	0.
491	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
511	1.	0.								

222-S Analytical Laboraratory
G E N E R A L A L P H A E N E R G Y A N A L Y S I S
Rev. 2.10

DATA REDUCTION REPORT

SAMPLE
S98B62-DUP
File ID: 4a4126.CNF

Counted on: 3/ 4/98 @13:29
Detector: AEA4
Geometry number: 1
Count time: 28804. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1	583.5	583.5	301.301	301.301	12.000	4.933	6.000	3.195
2	1613.3	1613.3	255.361	255.361	10.000	3.596	5.000	2.338

PEAK RESULTS
Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	%err @95	d/m	Activity uCi/ea
1	~~Pu238~~	0.258	5.487	5.474	0.013	0.02	15.09	2.3	89.0	0.401E-04
	~~Am241~~		5.479	5.474	0.005				68.2	0.307E-04
2	Am243	0.645	5.266	5.262	0.004	0.02	37.72	1.5	161.9	0.729E-04
Totals:		0.903	<--valid peaks only-->				52.81			

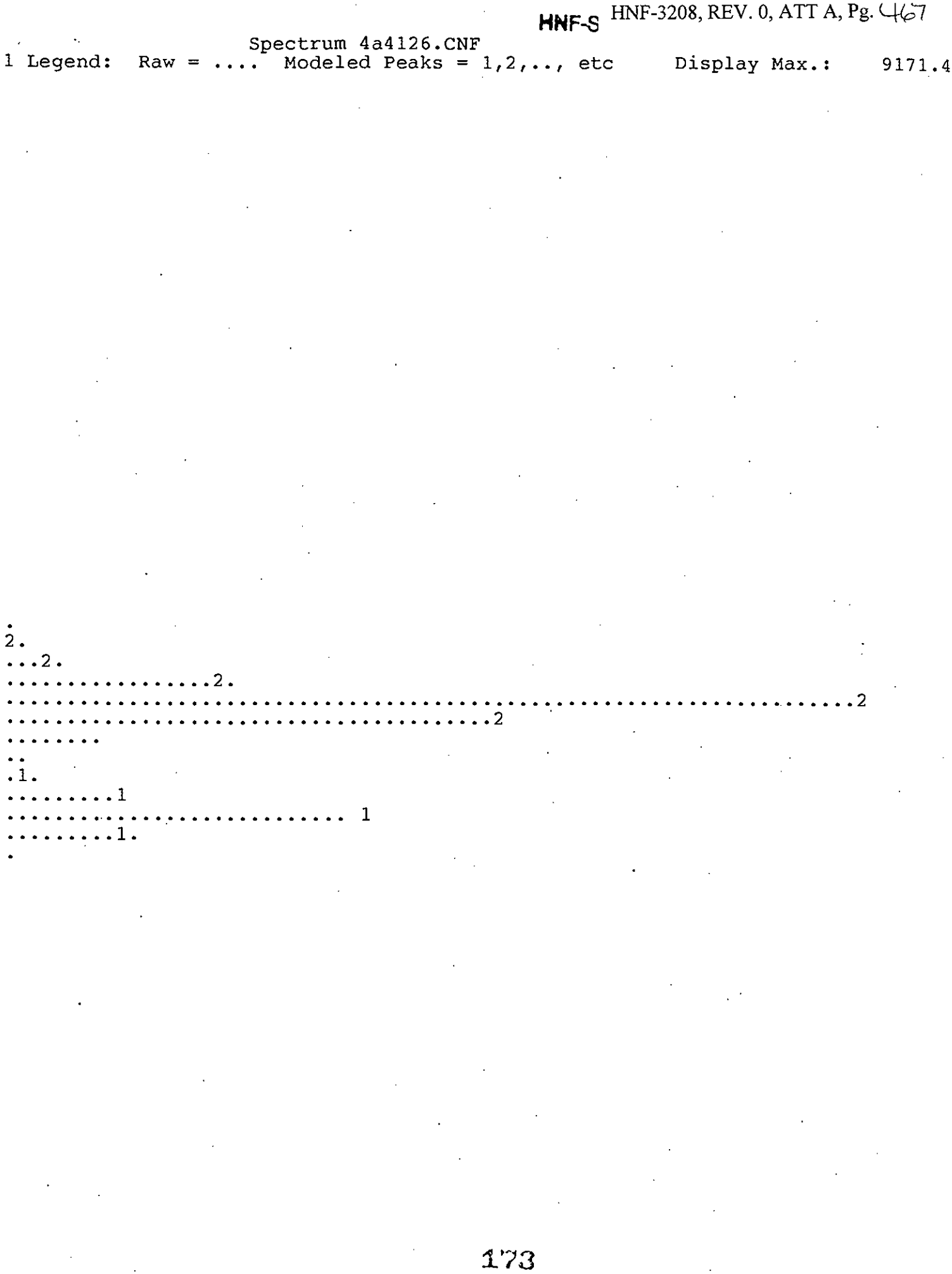
JAR 5 Mar 98

DETECTOR CALIBRATION
Energy(MEV) = 4.088 + (0.0046)*Channel
Energy range (MeV): 4.088 TO 6.443
Efficiency = 0.2354 CPM/DPM
(Data reduction compression factor: 1.)

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	28065.0	100.000
Smoothed	28058.4	99.976
Composite fit	25353.8	90.340
Residuals	2711.2	9.660

Analyzed by: _____
SEH


Spectrum 4a4126.CNF
1 Legend: Raw = ... Modeled Peaks = 1,2,.., etc Display Max.: 9171.4

Raw Data Dump for AEA Spectrum: 4a4126.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	2.	1.
21	1.	0.	1.	0.	1.	3.	0.	2.	0.	0.
31	2.	1.	1.	0.	1.	0.	0.	0.	0.	1.
41	2.	3.	0.	1.	0.	0.	0.	1.	0.	1.
51	1.	1.	0.	0.	1.	0.	1.	3.	2.	0.
61	1.	0.	3.	0.	2.	1.	0.	0.	1.	0.
71	1.	2.	3.	1.	1.	0.	4.	1.	1.	1.
81	2.	3.	0.	0.	4.	1.	2.	2.	1.	3.
91	0.	1.	2.	1.	1.	2.	0.	0.	2.	1.
101	0.	3.	2.	2.	4.	1.	2.	1.	1.	1.
111	1.	1.	0.	0.	2.	1.	0.	3.	1.	4.
121	1.	2.	1.	0.	1.	0.	0.	1.	0.	2.
131	2.	2.	2.	0.	0.	2.	2.	1.	2.	1.
141	2.	2.	0.	0.	4.	1.	2.	1.	3.	4.
151	1.	0.	1.	0.	1.	5.	4.	0.	1.	5.
161	4.	2.	3.	2.	2.	2.	2.	3.	4.	6.
171	3.	3.	3.	1.	1.	4.	2.	3.	8.	7.
181	2.	2.	1.	2.	2.	2.	1.	1.	2.	11.
191	6.	3.	2.	4.	4.	4.	5.	6.	2.	7.
201	5.	5.	10.	10.	2.	11.	10.	10.	6.	10.
211	7.	16.	8.	16.	15.	16.	12.	16.	20.	21.
221	19.	23.	20.	25.	23.	28.	35.	33.	40.	43.
231	51.	52.	56.	72.	94.	104.	100.	123.	107.	136.
241	196.	234.	269.	291.	340.	426.	472.	595.	641.	776.
251	863.	1103.	1410.	1756.	1937.	2006.	1733.	1112.	508.	280.
261	179.	139.	106.	137.	137.	125.	139.	109.	79.	68.
271	69.	57.	48.	32.	27.	27.	32.	18.	30.	46.
281	37.	38.	49.	54.	60.	66.	50.	65.	111.	118.
291	139.	157.	201.	222.	222.	305.	343.	387.	512.	635.
301	737.	677.	591.	393.	261.	185.	141.	102.	127.	74.
311	73.	59.	52.	44.	14.	15.	3.	3.	4.	6.
321	4.	2.	6.	4.	3.	4.	3.	6.	2.	2.
331	0.	3.	5.	5.	4.	3.	2.	1.	1.	4.
341	2.	2.	2.	2.	1.	3.	1.	3.	4.	1.
351	2.	2.	2.	3.	2.	4.	4.	5.	8.	8.
361	4.	8.	4.	7.	11.	3.	8.	8.	7.	9.
371	10.	7.	2.	2.	3.	3.	0.	0.	0.	2.
381	0.	0.	3.	1.	1.	1.	4.	1.	1.	2.
391	0.	0.	2.	1.	0.	3.	0.	1.	3.	1.
401	2.	2.	2.	2.	4.	2.	4.	2.	2.	0.
411	2.	1.	1.	2.	3.	4.	2.	3.	7.	7.
421	4.	1.	2.	2.	0.	0.	1.	1.	3.	2.
431	3.	2.	1.	0.	2.	3.	2.	1.	3.	1.
441	1.	1.	1.	1.	0.	0.	1.	0.	1.	2.
451	0.	2.	1.	0.	2.	2.	0.	0.	2.	1.
461	1.	1.	1.	0.	4.	1.	1.	1.	0.	0.
471	1.	1.	0.	1.	0.	0.	0.	0.	0.	0.
481	2.	1.	0.	2.	2.	0.	1.	1.	0.	1.
491	2.	1.	1.	1.	2.	2.	2.	2.	2.	3.
511	10.	0.								

worklistdata Version 1.0 05/15/96
03/05/98 10:43

~~HNF-SD-WM-DP-301 REV. 0~~

LABCORE Completed Worklist Report for Worklist# 22656

Analyst: jmv **Instrument:** AB14 **Book#** _____

Method: _____ Rev/Mod _____

Worklist Comment: B Plant Tk21-1 PU23901 1mL TINKFUS .100 tracer skb

Seq	Type	Sample#	R	A	Test	Matrix	Actual	Found	DL or Yield	Unit
1	STD		0		@PU23901 PU23901	LIQUID	1.09E-04	9.77E-5	89.633	% Recovery
1	STD		0		@PU23901 PU23901E	LIQUID	1.00	1.95E+00	1.950	% Ct Error
1	STD		0		@PU23901 PU23901T	LIQUID	100	9.01E+01	90.100	% Recovery
2	BLNK		0		@PU23901 PU23901	LIQUID	1	<2.75E-5		uCi/mL
2	BLNK		0		@PU23901 PU23901T	LIQUID	100	1.02E+02	102.000	% Recovery
2	BLNK		0		@PU23901 PU23901E	LIQUID	1.00	1.00E+02	100.000	uCi/mL
3	SAMPLE	S98B000062	0		@PU23901 PU23901	LIQUID	N/A	4.01E-04	4.62e-005	uCi/mL
3	SAMPLE	S98B000062	0		@PU23901 PU23901T	LIQUID	N/A	9.53E+01		% Recovery
3	SAMPLE	S98B000062	0		@PU23901 PU23901E	LIQUID	N/A	2.48E+00		% Ct. Error
4	DUP	S98B000062	0		@PU23901 PU23901	LIQUID	4.01E-4	4.22E-4	5.103	RPD
4	DUP	S98B000062	0		@PU23901 PU23901T	LIQUID	100	9.33E+01	93.300	% Recovery
4	DUP	S98B000062	0		@PU23901 PU23901E	LIQUID	1.00	2.50E+00	2.500	% Ct Error

Final page for worklist# 22656

_____ _____
Analyst Signature Date

Susan Bee 3/05/98
Analyst Signature Date

John Relyea 5 Mar 98
Reviewer Signature Date

PJCD

Units shown for QC (BLK/BKG) may not reflect the actual units.

LABCORE Data Entry Template for Worklist# 22656

Analyst: JmV **Instrument:** PU01 _____ **Book#** 75856

Method: LA-953-104 Rev/Mod _____

Worklist Comment: B Plant Tk21-1 PU23901 1mL TINKFUS .100 tracer skb

S	Type	Sample#	R	A	Test	Matrix	Group#	Project
1	STD				@PU23901	LIQUID		
2	BLNK				@PU23901	LIQUID		
3	SAMPLE	S98B000062	0		@PU23901	LIQUID	98000140	TK-21-1 (1)
	Analytes Requested: PU23901 , PU23901E, PU23901T							
4	DUP	S98B000062	0		@PU23901	LIQUID		

Final page for worklist # 22656

JmVanSant 3-3-98
Analyst Signature **Date**

_____
Analyst Signature **Date**

Data Entry Comments:

S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

~~HNF-SD-WM-DP-301 REV. 0~~

WORKBOOK PAGE: STD1

Pu 238 and 239/240 : LA-943-128 (VOID) or LA-953-104(B-0)) LIQUID

Type	DATE COUNTED		MAR-04-98	PU 236 AEA FRAC	(C236)	STD	0.417
STD	SAMPLE VOLUME in mL	SS	1.000	PU 238 AEA FRAC	(C238)		0.000
Work List	SAMPLE DILUTION FACTOR	DF	1.000	PU 239 AEA FRAC	(C239)		0.477
22656	TRACER VOLUME in mL	SPKV	0.100	TOTAL AT COUNTS			3577
Test Code	DIGEST DILUTION FACTOR	DDF	1.000	AT COUNT TIME (MIN)			30
@PU23901	TRACER BOOK NO		128B43	BACKGROUND in cpm	(Bkg)		0.030
Matrix	DETECTOR NUMBER		14	PU 236 cpm			39.370
LIQUID	EFFICIENCY FACTOR	EFF	0.291	PU 238 cpm			0.000
Batch Number	TRACER PREPARATION DATE		11/15/96	PU 239 cpm			44.960
98000995	TRACER PREPARATION VALUE (dpm/mL)		2600.000	AEA COUNT TIME			480
Rerun	PU-236 DECAY CORR'D VALUE (dpm/mL)		1896.262	Pu 239/240 µCi/L			9.7707E-02
0	PU-238 TRACER VALUE (dpm/mL)		0.000				
Sample Prep	STANDARD BOOK NO		75B56				
N/A	STANDARD VALUE in µCi/mL		1.090E-04				

Sample #	
STANDARD	
Instrument Code	Decay Time = Date Counted - Tracer Preparation Date
PU01	Pu-236 Decay Corr'd Value = Pu-236 Preparation Value *[e to the power of {(-ln2 * Decay Time/1040.95)]
Prepared By	Pu 236 Tracer Recovery = (Total AT Counts / TC -Bkg)* 1/EFF *C236*100/Pu-236 Decay Corr'd Value * SPKV
SKB	Pu 239/240 µCi/L = (C239)(Pu 236 Decay Corr'd Value)(SPKV)(1000mL/L)(DF)(DDF) / [(C236)(SS)(2220000 dpm/µCi)]
Chemist	Pu 238 dpm = [(Total AT Counts / TC) - Bkg * 1/EFF * C238] - (Pu-238 Tracer Value *SPKV *Pu 236 Tracer Recovery / 100)
JFR	Pu 238 µCi/L = [(Pu 238 dpm)(DF)(DDF)(1000mL/L)] / [(Pu-236 Tracer Recovery /100)(2220000 dpm/µCi)(D g/L)(SS)]
Analyst	Relative Counting Error = Square Root of [(1/(Pu 236 cpm * min)) + (1 / (Pu 238 or 239/240 cpm * min))] * 1.96 * 100
JMV	
Date Complete	
03/05/98	
Analysis Date	
03/04/98	
Analysis Time	
10:20 AM	
Sample Point	
TK21-1	

Pu 239/240 µCi/mL		9.77E-05	DETECTION LEVELS in µCi/mL
Relative Counting Error	=	2.0%	Pu 239/240 6.82E-06
Pu 236 Tracer Recovery	=	90.1%	

Analyst:		JMV	Date:	05-Mar-98
Signature of Chemist:	John Relyea	JFR	Date:	5 Mar 98

STANDARD.WB1 REV 1.0 943128ML

HNF-SD-WM-DP-301 REV. 0

WORKBOOK PAGE: BLANK2

Pu 238 and 239/240 : LA-943-128 (VOID) or LA-953-104(B-0))

LI BLNK

Type	DATE COUNTED		MAR-04-98	PU 236 AEA FRAC	(C236)	0.933
BLNK	SAMPLE VOLUME in mL	SS	0.100	PU 238 AEA FRAC	(C238)	0.000
Work List	SAMPLE DILUTION FACTOR	DF	1.000	PU 239 AEA FRAC	(C239)	0.000
22656	TRACER VOLUME in mL	SPKV	0.100	TOTAL AT COUNTS		1816
Test Code	DIGEST DILUTION FACTOR	DDF	1.0000	AT COUNT TIME (MIN)		30
@PU23901	TRACER BOOK NO		128B43	BACKGROUND in cp	(Bkg)	0.030
Matrix	DETECTOR NUMBER		14	PU 236 cpm		38.590
LIQUID	EFFICIENCY FACTOR	EFF	0.2910	PU 238 cpm		0.000
Batch Number	TRACER PREPARATION DATE		11/15/96	PU 239 cpm		0.000
98000995	TRACER PREPARATION VALUE (dpm/mL)		2600.00	AEA COUNT TIME		480
Rerun	PU-236 DECAY CORR'D VALUE	(dpm/mL)	1896.26	Pu 239/240 µCi/L =	<	2.747E-02
0	PU-238 TRACER VALUE	(dpm/m	0.00			

Sample Prep
N/A
Sample #
BLANK
Instrument Code
PU01
Prepared By
SKB
Chemist
JFR
Analyst
JMV
Date Complete
03/05/98
Analysis Date
03/04/98
Analysis Time
10:20 AM
Sample Point
TK21-1

Decay Time = Date Counted - Tracer Preparation Date

Pu-236 Decay Corr'd Value = Pu-236 Preparation Value *[e to the power of {(-ln2 * Decay Time/1040.95)}]

Pu 236 Tracer Recovery = (Total AT Counts / TC -Bkg)*C236*100/(Pu-236 Decay Corr'd Value * SPKV*EFF)

Pu 239/240 µCi/L = (C239)(Pu 236 Decay Corr'd Value)(SPKV)(1000mL/L)(DF)(DDF) / [(C236)(SS)(D g/L)(2220000 dpm/µCi)]

Pu 238 dpm = [(Total AT Counts / TC) - Bkg * 1/EFF * C238] - (Pu-238 Tracer Value *SPKV *Pu 236 Tracer Recovery / 100)

Pu 238 µCi/L = [(Pu 238 dpm)(DF)(DDF)(1000mL/L)] / [(Pu-236 Tracer Recovery /100)(2220000 dpm/µCi)(D g/L)(SS)]

Relative Counting Error = Square Root of [(1/(Pu 236 cpm * min)) + (1 / (Pu 238 or 239/240 cpm * min))] * 1.96 * 100

Pu 239/240 µCi/mL		< 2.75E-05	DETECTION LEVELS in µCi/mL
Relative Counting Error	=	100.0%	
NOTE: Pu 238 Result is a LESS THAN Value.			Pu 239/240
Pu 238 µCimL		< 2.75E-05	2.75E-05
Relative Counting Error	=	100.0%	Pu 238
Pu 236 Tracer Recovery	=	102.3%	2.75E-05

Analyst:		JMV	Date:	05-Mar-98
Signature of Chemist:	John Relyea	JFR	Date:	5 Mar 98

BLANK.WB1 REV 1.0 943128ML

WORKBOOK PAGE: SAM3

Pu 238 and 239/240 : LA-943-128 (VOID) or LA-953-104(B-0))

LIQUID / SAMPLE

Type	DATE COUNTED		MAR-04-98	PU 236 AEA FRAC	(C236)	0.582
SAMPLE	SAMPLE VOLUME in mL	SS	0.100	PU 238 AEA FRAC	(C238)	0.095
Work List	SAMPLE DILUTION FACTOR	DF	1.000	PU 239 AEA FRAC	(C239)	0.273
22656	TRACER VOLUME in mL	SPKV	0.100	TOTAL AT COUNTS		2713
Test Code	DIGEST DILUTION FACTOR	DDF	1.0000	AT COUNT TIME (MIN)		30
@PU23901	TRACER BOOK NO		128B43	BACKGROUND in cpm	(Bkg)	0.030
Matrix	DETECTOR NUMBER		14	PU 236 cpm		40.800
LIQUID	EFFICIENCY FACTOR	EFF	0.291	PU 238 cpm		6.660
Batch Number	TRACER PREPARATION DATE		11/15/96	PU 239 cpm		19.170
98000995	TRACER PREPARATION VALUE (dpm/mL)		2600.000	AEA COUNT TIME		480
Rerun	PU-236 DECAY CORR'D VALUE (dpm/mL)		1896.262	Pu 239/240 µCi/L		4.0067E-01
0	PU-238 TRACER VALUE (dpm/mL)		0.000			

Sample Prep
N/A
Sample #
S98B000062
Instrument Code
PU01
Prepared By
SKB
Chemist
JFR
Analyst
JMV
Date Complete
03/05/98
Analysis Date
03/04/98
Analysis Time
10:20 AM
Sample Point
TK21-1

Decay Time = Date Counted - Tracer Preparation Date

Pu-236 Decay Corr'd Value = Pu-236 Preparation Value *[e to the power of {(-ln2 * Decay Time/1040.95)]

Pu 236 Tracer Recovery = (Total AT Counts / TC -Bkg) *C236*100/(Pu-236 Decay Corr'd Value * SPKV * EFF)

Pu 239/240 µCi/L = (C239)(Pu 236 Decay Corr'd Value)(SPKV)(1000mL/L)(DF)(DDF) / [(C236)(SS)(D g/L)(2220000 dpm/µCi)]

Pu 238 dpm = [(Total AT Counts / TC) - Bkg * 1/EFF * C238] - (Pu-238 Tracer Value *SPKV *Pu 236 Tracer Recovery / 100)

Pu 238 µCi/L = [(Pu 238 dpm)(DF)(DDF)(1000mL/L)] / [(Pu-236 Tracer Recovery /100)(2220000 dpm/µCi)(D g/L)(SS)]

Relative Counting Error = Square Root of [(1/(Pu 236 cpm * min)) + (1 / (Pu 238 or 239/240 cpm * min))] * 1.96 * 100

			DETECTION LEVELS in µCi/mL
Pu 239/240 µCi/mL		4.01E-04	
Relative Counting Error	=	2.5%	
			Pu 239/240 4.62E-05
Pu 238 µCimL		1.39E-04	
Relative Counting Error	=	3.7%	
Pu 236 Tracer Recovery	=	95.3%	Pu 238 4.62E-05

Analyst:	JMV	Date:	05-Mar-98
Signature of Chemist: John Relyea	JFR	Date:	5 Mar 98

SAMPLE.WB1 REV 1.0 943128ML

HNF-SD-WM-DP-901 REV. 0

WORKBOOK PAGE: DUP4

Pu 238 and 239/240 : LA-943-128 (VOID) or LA-953-104(B-0)) LIQUID /

Type					DUP
DUP	DATE COUNTED		MAR-04-98	PU 236 AEA FRAC (C236)	0.571
Work List	SAMPLE VOLUME in mL	SS	0.100	PU 238 AEA FRAC (C238)	0.092
22656	SAMPLE DILUTION FACTOR	DF	1.000	PU 239 AEA FRAC (C239)	0.282
Test Code	TRACER VOLUME in mL	SPKV	0.100	TOTAL AT COUNTS	2705
@PU23901	DIGEST DILUTION FACTOR	DDF	1.0000	AT COUNT TIME (MIN)	30
Matrix	TRACER BOOK NO		128B43	BACKGROUND in cpm (Bkg)	0.030
LIQUID	DETECTOR NUMBER		14	PU 236 cpm	38.610
Batch Number	EFFICIENCY FACTOR	EFF	0.291	PU 238 cpm	6.190
98000995	TRACER PREPARATION DATE		11/15/96	PU 239 cpm	19.050
Rerun	TRACER PREPARATION VALUE (dpm/mL)		2600.000	AEA COUNT TIME	480
0	PU-236 DECAY CORR'D VALUE (dpm/mL)		1896.262	Pu 239/240 µCi/L	4.2185E-01
	PU-238 TRACER VALUE (dpm/mL)		0.000		

Sample Prep	
N/A	
Sample #	Decay Time = Date Counted - Tracer Preparation Date
S98B000062	Pu-236 Decay Corr'd Value = Pu-236 Preparation Value *[e to the power of {(-ln2 * Decay Time/1040.95)]
Instrument Code	Pu 236 Tracer Recovery = (Total AT Counts / TC -Bkg) *C236*100/(Pu-236 Decay Corr'd Value * SPKV * EFF)
PU01	Pu 239/240 µCi/L = (C239)(Pu 236 Decay Corr'd Value)(SPKV)(1000mL/L)(DF)(DDF) / [(C236)(SS)(D g/L)(2220000 dpm/µCi)]
Prepared By	Pu 238 dpm = [(Total AT Counts / TC) - Bkg * 1/EFF * C238] - (Pu-238 Tracer Value *SPKV *Pu 236 Tracer Recovery / 100)
SKB	Pu 238 µCi/L = [(Pu 238 dpm)(DF)(DDF)(1000mL/L)] / [(Pu-236 Tracer Recovery /100)(2220000 dpm/µCi)(D g/L)(SS)]
Chemist	Relative Counting Error = Square Root of [(1/(Pu 236 cpm * min)) + (1 / (Pu 238 or 239/240 cpm * min))] * 1.96 * 100
JFR	
Analyst	
JMV	
Date Complete	

03/05/98	Pu 239/240 µCi/mL		4.22E-04	DETECTION LEVELS in µCi/mL
Analysis Date	Relative Counting Error	=	2.5%	
03/04/98				Pu 239/240
Analysis Time				4.81E-05
10:20 AM	Pu 238 µCimL		1.38E-04	
Sample Point	Relative Counting Error	=	3.9%	Pu 238
TK21-1	Pu 236 Tracer Recovery	=	93.3%	4.81E-05

Analyst:	JMV	Date:	05-Mar-98
Signature of Chemist:	JFR	Date:	5 Mar 98

SAMPLE.WB1 REV 1.0 943128ML

222-S Analytical Laboraratory
G E N E R A L A L P H A E N E R G Y A N A L Y S I S
Rev. 2.10

DATA REDUCTION REPORT

SAMPLE
WL22656-STD
File ID: 5a5088.CNF

Counted on: 3/ 4/98 @13:30
Detector: AEA5
Geometry number: 1
Count time: 28803. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1	107.1	107.1	478.625	478.625	20.000	13.080	10.000	8.769
2	1277.7	1277.7	362.389	362.389	10.000	3.297	5.000	1.211
3?	22.3	22.3	303.059	302.643	12.000	3.491	6.000	1.176
4	50.5	50.5	287.787	287.641	8.000	2.586	4.000	1.606
5?	14.7	14.7	270.456	269.611	10.000	3.294	5.000	0.712
6	30.5	30.5	253.060	252.339	8.000	0.041	4.000	0.003
7	1746.0	1746.0	229.118	229.114	12.000	3.402	6.000	1.733

PEAK RESULTS
Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid Exp.	Peak Centroid Obs.	Diff.	FWHM	Count Rate c/m	%err @95	d/m	Activity uCi/ea
1		0.042		6.290	0.06		4.00	4.5	16.5	0.745E-05
2	Pu236	0.417	5.755	5.755	0.0000.02		39.37	1.4	166.1	0.748E-04
3		????		5.481			0.73	11.9		
~~4~~	~~Th228~~	~~0.012~~	~~5.400~~	~~5.412~~	~~-.0120.01~~		~~1.10~~	~~9.8~~	~~6.4~~	~~0.289E-05~~
5		????		5.329			0.66	13.5		
~~6~~	~~Am243~~	~~0.032~~	~~5.266~~	~~5.249~~	~~0.0170.00~~		~~2.99~~	~~5.4~~	~~12.5~~	~~0.562E-05~~
7	Pu239	0.477	5.147	5.142	0.0050.02		44.96	1.4	186.0	0.838E-04
	Pu240		5.144	5.142	0.002				186.0	0.838E-04
Totals:		0.980	<--valid peaks only-->				92.41			

JHR 5Mar98

DETECTOR CALIBRATION
Energy(MEV) = 4.088 + (0.0046)*Channel
Energy range (MeV): 4.088 TO 6.444
Efficiency = 0.2418 CPM/DPM
(Data reduction compression factor: 1.)

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	45285.0	100.000
Smoothed	45282.3	99.994
Composite fit	45030.6	99.438
Residuals	254.4	0.562

Analyzed by: HNF-SD-WM-DP-301 REV. 0

SEH

Spectrum 5a5088.CNF
Raw = ... Modeled Peaks = 1,2,.., etc Display Max.: 11890.2

7
.....7
.....7..
.....7..

.....2
.....2
.....2

222-S Analytical Laboraratory
G E N E R A L A L P H A E N E R G Y A N A L Y S I S
Rev. 2.10

DATA REDUCTION REPORT

SAMPLE
WL22656-BLK
File ID: 6a6069.CNF

Counted on: 3/ 4/98 @13:30
Detector: AEA6
Geometry number: 1
Count time: 28803. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1	1288.6	1288.6	359.246	359.246	10.000	3.034	5.000	1.138
2	50.7	50.7	284.608	284.588	10.000	3.995	5.000	2.543
3	15.4	15.4	267.146	266.644	12.000	3.420	6.000	1.132

PEAK RESULTS
Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	%err @95	d/m	Activity uCi/ea
1	Pu236	0.933	5.755	5.741	0.014	0.01	38.59	1.4	167.7	0.755E-04
~~2~~	~~Th228~~	~~0.030~~	~~5.400~~	~~5.398~~	~~0.002~~	~~0.02~~	~~1.23~~	~~8.2~~	~~7.4~~	~~0.333E-05~~
3		0.012		5.315	0.02		0.51	15.4	2.2	0.979E-06
Totals:		0.975	<--valid peaks only-->				40.34			

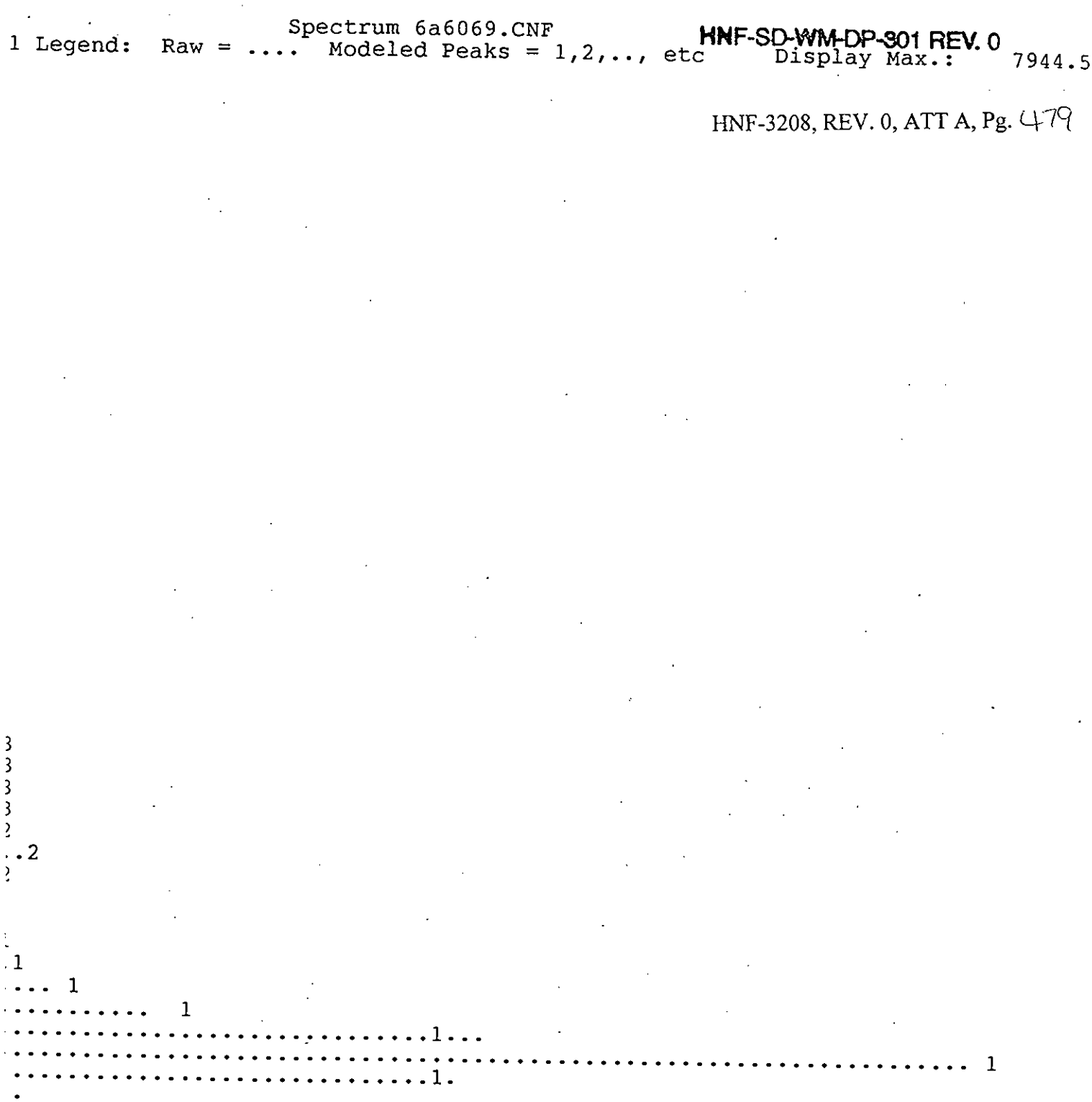
JAR
5 Mar 98

DETECTOR CALIBRATION
Energy(MEV) = 4.089 + (0.0046)*Channel
Energy range (MeV): 4.089 TO 6.444
Efficiency = 0.2348 CPM/DPM
(Data reduction compression factor: 1.)

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	19867.0	100.000
Smoothed	19860.1	99.965
Composite fit	19364.1	97.469
Residuals	502.9	2.531

Analyzed by: SEH


Spectrum 6a6069.CNF
1 Legend: Raw = ... Modeled Peaks = 1,2,.., etc
Display Max.: 7944.5

Raw Data Dump for AEA Spectrum: 6a6069.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	0.	0.	0.	1.	1.	0.	0.	0.	1.	0.
31	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
41	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
51	0.	1.	1.	0.	1.	0.	0.	0.	0.	0.
61	1.	0.	1.	0.	0.	1.	0.	0.	0.	0.
71	1.	0.	0.	1.	0.	0.	0.	1.	1.	1.
81	0.	0.	0.	1.	0.	2.	1.	0.	1.	0.
91	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
101	0.	0.	0.	2.	1.	0.	0.	0.	2.	0.
111	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.
121	0.	0.	1.	0.	0.	0.	0.	0.	0.	1.
131	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
141	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
151	0.	1.	0.	0.	1.	1.	0.	0.	0.	2.
161	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
171	0.	0.	1.	0.	0.	1.	2.	1.	0.	1.
181	0.	1.	0.	1.	0.	0.	1.	0.	1.	0.
191	2.	1.	1.	0.	0.	1.	0.	0.	0.	1.
201	1.	0.	2.	3.	0.	0.	0.	0.	0.	1.
211	1.	3.	1.	4.	0.	5.	1.	7.	1.	2.
221	3.	7.	6.	4.	4.	9.	7.	6.	3.	1.
231	1.	3.	2.	2.	1.	4.	3.	1.	4.	0.
241	4.	1.	0.	1.	2.	6.	5.	5.	5.	6.
251	7.	9.	8.	5.	7.	6.	2.	5.	10.	7.
261	8.	10.	9.	14.	21.	14.	23.	25.	11.	14.
271	12.	17.	7.	7.	14.	15.	16.	14.	40.	16.
281	31.	54.	53.	57.	62.	57.	41.	30.	12.	6.
291	5.	5.	4.	3.	14.	14.	11.	12.	17.	16.
301	13.	11.	24.	9.	8.	4.	12.	8.	7.	13.
311	9.	13.	7.	13.	12.	21.	20.	16.	19.	22.
321	19.	30.	32.	19.	31.	35.	45.	36.	49.	55.
331	64.	45.	69.	57.	84.	91.	100.	133.	129.	130.
341	196.	225.	198.	266.	289.	352.	455.	554.	659.	760.
351	761.	755.	653.	712.	779.	924.	1145.	1315.	1509.	1586.
361	1363.	851.	367.	88.	16.	13.	15.	10.	6.	3.
371	10.	5.	7.	5.	4.	6.	6.	5.	9.	3.
381	4.	5.	6.	7.	4.	2.	2.	7.	8.	6.
391	5.	1.	2.	5.	3.	5.	4.	3.	3.	5.
401	1.	1.	1.	6.	3.	6.	3.	0.	4.	0.
411	1.	1.	1.	3.	6.	5.	5.	1.	0.	2.
421	2.	2.	1.	4.	3.	0.	1.	2.	0.	5.
431	2.	4.	0.	1.	2.	2.	1.	2.	2.	0.
441	1.	3.	2.	0.	3.	0.	2.	3.	0.	1.
451	2.	1.	1.	2.	0.	2.	2.	2.	3.	0.
461	2.	1.	2.	7.	2.	4.	6.	5.	5.	6.
471	6.	3.	13.	2.	7.	6.	5.	2.	2.	3.
481	1.	5.	4.	1.	1.	7.	5.	3.	0.	2.
491	2.	5.	3.	1.	7.	7.	3.	4.	1.	6.
511	2.	0.								

222-S Analytical Laboraratory
G E N E R A L A L P H A E N E R G Y A N A L Y S I S
Rev. 2.10

DATA REDUCTION REPORT

SAMPLE
S98B62-SAM
File ID: 7a7109.CNF

Counted on: 3/ 4/98 @13:37
Detector: AEA7
Geometry number: 1
Count time: 28802. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1	15.3	15.3	497.540	497.540	14.000	6.689	7.000	1.135
2	59.0	59.0	448.709	448.688	12.000	4.369	6.000	2.470
3	1307.2	1307.2	361.200	361.200	8.000	3.135	4.000	1.113
4	160.7	160.7	303.297	303.260	10.000	3.125	5.000	0.740
5?	8.4	8.4	255.787	253.724	28.000	49.252	14.000	20.244
6	701.6	701.6	228.648	228.641	12.000	4.009	6.000	1.970

PEAK RESULTS
Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid Exp.	Peak Centroid Obs.	Peak Centroid Diff.	FWHM	Count Rate c/m	%err @95	d/m	Activity uCi/ea
1		0.013		6.378	0.03		0.90	9.4	3.7	0.165E-05
2		0.022		6.154	0.02		1.55	7.5	6.3	0.285E-05
3	Pu236	0.582	5.755	5.751	0.0040	0.01	40.80	1.4	170.3	0.767E-04
4	Pu238	0.095	5.487	5.485	0.0020	0.01	6.66	3.5	37.9	0.170E-04
	~~Am241~~		5.479	5.485	-.006				29.0	0.131E-04
5		????		5.257			0.60	29.3		
6	Pu239	0.273	5.147	5.141	0.0060	0.02	19.17	2.1	78.4	0.353E-04
	Pu240		5.144	5.141	0.003				78.4	0.353E-04
Totals:		0.985	<--valid peaks only-->				69.07			

JTR
5 Mar 98

DETECTOR CALIBRATION
Energy(MEV) = 4.090 + (0.0046)*Channel
Energy range (MeV): 4.090 TO 6.445
Efficiency = 0.2444 CPM/DPM
(Data reduction compression factor: 1.)

TOTAL COUNT DATA:

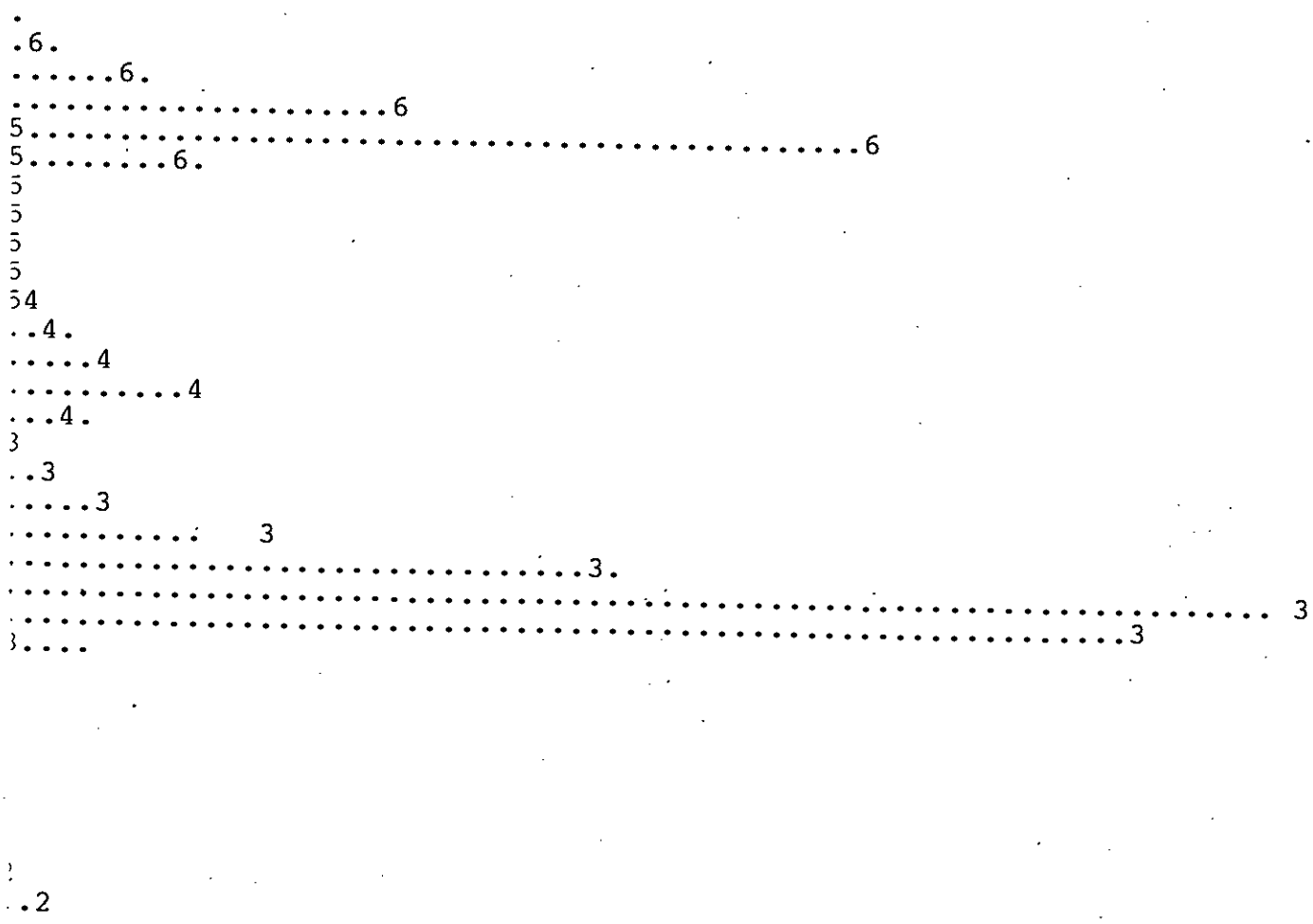
Item	Total	% Recovery
Raw spectrum	33666.0	100.000
Smoothed	33659.7	99.981
Composite fit	33442.4	99.336
Residuals	223.6	0.664

H

Analyzed by: SEH

Spectrum 7a7109.CNF

1 Legend: Raw = ... Modeled Peaks = 1,2,.., etc Display Max.: 6865.1



Raw Data Dump for AEA Spectrum: 7a7109.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	1.	0.	0.	0.	1.	0.	2.	0.	2.	0.
31	0.	0.	0.	0.	0.	0.	1.	0.	2.	0.
41	0.	0.	1.	0.	0.	0.	1.	0.	0.	0.
51	0.	1.	1.	0.	0.	1.	0.	1.	0.	0.
61	0.	0.	2.	1.	1.	0.	0.	1.	2.	1.
71	2.	2.	0.	0.	0.	0.	0.	0.	2.	0.
81	1.	0.	0.	3.	0.	0.	0.	1.	0.	2.
91	1.	0.	0.	0.	1.	2.	0.	0.	1.	0.
101	1.	0.	0.	1.	0.	1.	1.	1.	1.	2.
111	1.	1.	0.	1.	1.	1.	0.	4.	2.	1.
121	0.	0.	0.	0.	0.	2.	0.	2.	0.	1.
131	0.	2.	1.	2.	1.	0.	1.	0.	1.	1.
141	0.	2.	5.	1.	5.	4.	3.	4.	0.	4.
151	1.	2.	0.	1.	1.	3.	2.	2.	4.	2.
161	5.	3.	5.	5.	3.	4.	4.	5.	6.	7.
171	4.	3.	8.	1.	8.	6.	6.	5.	4.	3.
181	9.	11.	7.	12.	9.	9.	7.	12.	11.	15.
191	15.	23.	19.	21.	20.	19.	22.	36.	29.	39.
201	27.	37.	37.	55.	38.	52.	55.	61.	81.	69.
211	93.	86.	111.	117.	144.	156.	191.	210.	260.	257.
221	280.	323.	419.	405.	503.	588.	783.	763.	848.	742.
231	645.	380.	248.	142.	51.	17.	12.	6.	6.	7.
241	6.	8.	7.	10.	8.	6.	9.	9.	7.	8.
251	11.	10.	15.	8.	18.	9.	16.	12.	7.	10.
261	8.	10.	9.	14.	15.	16.	22.	29.	22.	25.
271	25.	29.	18.	16.	22.	19.	19.	26.	34.	47.
281	37.	54.	45.	54.	74.	85.	80.	80.	91.	71.
291	69.	54.	71.	85.	98.	96.	105.	100.	133.	134.
301	137.	157.	193.	195.	184.	112.	51.	24.	19.	10.
311	12.	13.	21.	17.	19.	18.	21.	21.	34.	27.
321	20.	23.	28.	40.	34.	29.	43.	42.	41.	56.
331	68.	53.	82.	81.	55.	73.	108.	111.	115.	125.
341	125.	194.	218.	211.	260.	309.	316.	398.	487.	578.
351	676.	750.	788.	744.	653.	724.	781.	962.	1222.	1364.
361	1485.	1637.	1332.	898.	377.	107.	19.	17.	14.	14.
371	6.	10.	12.	10.	5.	7.	5.	12.	6.	4.
381	6.	4.	4.	5.	1.	10.	3.	5.	3.	6.
391	5.	4.	5.	3.	3.	5.	4.	4.	5.	1.
401	3.	3.	3.	2.	1.	3.	2.	6.	3.	2.
411	1.	3.	4.	2.	2.	2.	2.	3.	4.	4.
421	3.	1.	4.	8.	5.	6.	7.	3.	2.	6.
431	8.	8.	10.	9.	4.	11.	10.	16.	17.	24.
441	17.	37.	30.	43.	36.	57.	57.	64.	77.	64.
451	52.	28.	27.	22.	9.	9.	2.	4.	3.	4.
461	2.	1.	2.	2.	1.	4.	6.	5.	4.	2.
471	5.	5.	11.	9.	10.	7.	9.	5.	4.	6.
481	7.	2.	6.	4.	8.	9.	7.	11.	18.	10.
491	13.	10.	20.	11.	14.	14.	13.	20.	13.	14.
511	2.	0.								

222-S Analytical Laboraratory
G E N E R A L A L P H A E N E R G Y A N A L Y S I S
Rev. 2.10

DATA REDUCTION REPORT

SAMPLE
S98B62-DUP
File ID: 8a8066.CNF

Counted on: 3/ 4/98 @13:38
Detector: AEA8
Geometry number: 1
Count time: 28804. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1	14.1	14.1	491.307	491.307	12.000	12.092	6.000	1.677
2	50.1	50.1	442.618	442.561	12.000	4.560	6.000	2.282
3	1356.2	1356.2	361.418	361.418	10.000	2.977	5.000	1.204
4?	81.4	81.4	317.456	317.456	6.000	0.000	3.000	2.765
5	167.2	167.2	303.317	303.299	8.000	2.947	4.000	0.804
6?	7.6	7.6	269.412	267.875	10.000	1.655	5.000	2.492
7?	7.2	7.2	256.437	253.273	28.000	26.579	14.000	14.554
8	726.2	726.2	228.654	228.651	10.000	3.890	5.000	2.046

PEAK RESULTS
Peak Error Limit: 30%

Peak ID	Isotope	AEA Frac	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	%err @95	d/m	Activity uCi/ea
1		0.015		6.347	0.06		1.04	8.8	4.5	0.202E-05
~~2~~	~~Cm242~~	~~0.021~~	~~6.101~~	~~6.123~~	~~=.0220.02~~		~~1.40~~	~~8.1~~	~~8.2~~	~~0.369E-05~~
3	Pu236	0.571	5.755	5.750	0.0050.01		38.61	1.4	170.3	0.767E-04
4		????		5.548			0.00	1000.		
5	Pu238	0.092	5.487	5.482	0.0050.01		6.19	3.6	37.2	0.167E-04
	~~Am241~~		5.479	5.482	-.003				28.5	0.128E-04
6		????		5.320			0.10	73.7		
7		????		5.252			0.38	30.3		
8	Pu239	0.282	5.147	5.139	0.0080.02		19.05	2.1	82.3	0.371E-04
	Pu240		5.144	5.139	0.005				82.3	0.371E-04
Totals:		0.980	<--valid peaks only-->				66.29			

JHR
5Mar98

DETECTOR CALIBRATION
Energy(MEV) = 4.087 + (0.0046)*Channel
Energy range (MeV): 4.087 TO 6.443
Efficiency = 0.2314 CPM/DPM
(Data reduction compression factor: 1.)

TOTAL COUNT DATA:

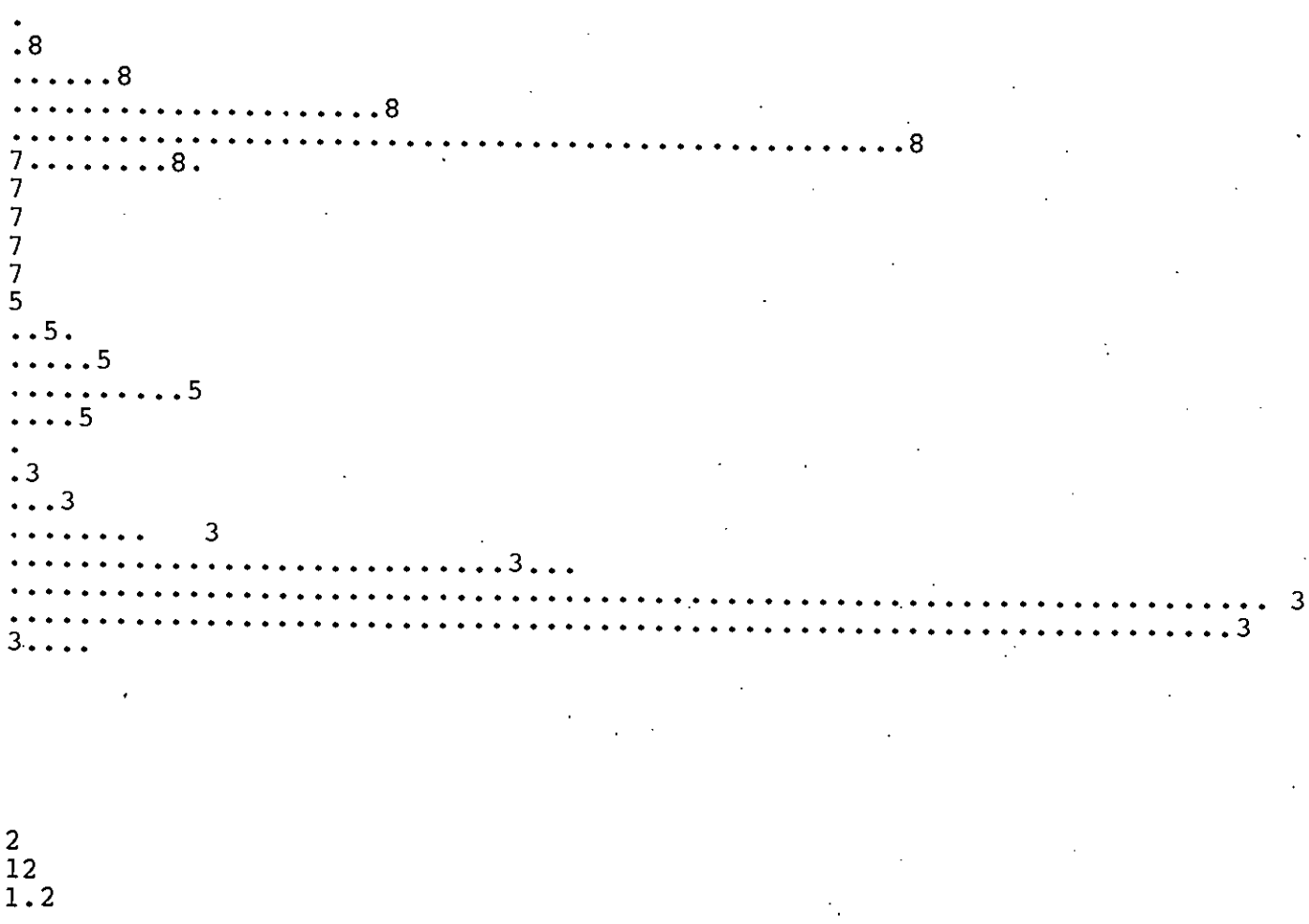
Item	Total	% Recovery
Raw spectrum	32478.0	100.000

Smoothed	32472.7	99.984
Composite fit	32057.3	98.705
Residuals	420.7	1.295

Analyzed by: HNF-3208, REV. 0, ATT A, Pg. 486

Spectrum 8a8066.CNF

1 Legend: Raw = ... Modeled Peaks = 1,2,..,' etc Display Max.: 6674.9



Raw Data Dump for AEA Spectrum: 8a8066.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	0.	1.	0.	0.	0.	1.	0.	0.	0.	0.
31	0.	0.	0.	1.	0.	0.	1.	1.	0.	0.
41	0.	0.	0.	0.	0.	1.	1.	0.	0.	0.
51	1.	0.	0.	1.	0.	0.	1.	0.	1.	0.
61	1.	0.	1.	0.	2.	0.	0.	0.	0.	0.
71	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.
81	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
91	2.	0.	0.	2.	0.	0.	0.	0.	0.	0.
101	0.	0.	0.	0.	1.	1.	0.	0.	0.	0.
111	1.	0.	1.	0.	0.	0.	2.	1.	0.	1.
121	0.	1.	3.	2.	2.	0.	1.	0.	0.	1.
131	0.	1.	0.	0.	2.	0.	2.	0.	0.	0.
141	0.	1.	0.	0.	4.	1.	3.	1.	2.	1.
151	2.	0.	2.	0.	0.	1.	1.	0.	2.	2.
161	0.	0.	3.	3.	3.	2.	1.	2.	4.	4.
171	1.	2.	1.	3.	3.	3.	5.	4.	5.	6.
181	5.	9.	3.	11.	7.	5.	6.	5.	4.	7.
191	17.	8.	12.	18.	13.	12.	11.	27.	14.	21.
201	23.	30.	20.	31.	34.	43.	48.	47.	46.	71.
211	66.	81.	84.	109.	125.	164.	174.	183.	219.	276.
221	268.	351.	417.	444.	545.	678.	759.	804.	832.	824.
231	663.	374.	206.	110.	61.	14.	9.	5.	8.	5.
241	6.	10.	8.	11.	5.	5.	7.	6.	6.	9.
251	7.	10.	12.	14.	8.	9.	13.	11.	11.	4.
261	10.	7.	10.	11.	13.	21.	18.	22.	28.	16.
271	20.	22.	11.	16.	19.	17.	12.	17.	24.	37.
281	29.	23.	40.	59.	63.	72.	92.	88.	83.	72.
291	51.	70.	74.	90.	94.	89.	101.	107.	102.	130.
301	149.	166.	192.	205.	193.	110.	50.	17.	10.	5.
311	6.	4.	10.	9.	12.	9.	20.	18.	12.	16.
321	12.	14.	13.	26.	17.	22.	28.	28.	33.	31.
331	48.	48.	34.	55.	61.	52.	62.	91.	73.	111.
341	101.	111.	147.	166.	215.	265.	301.	369.	437.	517.
351	626.	754.	710.	740.	644.	684.	812.	947.	1093.	1343.
361	1605.	1679.	1488.	964.	442.	134.	31.	13.	8.	15.
371	13.	11.	8.	6.	4.	9.	6.	6.	12.	8.
381	8.	6.	2.	8.	13.	11.	5.	3.	2.	3.
391	5.	5.	6.	2.	7.	6.	9.	3.	7.	2.
401	4.	1.	7.	4.	2.	2.	3.	1.	2.	0.
411	5.	6.	2.	5.	4.	7.	6.	2.	2.	2.
421	1.	4.	4.	6.	3.	7.	11.	6.	9.	10.
431	10.	15.	19.	29.	19.	28.	39.	47.	48.	58.
441	50.	58.	57.	53.	55.	36.	24.	6.	7.	0.
451	3.	4.	2.	1.	1.	2.	3.	3.	5.	5.
461	5.	1.	6.	2.	4.	8.	3.	4.	1.	4.
471	6.	10.	7.	12.	8.	10.	11.	8.	8.	12.
481	12.	17.	12.	12.	15.	7.	9.	14.	18.	14.
491	13.	13.	17.	13.	11.	8.	7.	5.	5.	2.
511	5.	0.								

HNF-SD-WM-DP-301, REV.0

222-S ANALYTICAL SERVICES

B PLANT CANYON SAMPLE, TK-21-1 ANALYTICAL RESULTS FOR THE FINAL REPORT

This document is the analytical laboratory report for the TK-21-1 sample collected from the B Plant Canyon on February 18, 1998. The sample was analyzed in accordance with the *Sampling and Analysis Plan for B Plant Solutions* (SAP) (Simmons, 1997) in support of the B Plant decommissioning project. Samples were analyzed to provide data both to describe the material which would remain in the tanks after the B Plant transition is complete and to determine Tank Farm compatibility. The analytical results are included in the data summary table (Table 1).

Appearance and Sample Handling

Attachment 1 is a cross reference to relate the tank farm identification numbers to the 222-S Laboratory LabCore/LIMS sample numbers. The subsamples generated in the laboratory for analyses are identified in these diagrams with their sources shown. Table 2 summarizes appearance information and over-the-top (OTR) dose readings performed on the sample.

Table 2. Appearance and OTR for B Plant Canyon Sample TK-21-1

Laboratory Id	Sample Amount	Color	Clarity	Organic Layer Extruded	Volume of Solids	OTR (mRad/hr)
S98B000059	125 mL	Colorless	Clear	None	None	5000

Analytical Results Summary

The data summary report (Table 1) compiles the analytical results and quality control (QC) data associated with the TK-21-1 sample.

Inorganic Analyses

Differential Scanning Calorimetry (DSC)

The DSC analyses were performed in duplicate on direct subsamples. The exothermic energy based on dry weight of subsample was calculated for all subsamples. The average of the TGA results for each subsample was used in the dry weight correction for that subsample. There were no exotherms observed during the analysis of the TK-21-1 sample. Therefore the results for the sample and duplicate were 0.0 J/g.

Since the sample results were zero, the calculation for the relative percent difference (RPD) is indeterminate because of the division by zero. However, due to the way the database performs calculations, zero divided by zero is reported as "0.0". The standard recovery for this analysis were within the required limits.

Thermogravimetric Analysis (TGA)

The TGA analyses were performed in duplicate on direct subsamples. The TGA result was determined by summing the weight loss steps which occurred below 250°C. The standard recovery and RPD for this analysis were within the required limits.

Specific Gravity (SpG)

The specific gravity analysis was performed in duplicate on direct subsamples. The results are provided in Table 1. The standard recovery and RPD for this analysis were within the required limits.

pH

The pH analysis was performed in duplicate on direct subsamples. The results are provided in Table 1. The standard recovery and RPD for this analysis were within the required limits.

Hydroxide (OH)

The TK-21-1 OH analysis was not performed. A value of pH = 1.3 (which represented the pH after the reagents were added) was entered to indicate the sample was too acidic (actual pH=0.7). A hydrogen ion (H+) determination was performed instead. The sample was analyzed in duplicate. The standard recovery was within the required limits.

Ion Chromatography (IC)

The IC analyses were performed in duplicate on direct subsamples. The required analytes were fluoride (F^-), chloride (Cl^-), nitrate (NO_3^-), nitrite (NO_2^-), phosphate (PO_4^{-3}) and sulfate (SO_4^{-2}). The standard recoveries, spike recoveries and RPDs for this analysis were within the required limits.

Inductively Coupled Plasma Spectrophotometry (ICP)

The liquid subsamples were prepared in duplicate by an acid adjustment of the direct subsample. This is indicated by a "D" in the A# column in Table 1.

The liquid subsamples were also prepared in duplicate by an acid digestion of the direct subsample. This is indicated by a "B" in the A# column in Table 1. A matrix spike analysis was performed on this sample in accordance with the SAP.

The required analytes for both analyses were aluminum (Al), barium (Ba), chromium (Cr), iron (Fe), lead (Pb), manganese (Mn), nickel (Ni), sodium (Na) and zirconium (Zr).

The standard recoveries and RPDs for these analyses were within the required limits.

Total Organic Carbon Persulfate (TOC)

Total organic carbon (TOC) analyses by furnace oxidation/coulometry were performed in duplicate on direct subsamples.

For all TOC analyses, an Analysis Report worksheet is included for each sample as raw data. Due to programming limitations with the instrument software, the sample size listed on the worksheet is incorrect. This value is not used in the final calculations and has no bearing on the results in Table 1. The blank is considered a reagent blank. The value was within the acceptance limits and all results were corrected for the concentration found in the blank.

The standard recovery and spike recovery for this analysis were within the required limits.

Total Inorganic/Organic Carbon (TIC)

Total inorganic carbon (TIC) analyses by persulfate oxidation/coulometry were performed in duplicate on direct subsamples.

For all TIC analyses, an Analysis Report worksheet is included for each sample as raw data. Due to programming limitations with the instrument software, the sample size listed on the worksheet is incorrect. This value is not used in the final calculations and has no bearing on the results in Table 1. The blank is considered a reagent blank. The value was within the acceptance limits and all results were corrected for the concentration found in the blank.

The standard recovery, spike recovery and RPD for this analysis were within the required limits.

SK

apr-1998 12:49:15
002-1

Table 1. Data Summary Report
TK-21-1 (1)

RE NUMBER: n/a
GMENT #: n/a

GMENT PORTION: n/a

Sample# R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S98B000059		Volume % Settled Solids	%	n/a	n/a	<1.00e-01	n/a	n/a	n/a	n/a	1.00e-01	n/a
S98B000061		DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	0.00e+00	0.00e+00	0.00e+00	0.00	n/a	n/a	n/a
S98B000061		DSC Exotherm on Perkin Elmer	Joules/g	98.00	n/a	0.00e+00	0.00e+00	0.00e+00	0.00	n/a	n/a	n/a
S98B000061		OH- by Pot. Titration	ug/mL	n/a	n/a	ph=1.3	ph=1.3	n/a	n/a	n/a	125.0	n/a
S98B000061		pH Direct	pH	99.25	n/a	7.10e-01	7.10e-01	7.10e-01	0.00	n/a	1.00e-02	n/a
S98B000061		Specific Gravity	Sp.G.	97.61	n/a	1.010	1.009	1.010	0.10	n/a	1.00e-02	n/a
S98B000061		% Water by TGA on Perkin Elmer	%	100.1	n/a	99.26	98.72	98.99	0.55	n/a	n/a	n/a
S98B000061		Tot. Organic Carbon by Coul.	ug/mL	95.67	1.000	1.31e+03	1.30e+03	1.30e+03	0.77	91.70	5.500	n/a
S98B000061		TIC by Acid/Coulometry	ug/mL	100.3	4.800	7.300	8.500	7.900	15.2	98.90	5.000	n/a
S98B000061		Fluoride-IC-Dionex 4000/4500	ug/mL	101.2	<1.20e-02	< 13.33	<1.33e1	n/a	n/a	104.7	13.33	n/a
S98B000061		Chloride-IC-Dionex 4000/4500	ug/mL	101.9	<1.70e-02	36.65	41.20	38.92	11.8	97.25	18.89	n/a
S98B000061		Nitrite-IC - Dionex 4000/4500	ug/mL	97.79	<1.08e-01	<1.20e+02	<1.20e2	n/a	n/a	98.71	120.0	n/a
S98B000061		Nitrate by IC-Dionex 4000/4500	ug/mL	97.47	<1.39e-01	1.81e+04	1.78e+04	1.80e+04	1.67	95.62	154.4	n/a
S98B000061		Phosphate-IC-Dionex 4000/4500	ug/mL	96.33	<1.20e-01	2.22e+02	210.0	216.2	5.56	97.25	133.3	n/a
S98B000061		Sulfate by IC-Dionex 4000/4500	ug/mL	100.9	1.64e-01	3.61e+02	340.0	350.7	5.99	100.0	153.3	n/a
S98B000062		Hydrogen Ion Analysis	moles/Liter	95.56	95.56	2.72e-01	2.66e-01	2.69e-01	2.23	n/a	2.50e-01	n/a
S98B000062		Ammonia by ISE-Std Additions	ug/mL	96.57	<2.00e-01	2.49e+02	209.0	229.0	17.5	116.0	5.000	n/a
S98B000062		Uranium by Phosphorescence	ug/mL	91.85	5.00e-03	4.87e-02	4.49e-02	4.68e-02	8.12	96.75	4.00e-03	1.26E+00
S98B000062		Strontium-89/90 High Level	uCi/mL	107.2	2.00e-02	4.570	4.600	4.585	0.65	n/a	2.40e-02	3.03E+00
S98B000062		Pu-239/240 by TRU-SPEC Resin	uCi/mL	89.63	<2.75e-05	4.01e-04	4.22e-04	4.11e-04	5.10	n/a	4.62e-05	2.48E+00
S98B000062	D	Aluminium-ICP-Acid Dil.	ug/mL	99.60	<5.00e-02	4.770	4.700	4.735	1.48	n/a	2.50e-01	n/a
S98B000062	D	Barium-ICP-Acid Dil.	ug/mL	97.40	<5.00e-02	1.980	1.960	1.970	1.02	n/a	2.50e-01	n/a
S98B000062	D	Chromium-ICP-Acid Dil.	ug/mL	96.60	<1.00e-02	9.10e-01	9.09e-01	9.09e-01	0.11	n/a	5.00e-02	n/a
S98B000062	D	Iron-ICP-Acid Dil.	ug/mL	100.6	<5.00e-02	18.20	18.20	18.20	0.00	n/a	2.50e-01	n/a
S98B000062	D	Manganese-ICP-Acid Dil.	ug/mL	98.40	<1.00e-02	4.27e-01	4.26e-01	4.26e-01	0.23	n/a	5.00e-02	n/a
S98B000062	D	Sodium-ICP-Acid Dil.	ug/mL	102.0	<1.00e-01	1.03e+03	1.02e+03	1.02e+03	0.98	n/a	5.00e-01	n/a
S98B000062	D	Nickel-ICP-Acid Dil.	ug/mL	98.20	<2.00e-02	7.87e-01	7.87e-01	7.87e-01	0.00	n/a	1.00e-01	n/a
S98B000062	D	Lead-ICP-Acid Dil.	ug/mL	98.00	<1.00e-01	5.56e-01	5.60e-01	5.58e-01	0.72	n/a	5.00e-01	n/a
S98B000062	D	Zirconium-ICP-Acid Dil.	ug/mL	99.60	<1.00e-02	1.080	1.060	1.070	1.87	n/a	5.00e-02	n/a
S98B000062		Cesium-137 by GEA	uCi/mL	101.7	<1.65e-03	1.71e+02	168.0	169.5	1.77	n/a	n/a	0.130
S98B000062		Am-241 by Extraction	uCi/mL	109.7	<6.94e-05	3.68e-04	3.73e-04	3.71e-04	1.35	n/a	8.90e-05	2.71E+00
S98B000085	G	Selenium by GFAA	ug/L	120.0	<1.000	<1	<1	n/a	n/a	110.0	1.000	n/a
S98B000086	B	Aluminium -ICP-Acid Digest-Liq	ug/mL	98.40	8.10e-02	10.10	7.300	8.700	32.2	90.60	1.250	n/a
S98B000086	B	Barium -ICP-Acid Digest-Liquid	ug/mL	99.20	<5.00e-02	2.200	2.140	2.170	2.76	94.40	1.250	n/a
S98B000086	B	Chromium -ICP-Acid Digest-Liq	ug/mL	97.60	<1.00e-02	1.040	1.020	1.030	1.94	91.40	2.50e-01	n/a
S98B000086	B	Iron -ICP-Acid Digest-Liquid	ug/mL	98.00	1.60e-01	19.80	27.20	23.50	31.5	91.20	1.250	n/a
S98B000086	B	Manganese -ICP-Acid Digest-Liq	ug/mL	97.80	<1.00e-02	5.41e-01	5.62e-01	5.52e-01	3.81	91.60	2.50e-01	n/a
S98B000086	B	Sodium -ICP-Acid Digest-Liquid	ug/mL	115.2	3.71e-01	1.15e+03	1.10e+03	1.12e+03	4.44	58.00	2.500	n/a
S98B000086	B	Nickel -ICP-Acid Digest-Liquid	ug/mL	101.0	<2.00e-02	9.70e-01	8.68e-01	9.19e-01	11.1	94.40	5.00e-01	n/a
S98B000086	B	Lead -ICP-Acid Digest-Liquid	ug/mL	96.00	<1.00e-01	< 2.500	<2.50e0	n/a	n/a	90.40	2.500	n/a
S98B000086	B	Zirconium -ICP-Acid Digest-Liq	ug/mL	100.8	<1.00e-02	1.130	1.040	1.085	8.29	101.6	2.50e-01	n/a

HNF-SD-WM-DP-001 REV. 0

HNF-3208, REV. 0
ATTACHMENT B
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RPX 4/27/99

Table 2. Data Summary Table

pH Direct

3/11/98

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result pH	Duplicate Result pH	Average Result pH	Duplicate Precision RPD	Standard Recover	Blank pH	Spike Recovery %	Spike Duplicate RPD	Detection Limit pH	Counting Error %
S97B000369	1.10	1.04	1.07	5.61	99.17	n/a	n/a	n/a	1.00E-02	n/a
S97B000370	1.47	1.56	1.52	5.94	99.17	n/a	n/a	n/a	1.00E-02	n/a

TOC by Coulometry

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard Recover	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000369	<5.50E+00	<5.50E+00	n/a	n/a	100.7	1.10E+00	n/a	n/a	5.50E+00	n/a
S97B000370	<5.50E+00	<5.50E+00	n/a	n/a	100.7	1.10E+00	n/a	n/a	5.50E+00	n/a

3/11/98

Strontium-89/90 High Level

ket 2/5/98

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result uCi/mL ug/mL ket 2/5/98	Duplicate Result uCi/mL ug/mL ket 2/5/98	Average Result uCi/mL ug/mL ket 2/5/98	Duplicate Precision RPD	Standard Recover	Blank uCi/mL ug/mL ket 2/5/98	Spike Recovery %	Spike Duplicate RPD	Detection Limit uCi/mL ug/mL ket 2/5/98	Counting Error %
S97B000369	5.59E+00	5.67E+00	5.63E+00	1.42	103.8	3.60E-02	n/a	n/a	5.10E-02	3.99
S97B000370	1.95E+02	1.86E+02	1.91E+02	4.72	103.8	3.60E-02	n/a	n/a	2.55E-01	1.49

ket 2/5/98

TG ket 2/5/98

ket 2/5/98 Analysis is Sr-90 high level and units are in µCi/mL

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Lead - ICP - Acid Dilution

	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Duplicate Precision RPD	Standard % Recovery	Blank uCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit uCi/mL	Counting Error %
S97B000369	<1.00E+00	<1.00E+00	n/a	n/a	98.6	<1.00E-01	107.0	0.00	1.00E+00	n/a
S97B000370	4.51E+01	4.43E+01	4.47E+01	1.79	98.8	<1.00E-01	97.2	0.98	2.10E+00	n/a

Barium - ICP - Acid Dilution

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000369	3.04E+00	3.02E+00	3.03E+00	0.66	99.2	<5.00E-02	96.2	1.96	5.00E-01	n/a
S97B000370	1.38E+00	1.38E+00	1.38E+00	0.00	100.6	<5.00E-02	98.4	0.96	1.05E+00	n/a

Chromium - ICP - Acid Dilution

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000369	1.17E+00	1.17E+00	1.17E+00	0.00	98.2	<1.00E-02	98.3	0.61	1.00E-01	n/a
S97B000370	3.28E+00	3.24E+00	3.26E+00	1.23	97.6	<1.00E-02	98.9	0.48	2.10E-01	n/a

Sodium - ICP - Acid Dilution

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000369	1.62E+03	1.61E+03	1.62E+03	0.62	104.4	<1.00E-01	96.9	n/a	1.00E+00	n/a
S97B000370	1.15E+03	1.14E+03	1.14E+03	0.87	105.8	<1.00E-01	99.7	n/a	2.10E+00	n/a

Aluminum - ICP - Acid Dilution

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard Recover	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000370	3.54E+01	3.53E+01	3.54E+01	0.28	98.60	<5.00E-02	97.2	1.46	1.05E+00	n/a

Iron - ICP - Acid Dilution

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard Recover	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000370	1.98E+02	1.96E+02	1.97E+02	1.02	96.40	<5.00E-02	84.5	6.56	1.05E+00	n/a

Manganese - ICP - Acid Dilution

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard Recover	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000370	2.13E+01	2.11E+01	2.12E+01	0.94	98.8	<1.00E-02	97.2	0.98	2.10E-01	n/a

Nickel - ICP - Acid Dilution

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard Recover	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000370	6.53E+00	6.60E+00	6.57E+00	1.07	99.2	<2.00E-02	101.0	0.94	4.20E-01	n/a

Zirconium - ICP - Acid Dilution

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard Recover	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000370	2.56E-01	2.18E-01	2.37E-01	16.00	99.8	<1.00E-02	99.5	0.48	2.10E-01	n/a

Table 2. Data Summary Table

pH Direct

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result pH	Duplicate Result pH	Average Result pH	Duplicate Precision RPD	Standard Recover	Blank pH	Spike Recovery %	Spike Duplicate RPD	Detection Limit pH	Counting Error %
S97B000369	1.10 J	1.04	1.07	5.61	99.17	n/a	n/a	n/a	1.00E-02	n/a
S97B000370	1.47 J	1.56	1.52	5.94	99.17	n/a	n/a	n/a	1.00E-02	n/a

TOC by Coulometry

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard Recover	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000369	<5.50E+00	<5.50E+00	n/a	n/a	100.7	1.10E+00	n/a	n/a	5.50E+00	n/a
S97B000370	<5.50E+00	<5.50E+00	n/a	n/a	100.7	1.10E+00	n/a	n/a	5.50E+00	n/a

Strontium-89/90 High Level

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard Recover	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000369	5.59E+00	5.67E+00	5.63E+00	1.42	103.8	3.60E-02	n/a	n/a	5.10E-02	3.99
S97B000370	1.95E+02	1.86E+02	1.91E+02	4.72	103.8	3.60E-02	n/a	n/a	2.55E-01	1.49

RECORD COPY

Fluoride - IC - Dionex 4000/4500

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard Recover	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000369	<1.03E+01	<1.03E+01	n/a	n/a	102.20	<1.20E-02	n/a	n/a	1.03E+01	n/a
S97B000370	<1.33E+01	<1.33E+01	n/a	n/a	102.20	<1.20E-02	n/a	n/a	1.33E+01	n/a

Chloride - IC - Dionex 4000/4500

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard Recover	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000369	1.86E+01	2.26E+01	2.06E+01	19.40	100.2	<1.70E-02	n/a	n/a	1.46E+01	n/a
S97B000370	4.10E+01	4.91E+01	4.51E+01	18.00	100.2	<1.70E-02	n/a	n/a	1.89E+01	n/a

Nitrite - IC - Dionex 4000/4500

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard Recover	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000369	<9.30E+01	<9.30E+01	n/a	n/a	99.3	<1.08E-01	n/a	n/a	9.30E+01	n/a
S97B000370	<1.20E+02	<1.20E+02	n/a	n/a	99.3	<1.08E-01	n/a	n/a	1.20E+02	n/a

Nitrate - IC - Dionex 4000/4500

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard Recover	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000369	2.90E+04	2.82E+04	2.86E+04	2.80	102.4	<1.39E-01	n/a	n/a	1.20E+02	n/a
S97B000370	6.67E+03	6.77E+03	6.72E+03	1.49	102.4	<1.39E-01	n/a	n/a	1.54E+02	n/a

Phosphate - IC - Dionex 4000/4500

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Duplicate Precision RPD	Standard Recover	Blank uCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit uCi/mL	Counting Error %
S97B000369	2.11E+02	1.92E+02	2.02E+02	9.43	97.8	<1.20E-01	n/a	n/a	1.03E+02	n/a
S97B000370	3.04E+03	3.28E+03	3.16E+03	7.59	97.8	<1.20E-01	n/a	n/a	1.33E+02	n/a

3/11/97

Sulfate - IC - Dionex 4000/4500

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard Recover	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000369	<1.19E+02	<1.19E+02	n/a	n/a	99.37	<1.38E-01	n/a	n/a	1.19E+02	n/a
S97B000370	1.85E+02	2.53E+02	2.19E+02	31.10	99.37	<1.38E-01	n/a	n/a	1.53E+02	n/a

3/11/97

Cesium-137 by GEA

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Duplicate Precision RPD	Standard Recover	Blank uCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit uCi/mL	Counting Error %
S97B000369	2.76E+02	2.74E+02	2.75E+02	0.73	105.8	<6.79E-04	n/a	n/a	n/a	0.13
S97B000370	5.96E+01	6.04E+01	6.00E+01	1.33	105.8	<6.79E-04	n/a	n/a	n/a	0.54

Selenium by GFAA

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard Recover	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97M000230	<5.00E+01	<5.00E+01	n/a	n/a	120.0	<2.00E+0	100.0	0.0	5.00E+01	n/a
S97M000231	<5.00E+01	<5.00E+01	n/a	n/a	120.0	<2.00E+0	90.0	10.5	5.00E+01	n/a

3/11/97

Phosphate - IC - Dionex 4000/4500

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Duplicate Precision RPD	Standard Recover	Blank uCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit uCi/mL	Counting Error %
S97B000369	2.11E+02	1.92E+02	2.02E+02	9.43	97.8	<1.20E-01	n/a	n/a	1.03E+02	n/a
S97B000370	3.04E+03	3.28E+03	3.16E+03	7.59	97.8	<1.20E-01	n/a	n/a	1.33E+02	n/a

Sulfate - IC - Dionex 4000/4500

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard Recover	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000369	<1.19E+02	<1.19E+02	n/a	n/a	99.37	<1.38E-01	n/a	n/a	1.19E+02	n/a
S97B000370	1.85E+02	2.53E+02	2.19E+02	31.10	99.37	<1.38E-01	n/a	n/a	1.53E+02	n/a

Cesium-137 by GEA

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Duplicate Precision RPD	Standard Recover	Blank uCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit uCi/mL	Counting Error %
S97B000369	2.76E+02	2.74E+02	2.75E+02	0.73	105.8	<6.79E-04	n/a	n/a	n/a	0.13
S97B000370	5.96E+01	6.04E+01	6.00E+01	1.33	105.8	<6.79E-04	n/a	n/a	n/a	0.54

Selenium by GFAA

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard Recover	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97M000230	<5.00E+01	<5.00E+01	n/a	n/a	120.0	<2.00E+0	100.0	0.0	5.00E+01	n/a
S97M000231	<5.00E+01	<5.00E+01	n/a	n/a	120.0	<2.00E+0	90.0	10.5	5.00E+01	n/a

Phosphate - IC - Dionex 4000/4500

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Duplicate Precision RPD	Standard Recover	Blank uCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit uCi/mL	Counting Error %
S97B000369	2.11E+02	1.92E+02	2.02E+02	9.43	97.8	<1.20E-01	n/a	n/a	1.03E+02	n/a
S97B000370	3.04E+03	3.28E+03	3.16E+03	7.59	97.8	<1.20E-01	n/a	n/a	1.33E+02	n/a

Sulfate - IC - Dionex 4000/4500

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard Recover	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000369	<1.19E+02	<1.19E+02	n/a	n/a	99.37	<1.38E-01	n/a	n/a	1.19E+02	n/a
S97B000370	1.85E+02	2.53E+02	2.19E+02	31.10	99.37	<1.38E-01	n/a	n/a	1.53E+02	n/a

Cesium-137 by GEA

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Duplicate Precision RPD	Standard Recover	Blank uCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit uCi/mL	Counting Error %
S97B000369	2.76E+02	2.74E+02	2.75E+02	0.73	105.8	<6.79E-04	n/a	n/a	n/a	0.13
S97B000370	5.96E+01	6.04E+01	6.00E+01	1.33	105.8	<6.79E-04	n/a	n/a	n/a	0.54

Selenium by GFAA

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard Recover	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97M000230	<5.00E+01	<5.00E+01	n/a	n/a	120.0	<2.00E+0	100.0	0.0	5.00E+01	n/a
S97M000231	<5.00E+01	<5.00E+01	n/a	n/a	120.0	<2.00E+0	90.0	10.5	5.00E+01	n/a

Table 2 (continued) Page 6 of 7

DSC Exotherm by Perkin Elmer

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result J/g	Duplicate Result J/g	Average Result J/g	Duplicate Precision RPD	Standard % Recovery	Blank J/g	Spike Recovery %	Spike Duplicate RPD	Detection Limit J/g	Counting Error %
S97B000370	0.00E+00	0.00E+00	0.00E+00	0.00	98.31	n/a	n/a	n/a	n/a	n/a

Ammonia by ISE - Std. Additions

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000370	1.59E+01	1.84E+01	1.72E+01	14.60	102.3	<2.00E-01	110.0	n/a	5.00E+00	n/a

Specific Gravity

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result	Duplicate Result	Average Result	Duplicate Precision RPD	Standard % Recovery	Blank	Spike Recovery %	Spike Duplicate RPD	Detection Limit	Counting Error %
S97B000370	9.87E-01	9.94E-01	9.90E-01	0.71	97.60	n/a	n/a	n/a	1.00E-03	n/a

% Water by TGA on Perkin Elmer

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ~~uCi/mL~~	Duplicate Result ~~uCi/mL~~	Average Result ~~uCi/mL~~	Duplicate Precision RPD	Standard % Recovery	Blank uCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit uCi/mL	Counting Error %
S97B000370	9.86E+01	9.85E+01	9.85E+01	0.11	100.0	n/a	n/a	n/a	n/a	n/a

percent RF 2/5/98

21
000015 RF 2/5/98

DSC Exotherm by Perkin Elmer

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result J/g	Duplicate Result J/g	Average Result J/g	Duplicate Precision RPD	Standard % Recovery	Blank J/g	Spike Recovery %	Spike Duplicate RPD	Detection Limit J/g	Counting Error %
S97B000370	0.00E+00	0.00E+00	0.00E+00	0.00	98.31	n/a	n/a	n/a	n/a	n/a

Ammonia by ISE - Std. Additions

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000370	1.59E+01	1.84E+01	1.72E+01	14.60	102.3	<2.00E-01	110.0	n/a	5.00E+00	n/a

Specific Gravity

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result	Duplicate Result	Average Result	Duplicate Precision RPD	Standard % Recovery	Blank	Spike Recovery %	Spike Duplicate RPD	Detection Limit	Counting Error %
S97B000370	9.87E-01	9.94E-01	9.90E-01	0.71	97.60	n/a	n/a	n/a	1.00E-03	n/a

% Water by TGA on Perkin Elmer

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ~~uCi/mL~~	Duplicate Result ~~uCi/mL~~	Average Result ~~uCi/mL~~	Duplicate Precision RPD	Standard % Recovery	Blank uCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit uCi/mL	Counting Error %
S97B000370	9.86E+01	9.85E+01	9.85E+01	0.11	100.0	n/a	n/a	n/a	n/a	n/a

percent RF 2/5/97

TIC by Acid/Coulometry

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000370	5.70E+00	5.60E+00	5.65E+00	1.77	102.2	5.00E+00	99.3	n/a	n/a	n/a

3/11/98

Uranium by Phosphorescence

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000370	2.59E-01	2.40E-01	2.49E-01	7.62	86.26	1.50E-02	107.3	n/a	4.00E-03	5.48

Pu-239/240 by TRU-SPEC Resin

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Duplicate Precision RPD	Standard % Recovery	Blank uCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit uCi/mL	Counting Error %
S97B000370	1.06E-03	9.76E-04	1.02E-03	8.25	94.5	<3.06E-05	n/a	n/a	7.28E-05	1.83

J KT 2-5-98

Am-241 by Extraction

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Duplicate Precision RPD	Standard % Recovery	Blank uCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit uCi/mL	Counting Error %
S97B000370	1.44E-02	1.46E-02	1.45E-02	1.38	104.90	<5.95E-04	n/a	n/a	1.00E-03	1.75

H+ Ion Concentration

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result moles/L	Duplicate Result moles/L	Average Result moles/L	Duplicate Precision RPD	Standard % Recovery	Blank moles/L	Spike Recovery %	Spike Duplicate RPD	Detection Limit moles/L	Counting Error %
S97B000370	7.24E-02	7.12E-02	7.18E-02	1.67	97.04	pH=6.79	n/a	n/a	1.47E-02	n/a

5/11/98

TIC by Acid/Coulometry

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000370	5.70E+00	5.60E+00	5.65E+00	1.77	102.2	5.00E+00	99.3	n/a	n/a	n/a

Uranium by Phosphorescence

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
S97B000370	2.59E-01	2.40E-01	2.49E-01	7.62	86.26	1.50E-02	107.3	n/a	4.00E-03	5.48

Pu-239/240 by TRU-SPEC Resin

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Duplicate Precision RPD	Standard % Recovery	Blank uCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit uCi/mL	Counting Error %
S97B000370	1.06E-03	9.76E-04	1.02E-03	8.25	94.5	<3.06E-05	n/a	n/a	7.28E-05	1.83

Am-241 by Extraction

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Duplicate Precision RPD	Standard % Recovery	Blank uCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit uCi/mL	Counting Error %
S97B000370	1.44E-02	1.46E-02	1.45E-02	1.38	104.90	<5.95E-04	n/a	n/a	1.00E-03	1.75

H+ Ion Concentration

SAMPLE ID	SAMPLE RESULTS				QUALITY CONTROL DATA					
Laboratory Sample Number	Sample Result moles/L	Duplicate Result moles/L	Average Result moles/L	Duplicate Precision RPD	Standard % Recovery	Blank moles/L	Spike Recovery %	Spike Duplicate RPD	Detection Limit moles/L	Counting Error %
S97B000370	7.24E-02	7.12E-02	7.18E-02	1.67	97.04	pH=6.79	n/a	n/a	1.47E-02	n/a

pH Direct

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result pH	Duplicate Result pH	Average Result pH	Duplicate Precision RPD %	Standard % Recovery	Blank pH	Spike Recovery %	Spike Duplicate RPD	Detection Limit pH	Counting Error %
Tank 21-1	S96B000454	1.86E+00	1.89E+00	1.88E+00	1.6	100.2	n/a	n/a	n/a	1.00E-02	n/a

TOC by Persulfate/Coulometry

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	9.60E+01	8.30E+01	8.95E+01	14.5	90.3	6.80E+00	n/a	n/a	4.00E+01	n/a

TOC by Persulfate/Coulometry(Triplicate Analysis)

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	4.40E+01	n/a	n/a	n/a	86.3	1.70E+00	n/a	n/a	4.00E+01	n/a

Strontium-89/90 High Level

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Duplicate Precision RPD %	Standard % Recovery	Blank uCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	4.88E-01	5.01E-01	4.94E-01	2.6	105.0	7.09E-04	n/a	n/a	1.00E-03	2.04E+00

Barium-ICP-Acid Dil.
Acid Digest

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	<1.00E+00	<1.00E+00	n/a	n/a	97.4	<5.00E-02	98.6	1.3	1.00E+00	n/a

Chromium-ICP-Acid Dil.
Acid Digest

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	7.68E-01	7.49E-01	7.58E-01	2.5	101.2	<1.00E-02	99.1	0.3	2.00E-01	n/a

Sodium-ICP-Acid Dil.
Acid Digest

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	1.42E+01	1.39E+01	1.41E+01	2.1	95.0	<1.00E-01	95.1	0.2	2.00E+00	n/a

Lead-ICP-Acid Dil.
Acid Digest

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	<2.00E+00	<2.00E+00	n/a	n/a	100.6	<1.00E-01	100.0	3.1	2.00E+00	n/a

WHC-SD-WM-DP-213, REV. 0

Fluoride-IC-Dionex 4000/4500

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	<1.21E+00	<1.21E+00	n/a	n/a	92.7	<1.20E-02	n/a	n/a	1.21E+00	n/a

Nitrite-IC - Dionex 4000/4500

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	<1.09E+01	<1.09E+01	n/a	n/a	93.1	<1.08E-01	n/a	n/a	1.09E+01	n/a

Nitrate by IC-Dionex 4000/4500

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	2.84E+03	2.88E+03	2.86E+03	1.4	102.7	1.51E-01	n/a	n/a	1.40E+01	n/a

Phosphate-IC-Dionex 4000/4500

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	<1.21E+01	<1.21E+01	n/a	n/a	97.8	<1.20E-01	n/a	n/a	1.21E+01	n/a

Sulfate by IC-Dionex 4000/4500

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000454	1.65E+01	1.68E+01	1.67E+01	1.8	103.2	<1.38E-01	n/a	n/a	1.39E+01	n/a

Cesium-137 by GEA

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Duplicate Precision RPD %	Standard % Recovery	Blank uCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit uCi/mL	Counting Error %
Tank 21-1	S96B000454	1.90E+01	1.88E+01	1.89E+01	1.1	99.8	<6.18E-02	n/a	n/a	n/a	2.30E-01

Selenium by HYAA
Acid Digest

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 21-1	S96B000534	<2.50E-01	<2.50E-01	n/a	n/a	113.0	<2.50E-01	104.8	n/a	2.50E-01	n/a

pH Direct

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result pH	Duplicate Result pH	Average Result pH	Duplicate Precision RPD %	Standard % Recovery	Blank pH	Spike Recovery %	Spike Duplicate RPD	Detection Limit pH	Counting Error %
Tank 24-1	S96B000453	2.10	2.05	2.08	2.41	100.2	n/a	n/a	n/a	1.00E-02	n/a

TOC by Persulfate/Coulometry

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	7.42E+01	7.80E+01	7.61E+01	5.0	90.3	6.80E+00	91.0	n/a	4.00E+01	n/a

Tot. Organic Carbon by Coul. (Triplicate Analysis by Furnace Oxidation)

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	1.87E+02	n/a	n/a	n/a	90.7	9.00E-01	n/a	n/a	5.50E+01	n/a

Strontium-89/90 High Level

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Duplicate Precision RPD %	Standard % Recovery	Blank uCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	7.68E+01	7.33E+01	7.51E+01	4.7	105.0	7.09E-04	n/a	n/a	2.17E-02	7.24E-01

Barium-ICP-Acid Dil.
Acid Digest

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	1.15E+01	1.19E+01	1.17E+01	3.4	97.4	<5.00E-02	98.3	0.1	1.00E+00	n/a

Chromium-ICP-Acid Dil.
Acid Digest

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	6.28E+00	6.13E+00	6.21E+00	2.4	101.2	<1.00E-02	97.8	3.2	2.00E-01	n/a

Sodium-ICP-Acid Dil.
Acid Digest

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	5.43E+02	5.60E+02	5.52E+02	3.1	95.0	<1.00E-01	97.6	0.4	2.00E+00	n/a

Lead-ICP-Acid Dil.
Acid Digest

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	3.92E+01	3.87E+01	3.90E+01	1.28	100.6	<1.00E-01	96.7	3.7	2.00E+00	n/a

Fluoride-IC-Dionex 4000/4500

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	3.26E+00	3.35E+00	3.30E+00	2.7	92.7	<1.20E-02	95.3	n/a	1.21E+00	n/a

Nitrite-IC - Dionex 4000/4500

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	<1.09E+01	<1.09E+01	n/a	n/a	93.1	<1.08E-01	92.2	n/a	1.09E+01	n/a

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Nitrate by IC-Dionex 4000/4500

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	3.84E+03	3.87E+03	3.85E+03	0.8	102.7	1.51E-01	101.2	n/a	1.40E+01	n/a

Phosphate-IC-Dionex 4000/4500

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	2.20E+02	2.30E+02	2.25E+02	4.4	97.8	<1.20E-01	100.0	n/a	1.21E+01	n/a

Sulfate by IC-Dionex 4000/4500

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000453	4.12E+01	4.61E+01	4.37E+01	11.2	103.2	<1.38E-01	101.0	n/a	1.39E+01	n/a

Cesium-137 by GEA

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result uCi/mL	Duplicate Result uCi/mL	Average Result uCi/mL	Duplicate Precision RPD %	Standard % Recovery	Blank uCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit uCi/mL	Counting Error %
Tank 24-1	S96B000453	4.37E+01	4.26E+01	4.32E+01	2.6	99.8	<6.18E-02	n/a	n/a	n/a	1.0

Selenium by HYAA Acid Digest

SAMPLE IDENTIFICATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Sample Number	Laboratory Sample Number	Sample Result ug/mL	Duplicate Result ug/mL	Average Result ug/mL	Duplicate Precision RPD %	Standard % Recovery	Blank ug/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit ug/mL	Counting Error %
Tank 24-1	S96B000535	<2.50E-01	<2.50E-01	n/a	n/a	103.7	<5.00E-03	112.5	n/a	2.50E-01	n/a

WHC-SD-WM-TP-212, REV. 0

"FINAL CHARACTERIZATION OF AQUEOUS WASTER FROM B-PLANT TANK 25-2"

G. L. Miller
Westinghouse Hanford Company, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-87RL10930

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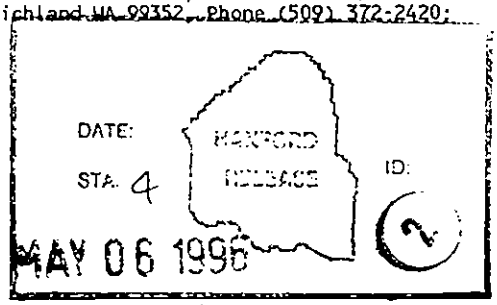

Release Approval — Date: 5/6/96

Release Stamp

Approved for Public Release

B Plant, Tank 25-2

Alpha in Liquid Samples
Acid Digestion

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Identification	Laboratory Identification	Sample Result µCi/mL	Duplicate Result µCi/mL	Average Result µCi/mL	Sample Precision RPD	Standard Recovery %	Preparation Blank µCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit µCi/mL	Counting Error %
B0065	S95R000115	<7.72E-03	n/a	n/a	n/a	94.6	<7.72E-03	97.7	2.6	1.26E-02	500.0
B0066	S95R000116	<1.00E-02	n/a	n/a	n/a	94.6	<7.72E-03	97.5	1.8	1.26E-02	259.0

Beta in Liquid Samples
Acid Digestion

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Identification	Laboratory Identification	Sample Result µCi/mL	Duplicate Result µCi/mL	Average Result µCi/mL	Sample Precision RPD	Standard Recovery %	Preparation Blank µCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit µCi/mL	Counting Error %
B0065	S95R000115	2.37E+02	n/a	n/a	n/a	100.0	<4.12e-02	105.3	4.6	2.84E-02	0.2
B0066	S95R000116	2.34E+02	n/a	n/a	n/a	100.0	<4.12e-02	102.4	2.3	2.84E-02	0.2

Am-241 by Extraction
Acid Digestion

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Identification	Laboratory Identification	Sample Result µCi/mL	Duplicate Result µCi/mL	Average Result µCi/mL	Sample Precision RPD	Standard Recovery %	Preparation Blank µCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit µCi/mL	Counting Error %
B0065	S95R000115	<2.58E-03	n/a	n/a	n/a	91.2	<2.22E-03	92.2	1.4	2.58E-03	100.0
B0066	S95R000116	<2.28E-03	n/a	n/a	n/a	91.2	<2.22E-03	91.5	0.7	2.28E-03	100.0

Pu-239/240 by TRU-SPEC Resin
Acid Digestion

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Identification	Laboratory Identification	Sample Result µCi/mL	Duplicate Result µCi/mL	Average Result µCi/mL	Sample Precision RPD	Standard Recovery %	Preparation Blank µCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit µCi/mL	Counting Error %
B0065	S95R000115	<6.23E-04	n/a	n/a	n/a	100.8	<6.87E-04	103.1	3.9	6.23E-04	100.0
B0066	S95R000116	<7.54E-04	n/a	n/a	n/a	100.8	<6.87E-04	100.8	2.3	7.54E-04	100.0

Strontium-89/90 High Level
Acid Digestion

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Identification	Laboratory Identification	Sample Result µCi/mL	Duplicate Result µCi/mL	Average Result µCi/mL	Sample Precision RPD	Standard Recovery %	Preparation Blank µCi/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit µCi/mL	Counting Error %
B0065	S95R000115	2.67E+01	n/a	n/a	n/a	92.7	<1.20E-02	118.5	20.2	1.34E-02	0.9
B0066	S95R000116	2.90E+01	n/a	n/a	n/a	92.7	<1.20E-02	87.9	13.7	1.34E-02	0.8

Cesium-137 by GEA
Direct Analysis

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result µCi/mL	Duplicate Result µCi/mL	Average Result µCi/mL	Sample Precision RPD	Standard Recovery %	Reagent Blank µCi/mL	Spike Recovery %	Detection Limit µCi/mL	Counting Error %
B0065	S96R000041	1.52E+02	1.69E+02	1.61E+02	10.6	96.2	<7.22E-03	n/a	7.00E-03	0.2
B0066	S96R000042	1.55E+02	1.55E+02	1.55E+02	0.0	96.2	<7.22E-03	n/a	7.00E-03	0.2

Uranium by Phosphorescence
Direct Analysis

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS					
Customer Identification	Laboratory Identification	Sample Result µg/mL	Duplicate Result µg/mL	Average Result µg/mL	Sample Precision RPD	Standard Recovery %	Reagent Blank µg/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit µg/mL	Counting Error %
B0065	S96R000041	2.57E-01	n/a	n/a	n/a	98.9	3.98E-01	112.1	4.3	4.07E-02	1.9
B0066	S96R000042	8.39E-02	n/a	n/a	n/a	98.9	3.98E-01	125.3	0.2	4.07E-02	4.0

Silver -ICP-Acid Digest-Liquid
Acid Digestion

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result µg/mL	Duplicate Result µg/mL	Average Result µg/mL	Sample Precision RPD	Standard Recovery %	Preparation Blank µg/mL	Spike Recovery %	Detection Limit µg/mL	Counting Error %
B0065	S95R000115	2.04E+01	2.08E+01	2.06E+01	1.9	98.3	<1.00E-02	94.6	1.00E-04	n/a
B0066	S95R000116	1.94E+01	1.99E+01	1.97E+01	2.5	98.3	<1.00E-02	n/a	1.00E-04	n/a

Aluminium -ICP-Acid Digest-Liq
Acid Digestion

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result µg/mL	Duplicate Result µg/mL	Average Result µg/mL	Sample Precision RPD	Standard Recovery %	Preparation Blank µg/mL	Spike Recovery %	Detection Limit µg/mL	Counting Error %
B0065	S95R000115	3.20E-01	2.33E-01	2.77E-01	31.5	104.0	<5.00E-02	98.5	5.00E-04	n/a
B0066	S95R000116	<5.00E-04	8.03E-01	n/a	n/a	104.0	<5.00E-02	n/a	5.00E-04	n/a

Cadmium -ICP-Acid Digest-Liq
Acid Digestion

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result µg/mL	Duplicate Result µg/mL	Average Result µg/mL	Sample Precision RPD	Standard Recovery %	Preparation Blank µg/mL	Spike Recovery %	Detection Limit µg/mL	Counting Error %
B0065	S95R000115	1.47E-01	4.00E-02	9.35E-02	114.0	100.6	<5.00E-03	96.0	5.00E-05	n/a
B0066	S95R000116	2.07E-01	1.17E-01	1.62E-01	55.6	100.6	<5.00E-03	n/a	5.00E-05	n/a

Chromium -ICP-Acid Digest-Liq
Acid Digestion

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result µg/mL	Duplicate Result µg/mL	Average Result µg/mL	Sample Precision RPD	Standard Recovery %	Preparation Blank µg/mL	Spike Recovery %	Detection Limit µg/mL	Counting Error %
B0065	S95R000115	1.94E+00	1.74E+00	1.84E+00	10.9	102.4	<1.00E-02	97.6	1.00E-04	n/a
B0066	S95R000116	1.87E+00	1.81E+00	1.84E+00	3.3	102.4	<1.00E-02	n/a	1.00E-04	n/a

Iron -ICP-Acid Digest-Liquid
Acid Digestion

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result µg/mL	Duplicate Result µg/mL	Average Result µg/mL	Sample Precision RPD	Standard Recovery %	Preparation Blank µg/mL	Spike Recovery %	Detection Limit µg/mL	Counting Error %
B0065	S95R000115	2.47E+00	3.20E+00	2.84E+00	25.7	103.0	<5.00E-02	98.3	5.00E-04	n/a
B0066	S95R000116	2.74E+00	3.61E+00	3.18E+00	27.4	103.0	<5.00E-02	n/a	5.00E-04	n/a

Sodium -ICP-Acid Digest-Liquid
Acid Digestion

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result µg/mL	Duplicate Result µg/mL	Average Result µg/mL	Sample Precision RPD	Standard Recovery %	Preparation Blank µg/mL	Spike Recovery %	Detection Limit µg/mL	Serial Dilution % Difference
B0065	S95R000115	1.66E+04	1.70E+04	1.68E+04	2.4	108.9	1.47E-01	189.6	1.00E-03	12.6
B0066	S95R000116	1.66E+04	1.66E+04	1.66E+04	0.0	108.9	1.47E-01	n/a	1.00E-03	8.8

							n/a	1.00E-03	8.8	

Nickel -ICP-Acid Digest-Liquid
Acid Digestion

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result µg/mL	Duplicate Result µg/mL	Average Result µg/mL	Sample Precision RPD	Standard Recovery %	Preparation Blank µg/mL	Spike Recovery %	Detection Limit µg/mL	Counting Error %
B0065	S95R000115	8.39E+00	8.69E+00	8.54E+00	3.5	103.0	<2.00E-02	98.1	2.00E-04	n/a
B0066	S95R000116	7.66E+00	8.48E+00	8.07E+00	10.2	103.0	<2.00E-02	n/a	2.00E-04	n/a

Lead -ICP-Acid Digest-Liquid
Acid Digestion

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result µg/mL	Duplicate Result µg/mL	Average Result µg/mL	Sample Precision RPD	Standard Recovery %	Preparation Blank µg/mL	Spike Recovery %	Detection Limit µg/mL	Counting Error %
B0065	S95R000115	1.05E+00	9.30E-01	9.90E-01	12.1	101.4	<1.00E-01	96.8	1.00E-03	n/a
B0066	S95R000116	<1.00E-03	2.28E+00	n/a	n/a	101.4	<1.00E-01	n/a	1.00E-03	n/a

DSC Exotherm on Perkin Elmer
Direct Analysis

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result Joules/g	Duplicate Result Joules/g	Average Result Joules/g	Sample Precision RPD	Standard Recovery %	Reagent Blank Joules/g	Spike Recovery %	Detection Limit Joules/g	Counting Error %
B0065	S96R000041	0.00E+00	0.00E+00	0.00E+00	0.00	92.8	n/a	n/a	n/a	n/a
B0066	S96R000042	0.00E+00	0.00E+00	0.00E+00	0.00	92.8	n/a	n/a	n/a	n/a

% Water by TGA on Perkin Elmer
Direct Analysis

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result %	Duplicate Result %	Average Result %	Sample Precision RPD	Standard Recovery %	Reagent Blank %	Spike Recovery %	Detection Limit %	Counting Error %
B0065	S96R000041	93.4	93.2	93.3	0.2	101.5	n/a	n/a	n/a	n/a
B0066	S96R000042	93.3	91.8	92.6	1.6	101.5	n/a	n/a	n/a	n/a

Volume % Solids
Direct Analysis

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result %	Duplicate Result %	Average Result %	Sample Precision RPD	Standard Recovery %	Reagent Blank %	Spike Recovery %	Detection Limit %	Counting Error %
B0065	S95R000113	<2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B0066	S95R000114	<2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

B Plant, Tank 25-2

Specific Gravity
Direct Analysis

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result Sp.G.	Duplicate Result Sp.G.	Average Result Sp.G.	Sample Precision RPD	Standard Recovery %	Reagent Blank Sp.G.	Spike Recovery %	Detection Limit Sp.G.	Counting Error %
B0065	S96R000041	1.021	1.027	1.024	0.59	97.7	n/a	n/a	1.00E-03	n/a
B0066	S96R000042	1.016	1.019	1.018	0.29	97.7	n/a	n/a	1.00E-03	n/a

Sulfate by IC-Dionex4000i/4500
Direct Analysis

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result µg/mL	Duplicate Result µg/mL	Average Result µg/mL	Sample Precision RPD	Standard Recovery %	Reagent Blank µg/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit µg/mL
B0065	S96R000071	3.85E+02	n/a	n/a	n/a	93.5	1.43E-01	91.1	3.6	2.89E+02
B0066	S96R000072	4.12E+02	n/a	n/a	n/a	93.5	1.43E-01	90.9	0.1	2.89E+02

Phosphate-IC-Dionex 4000i/4500
Direct Analysis

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result µg/mL	Duplicate Result µg/mL	Average Result µg/mL	Sample Precision RPD	Standard Recovery %	Reagent Blank µg/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit µg/mL
B0065	S96R000071	1.31E+03	n/a	n/a	n/a	96.2	2.11E-01	91.4	4.1	2.55E+02
B0066	S96R000072	1.10E+03	n/a	n/a	n/a	96.2	2.11E-01	93.4	0.0	2.55E+02

Nitrate-IC - Dionex 4000i/4500
Direct Analysis

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result µg/mL	Duplicate Result µg/mL	Average Result µg/mL	Sample Precision RPD	Standard Recovery %	Reagent Blank µg/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit µg/mL
B0065	S96R000071	4.41E+04	n/a	n/a	n/a	94.5	2.91E-01	91.1	8.5	2.97E+02
B0066	S96R000072	4.06E+04	n/a	n/a	n/a	94.5	2.91E-01	113.5	0.3	2.97E+02

B0066	S96R000072	4.06E+04	n/a	n/a	n/a	94.5	2.91E-01	91.1	8.5	2.97E+02
						94.5	2.91E-01	113.5	0.3	2.97E+02

B Plant, Tank 25-2

Nitrite-IC - Dionex 4000i/4500
Direct Analysis

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result µg/mL	Duplicate Result µg/mL	Average Result µg/mL	Sample Precision RPD	Standard Recovery %	Reagent Blank µg/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit µg/mL
B0065	S96R000071	2.67E+03	n/a	n/a	n/a	92.7	2.01E-01	90.2	6.1	2.27E+02
B0066	S96R000072	2.49E+03	n/a	n/a	n/a	92.7	2.01E-01	94.6	0.2	2.27E+02

Fluoride-IC-Dionex 4000i/4500
Direct Analysis

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result µg/mL	Duplicate Result µg/mL	Average Result µg/mL	Sample Precision RPD	Standard Recovery %	Reagent Blank µg/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit µg/mL
B0065	S96R000071	8.77E+01	n/a	n/a	n/a	95.1	<1.30E-02	91.6	4.1	2.76E+01
B0066	S96R000072	8.90E+01	n/a	n/a	n/a	95.1	<1.30E-02	91.5	0.3	2.76E+01

Chloride-IC-Dionex 4000i/4500
Direct Analysis

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result µg/mL	Duplicate Result µg/mL	Average Result µg/mL	Sample Precision RPD	Standard Recovery %	Reagent Blank µg/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit µg/mL
B0065	S96R000071	3.42E+02	n/a	n/a	n/a	92.3	4.00E-02	93.9	5.4	3.61E+01
B0066	S96R000072	3.23E+02	n/a	n/a	n/a	92.3	4.00E-02	96.3	0.3	3.61E+01

pH Direct
Direct Analysis

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result pH Units	Duplicate Result pH Units	Average Result pH Units	Sample Precision RPD	Standard Recovery %	Reagent Blank pH Units	Spike Recovery %	Detection Limit pH Units	Counting Error %
B0065	S96R000041	7.22	7.21	7.22	0.14	100.0	n/a	n/a	1.00E-02	n/a
B0066	S96R000042	7.19	n/a	n/a	n/a	100.0	n/a	n/a	1.00E-02	n/a

OH- by Pot. Titration
Direct Analysis

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result µg/mL	Duplicate Result µg/mL	Average Result µg/mL	Sample Precision RPD	Standard Recovery %	Reagent Blank µg/mL	Spike Recovery %	Detection Limit µg/mL	Counting Error %
B0065	S96R000041	<4.20E+01	<4.20E+01	n/a	n/a	96.4	<4.20E+01	n/a	4.20E+01	n/a
B0066	S96R000042	<4.20E+01	<4.20E+01	n/a	n/a	96.4	<4.20E+01	n/a	4.20E+01	n/a

Caustic Demand
Direct Analysis

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result moles OH^-/L	Duplicate Result moles OH^-/L	Average Result oles OH^-/	Sample Precision RPD	Standard Recovery %	Reagent Blank moles OH^-/L	Spike Recovery %	Detection Limit moles OH^-/L	Counting Error %
B0066	S96R000072	1.03E-02	n/a	n/a	n/a	90.3	0.0	n/a	2.50E-03	n/a

		moles OH-/L	moles OH-/L	oles OH-/	RPD	%	moles OH-/L	%	moles OH-/L	%
B0066	S96R000072	1.03E-02	n/a	n/a	n/a	90.3	0.0	n/a	2.50E-03	n/a

B Plant, Tank 25-2

Tot. Organic Carbon by Coul.
Direct Analysis

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result µg/mL	Duplicate Result µg/mL	Average Result µg/mL	Sample Precision RPD	Standard Recovery %	Reagent Blank µg/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit µg/mL
B0065	S96R000041	7.55E+03	n/a	n/a	n/a	96.0	2.70E+00	n/a	n/a	5.50E+01
B0066	S96R000042	6.77E+03	n/a	n/a	n/a	96.0	2.70E+00	108.8	1.11	5.50E+01

Tot. Inorg. Carbon by Coul.
Direct Analysis

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result µg/mL	Duplicate Result µg/mL	Average Result µg/mL	Sample Precision RPD	Standard Recovery %	Reagent Blank µg/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit µg/mL
B0065	S96R000041	<5.00E+00	n/a	n/a	n/a	99.2	1.60E+00	97.4	1.55	5.00E+00
B0066	S96R000042	2.30E+01	n/a	n/a	n/a	99.2	1.60E+00	n/a	n/a	5.00E+00

Cyanide by Microdist. & Spec.
Direct Analysis

SAMPLE INFORMATION		SAMPLE RESULTS				QUALITY CONTROL RESULTS				
Customer Identification	Laboratory Identification	Sample Result µg/mL	Duplicate Result µg/mL	Average Result µg/mL	Sample Precision RPD	Standard Recovery %	Reagent Blank µg/mL	Spike Recovery %	Spike Duplicate RPD	Detection Limit µg/mL
B0065	S96R000041	Insufficient Sample								
B0066	S96R000042	1.28E+01	1.35E+01	1.32E+01	5.3	92.3	1.80E-02	86.3	n/a	1.10E+00
B0065	S96R000071	2.89E+01	n/a	n/a	n/a	93.3	<1.10E-02	103.7	2.9	1.10E+00

DON'T SAY IT --- *Write It!*

DATE: June 8, 1998

TO: D. K. Smith S6-60

FROM: D. W. Hendrickson, P.E. S6-60

Telephone: 372-0415

CC:
S. E. Killoy S6-60
D. W. Jeppson S4-49
L. F. Janin S4-49
M. D. Crippen S4-49
E. R. Hafla S6-51

SUBJECT: Analysis of Phosphoric Acid Neutralization Yielding B-Plant Residual Solids

Attached, please find an analysis of the neutralization plans developed and conducted in the reduction of phosphoric acid wastes generated out of B-Plant to Tank Farms for its last waste transfer.

As described, the reactions were planned to leave residual solid sodium phosphate in Tanks TK-27-3 and TK-27-3 in much the same manner as had been hisotrically conducted with TK-25-2.

In completion, the waste reaction raction plans were successful and generated a total of 1,320 gallons (from TK-28-3) of pumpable sodium phosphate/sodium hydroxide solution. At estimated solubilities, were all of the material to have been solubilized total transfers to Tank Farms would have exceeded 70,000 gallons of these wastes. This volume of waste would constitute approximately six waste transfers and required approximately five months to complete.

Should you have any questions in this regard, please contact me.

B-Plant Phosphoric Reaction Analysis

D. W. Hendrickson, P.E.
COGEMA Engineering Corp

TASK:

Neutralize H_3PO_4 residing in Tanks TK-30-3 and TK-26-1 and Decant Liquid to Tanks TK-28-3 and TK-27-3.

PROPOSED SOLUTION:

1) Do not relocate current contents of TK-28-3 (aqueous rinse heel).
2) Add 50% NaOH to TK-28-3 and follow with addition of contents of TK-30-3 (aqueous H_3PO_4), and partial addition of contents of TK-26-1 (aqueous H_3PO_4) to yield 0.05M OH^- free.
3) Add 50% NaOH to TK-27-3 and follow with balance of TK-26-1 to yield 0.05 M OH^- free.
4) React and decant each of TK-28-3 and TK-27-3 to TK-24-1. Decant TK-25-2 available liquid to TK-24-1.
5) Sample TK-24-1; prepare for Tank Farms shipment (BP-98-03).
6) Flow system described by Figure 1.

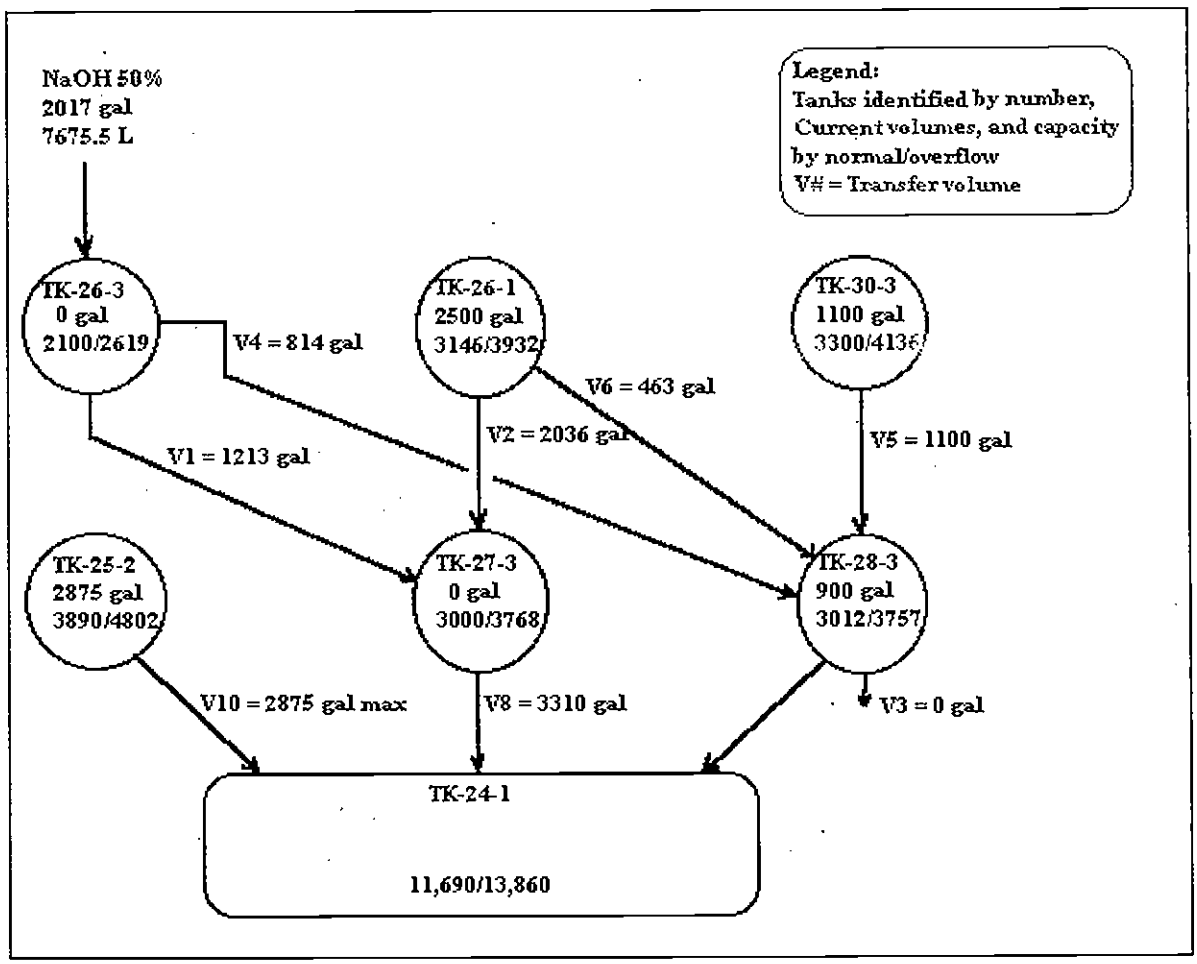

Figure 1: Neutralization Reaction and Aggregation Proposal

B-Plant Phosphoric Reaction Analysis

D. W. Hendrickson, P.E.
COGEMA Engineering Corp

ANALYSIS:

Reagent: 50% NaOH; density = 12.7 lb/gal

$$M_{NaOH} = \frac{12.7\ lb}{gal} \cdot \frac{0.50\ lb\ NaOH}{lb\ reagent} \cdot \frac{Kg}{2.2\ lb} \cdot \frac{1000\ g}{Kg} \cdot \frac{mol}{39.9971\ g} \cdot \frac{gal}{3.78533\ L}$$
$$= \frac{19.014\ mol\ NaOH}{L\ reagent}$$

Compositions: (Transfer history based)

Wash Solution	Total (Kg)	H_3PO_4 (Kg)	H_2O (Kg)
250 gal 75% H_3PO_4 @ 13.2 lb/gal	1,500	1,125	375
250 gal H_2O @ 8.34 lb/gal	946.3		946.3
Total	2,446.3	1,125	1,321.3

Rinse Solution	Total (Kg)	H_3PO_4 (Kg)	H_2O (Kg)
250 gal H_2O @ 8.34 lb/gal	946.3		946.3
Total	946.3		946.3

TK-26-1	Total (Kg)	H_3PO_4 (Kg)	H_2O (Kg)
3 * Wash Solution	9,338.9	3,375	3,964
4 * Rinse Solution	3,785.2		3,785.2
Total (Vol = 2,500 gal)	11,124.1	3,375	7,749.1

$$[H_3PO_4]_{TK\text{-}26\text{-}1} = 3375\ kg \cdot \frac{1000\ g}{Kg} \cdot \frac{mol}{97.9951\ g} \cdot \frac{1}{2{,}500\ gal} \cdot \frac{gal}{3.78533\ L}$$
$$= \frac{3.6394\ mol}{L}$$

B-Plant Phosphoric Reaction Analysis

D. W. Hendrickson, P.E.
COGEMA Engineering Corp

TK-30-3	Total (Kg)	H_3PO_4 (Kg)	H_2O (Kg)
1 * Wash Solution	1,500	1,125	375
2 * (300 gal) Rinse Solution	2,271.1		2,271.1
Total (Vol = 1,100 gal)	3,771.1	1,125	2,646.1

$$[H_3PO_4]_{TK\text{-}30\text{-}3} = 1125\ kg \cdot \frac{1000\ g}{Kg} \cdot \frac{mol}{97.9951\ g} \cdot \frac{1}{1{,}100\ gal} \cdot \frac{gal}{3.78533\ L}$$
$$= \frac{2.7571\ mol}{L}$$

Neutralizations:

$$H_3PO_{4_{aq}} + 3\ NaOH_{aq} \rightarrow Na_3PO_4 \cdot x\ H_2O \quad (X \approx 12)$$

Target: Product of neutralization = 0.05 M OH^- free

Tank TK-26-1 Neutralization

1) Minimum Neutralization

$$\frac{V_{NaOH}}{L\ H_3PO_4} = \frac{3.6394\ mol\ H_3PO_4}{L\ H_3PO_4} \cdot \frac{3\ mol NaOH}{mol\ H_3PO_4} \cdot \frac{L\ NaOH}{19.014\ mol\ NaOH} = \frac{0.5742\ L\ NaOH}{L\ acid}$$

2) Free OH^- demand

$$\frac{V_{NaOH} + \frac{19.014\ mol}{L}}{V_{NaOH} + (1 + 0.5742)} = \frac{0.05\ mol}{L}$$
$$V_{supp} = \frac{0.0044\ L\ NaOH}{L\ acid}$$

3) Total NaOH demand

$$\frac{V_{NaOH}}{L\ TK\text{-}26\text{-}1} = 0.5742 + 0.0044 = 0.5786\ L$$

B-Plant Phosphoric Reaction Analysis

D. W. Hendrickson, P.E.
COGEMA Engineering Corp

Tank TK-30-3 Neutralization

1) Minimum Neutralization

$$\frac{V_{NaOH}}{L\ H_3PO_4} = \frac{2.7571\ mol\ H_3PO_4}{L\ H_3PO_4} \cdot \frac{3\ mol NaOH}{mol\ H_3PO_4} \cdot \frac{L\ NaOH}{19.014\ mol\ NaOH} = \frac{0.435\ L\ NaOH}{L\ acid}$$

2) Free OH^- demand

$$\frac{V_{NaOH} + \frac{19.014\ mol}{L}}{V_{NaOH} + (1 + 0.435)} \doteq \frac{0.05\ mol}{L}$$

$$V_{supp} = \frac{0.004\ L\ NaOH}{L\ acid}$$

3) Total NaOH demand

$$\frac{V_{NaOH}}{L\ TK\text{-}30\text{-}3} = 0.435 + 0.004 = 0.439\ L$$

Distribution

Total TK-26-1 and TK-30-3 neutralized

V = [2,500 $gal_{TK\text{-}26\text{-}1}$ • (1 + 0.5786)L/L + 1,100 $gal_{TK\text{-}30\text{-}3}$ • (1 + 0.439)] • 3.78533L/gal = 20,930.6 L

Split evenly: yields 10,465 L to each

Transfer Calculations

TK-27-3

$V_1 + V_2 = 12,168.8$ $V_2 = 7,708.6$ +/- 227 L acid

$V_1 = 0.5786\ V_2$ $V_1 = 4,460.2$ +/- 131.31 L NaOH (1,212.9 gal)

Total = 12,300 L (3,249 gal)

TK-28-3

- Retain 900 gal (3,407 L) H_2O residual
- V_4(resid) to bump H_2O to 0.05 M OH^-

V_5 = 4,163.9 L acid +/- 227 L (1,100 gal)

$V_{4(5)} = 0.439\ V_5$ = 1,827.9 +/- 99.7 L NaOH

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$$V_4\ (resid) = \frac{3407\ L \cdot \frac{0.05\ mol\ OH}{L}}{\frac{19.014\ mol\ NaOH}{L} \cdot 0.95} = 9.43\ L\ NaOH$$

$V_6 = TK\text{-}26\text{-}1_{vol} - V_2 = 9,463.3 - 7,708.6 = 1,754.7 +/- 227$ L acid (463.6 gal)

$V_{4(6)} = 0.5786\ V_2 = 1,015.3 +/- 131.3$ L NaOH

$V_4 = 3,083.6$ L (814 gal)

Total = 12,409.2 +/- 454 L (3,278 +/- 120 gal)

TK-24-1

Only difference is V_4(resid) = 9.4 L greater
Therefore if all solids transfer = 35,600 L (9,404 gal)

If 50% solids (half mass remain)

Total = $(V_8 + V_9 + V_{10})/2$ = 17,800 L (4,702.2 gal)

Total NaOH Demand

$Vol_{NaOH} = V_1 + V_4$ = 7,675 L (2,028 gal)

Also: Hydration H_2O mass of $Na_3PO_4 \bullet 12H_2O$

$$H_2O_{hyd} = \left(2500\ gal_{TK\text{-}26\text{-}1} \cdot \frac{3.6394\ mol\ H_3PO_4}{L} + 1100\ gal_{TK\text{-}30\text{-}3} \cdot \frac{2.7571\ mol\ H}{L}\right) \cdot \frac{3.87533\ L}{gal} \cdot \frac{12\ mol\ H_2O}{mol\ H_3PO_4} \cdot \frac{0.018016\ Kg}{mol\ H_2O}$$
$$= 9,928\ Kg\ H_2O$$

$$Total\ Na_3PO_4 \cdot 12H_2O = 45,921\ molPO_4 \cdot \frac{mol\ Na_3PO_4 \cdot 12H_2O}{mol\ PO_4} \cdot \frac{0.38013\ Kg}{mol\ Na_3PO_4 \cdot 12H_2O}$$
$$= 17,456\ Kg\ Na_3PO_4 \cdot 12H_2O$$

B-Plant Phosphoric Reaction Analysis

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Composition Check of TK-25-2

Heel Solution	Total (Kg)	H_3PO_4 (Kg)	H_2O (Kg)
490 gal H_2O @ 8.34 lb/gal	1,854.8		1,854.8
Total	1,854.8		1,854.8

NaOH (50%)	Total (Kg)	NaOH (Kg)	H_2O (Kg)
1,520 gal NAOH @ 12.7 lb/gal	8,771.6	4,387.3	4,387.3
Total	8,771.6	4,387.3	4,387.3

TK-25-2	Total (Kg)	H_3PO_4 (Kg)	H_2O (Kg)	NaOH (Kg)
1 * Heel	1,854.8		1,854.8	
2 * Wash Solution	4,892.6	2,250	2,642.6	
2 * Rinse Solution	1,892.6		1,892.6	
1 * NaOH	8,774.6		4,387.3	4,387.3
Total (Vol = 3,510 gal)	17,414.6	2,250	10.777.3	4,387.3

NaOH Demand

$$NaOH\ Demand = \frac{3\ mol\ NaOH}{mol\ H_3PO_4} \cdot \frac{mol\ H_3PO_4}{97.9951\ g\ H_3PO_4} \cdot \frac{1000\ g}{Kg} \cdot 2,250\ Kg\ H_3PO_4$$
$$= 68,881\ mol\ NaOH\ (2,755\ Kg)$$

NaOH Supply

$$NaOH = 4,387.3\ Kg\ NaOH \cdot \frac{1000\ g}{Kg} \cdot \frac{mol\ NaOH}{39.9971\ g\ NaOH} = 109,690.5\ molNa$$

H_2O Demand (assume twelve waters)

$$H_2O = \frac{12\ mol\ H_2O}{mol\ H_3PO_4} \cdot \frac{\frac{18.0152\ g\ H_2O}{mol\ H_2O}}{\frac{97.9951\ g\ H_3PO_4}{mol\ H_3PO4}} \cdot 2,250\ Kg\ H_3PO_4 = 4,963.6\ Kg\ H_2O$$

As water demand exceeds water supply, insufficient water exists to fully react sodium phosphate to dodecahydrate yielding rapid hard set.

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Reaction (gmoles)	H_2O	H_3PO_4	NaOH	$Na_3PO_4 \bullet 12H_2O$
INPUT	598,233.71	22,960.3	109,690.5	0
REACTION	206,642.98	-22,960.3	-22,960.3	22,960.3
OUTPUT	391,590.72	0	86,730.2	22,960.3
OUTPUT (Kg)	7,054.6	0	3,469	8,727.7

$$[NaOH]_{Free\ liquid} = \frac{86{,}730.2\ mol\ NaOH}{(7054.6 + 3469)\ Kg\ NaOH_{aq}} \cdot \left(\frac{3{,}469\ Kg}{\frac{7054.6 + 3460\ Kg}{0.5\ Kg/Kg}} \cdot \frac{(1.5232 - 1)\ Kg}{L} + \frac{1\ Kg}{L} \right)$$

$$= \frac{11.08\ mol\ NaOH}{L}$$

ENVIRONMENTAL SIMULATION PROGRAM (ESP) ANALYSIS

The above reaction plans were analyzed with ESP to verify compositions expected of the reaction products, heats of reaction and the amount of material to be expected to be pumped. The ESP model run feed streams and product streams are detailed below. With assumed 50% void fractions, the pumpable volume estimated from reaction in TK-28-3 would be 974 gal, while zero would be pumpable from TK-27-3.

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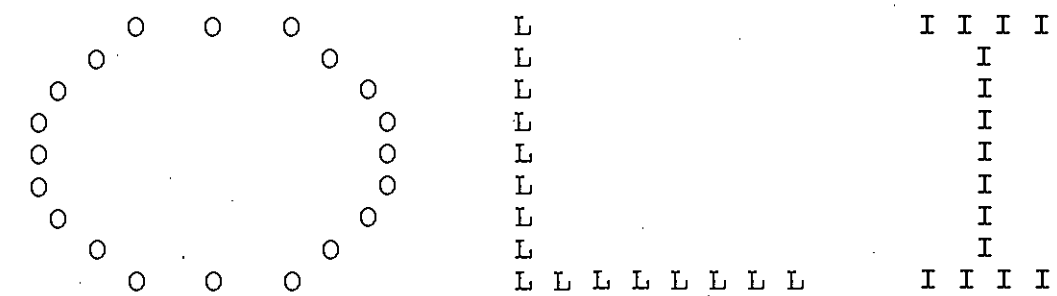

E N V I R O N M E N T A L S I M U L A T I O N P R O G R A M

V - 5.4 March 1, 1997

PROCESS: b-plant

CHEMISTRY MODEL: B-PLANT

THIS FILE NAME: b-plant.LIS

DATE: 12-Mar-98

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B-Plant Phosphoric Reaction Analysis

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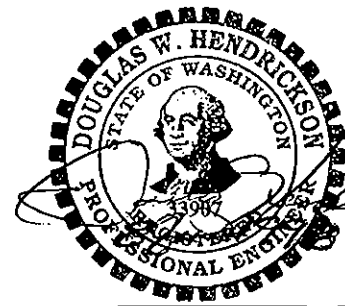
COGEMA Engineering Corp

SUMMARY

The reaction of residual phosphoric acid waste within B-Plant's Tanks TK-26-1 and TK-30-3 was evaluated in terms of material analysis and facility volumetric constraints to yield reaction volumes. The reaction planned was the reaction of phosphoric acid with sodium hydroxide to yield sodium phosphate. The conditions of reaction were such that the product would exceed its solubility limit and would precipitate. The development of a precipitate would reduce the waste material to be transferred to Tank Farms while leaving a relatively non-hazardous solid material resident in the tanks. Process analysis of comparable actions conducted with phosphoric acid in Tank TK-25-2 confirm that the material should full solidify without pumpable material.

In retrospect, all process actions, reactions, and products were as expected.



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PROCESS BLOCKS

BLOCK NAME	BLOCK TYPE	INLET STREAM(s)	OUTLET STREAM(s)
Tank 26-1 Splitter	Split	Tank 26-1 Acid	Feed to 27-3 Feed to 28-3
Tank 27-3 Separator	Separate	Feed to 27-3 50% NaOH 1	Vapor 27-3 Liquid 27-3 Sludge 27-3
Tank 28-3 Separator	Separate	Feed to 28-3 50% NaOH 2 Water Heel Tank 30-3	Vapor 28-3 Liquid 28-3 Sludge 28-3

STREAM: Tank 26-1 Acid
TO : Tank 26-1 Splitter
FROM :

Phases---------->	Aqueous	Solid	Vapor	Organic
Temperature, C	7.0000	7.0000	7.0000	7.0000
Pressure, atm	1.0000	1.0000	1.0000	1.0000
pH	.73369			
Total mol/hr	4.6654E+05	0.0	0.0	0.0
----------	mol/hr--------	mol/hr--------	mol/hr--------	mol/hr--------
H2O	4.3017E+05	0.0	0.0	0.0
H3PO4	32441.	0.0	0.0	0.0
OHION	1.3052E-10	0.0	0.0	0.0
H2PO4ION	1928.2	0.0	0.0	0.0
H3P2O7ION	33.199	0.0	0.0	0.0
HION	1966.5	0.0	0.0	0.0
HP2O7ION	1.2920E-05	0.0	0.0	0.0
HPO4ION	1.6352E-03	0.0	0.0	0.0
H2P2O7ION	2.5525	0.0	0.0	0.0
P2O7ION	4.0245E-13	0.0	0.0	0.0
PO4ION	1.2797E-14	0.0	0.0	0.0
	==========	==========	==========	==========
Total kg/hr	11124.	0.0	0.0	0.0
Volume, L/hr	9288.0	0.0	0.0	0.0
Enthalpy, kJ/hr	-2.0868E+08	0.0	0.0	0.0
Density, kg/L	1.1977			
Vapor fraction	0.0	0.0	0.0	0.0
Solid fraction	0.0	0.0	0.0	0.0
Organic fraction	0.0	0.0	0.0	0.0
Osmotic Pres, atm	96.873			
Redox Pot, volts	0.0			
E-Con, 1/ohm-cm	3.9815E-02			
E-Con, cm2/ohm-mol	10.738			
Ionic Strength	.25408			

STREAM: Feed to 27-3
TO : Tank 27-3 Separator
FROM : Tank 26-1 Splitter

Phases---------->	Aqueous	Solid	Vapor	Organic
Temperature, C	7.0000	7.0000	7.0000	7.0000
Pressure, atm	1.0000	1.0000	1.0000	1.0000
pH	.73369			
Total mol/hr	3.8002E+05	0.0	0.0	0.0
----------	mol/hr	mol/hr	mol/hr	mol/hr
H2O	3.5039E+05	0.0	0.0	0.0
H3PO4	26425.	0.0	0.0	0.0
OHION	1.0632E-10	0.0	0.0	0.0
H2PO4ION	1570.6	0.0	0.0	0.0
H3P2O7ION	27.042	0.0	0.0	0.0
HION	1601.8	0.0	0.0	0.0
HP2O7ION	1.0524E-05	0.0	0.0	0.0
HPO4ION	1.3320E-03	0.0	0.0	0.0
H2P2O7ION	2.0792	0.0	0.0	0.0
P2O7ION	3.2782E-13	0.0	0.0	0.0
PO4ION	1.0424E-14	0.0	0.0	0.0
	==========	==========	==========	==========
Total kg/hr	9061.0	0.0	0.0	0.0
Volume, L/hr	7565.5	0.0	0.0	0.0
Enthalpy, kJ/hr	-1.6998E+08	0.0	0.0	0.0
Density, kg/L	1.1977			
Vapor fraction	0.0	0.0	0.0	0.0
Solid fraction	0.0	0.0	0.0	0.0
Organic fraction	0.0	0.0	0.0	0.0
Osmotic Pres, atm	96.873			
Redox Pot, volts	0.0			
E-Con, 1/ohm-cm	3.9815E-02			
E-Con, cm2/ohm-mol	10.738			
Ionic Strength	.25408			

STREAM: Feed to 28-3
TO : Tank 28-3 Separator
FROM : Tank 26-1 Splitter

Phases---------->	Aqueous	Solid	Vapor	Organic
Temperature, C	7.0000	7.0000	7.0000	7.0000
Pressure, atm	1.0000	1.0000	1.0000	1.0000
pH	.73369			
Total mol/hr	86522.	0.0	0.0	0.0
----------	mol/hr	mol/hr	mol/hr	mol/hr
H2O	79777.	0.0	0.0	0.0
H3PO4	6016.3	0.0	0.0	0.0
OHION	2.4207E-11	0.0	0.0	0.0
H2PO4ION	357.59	0.0	0.0	0.0
H3P2O7ION	6.1570	0.0	0.0	0.0
HION	364.69	0.0	0.0	0.0
HP2O7ION	2.3960E-06	0.0	0.0	0.0
HPO4ION	3.0326E-04	0.0	0.0	0.0
H2P2O7ION	.47338	0.0	0.0	0.0
P2O7ION	7.4637E-14	0.0	0.0	0.0
PO4ION	2.3732E-15	0.0	0.0	0.0
	==========	==========	==========	==========
Total kg/hr	2063.0	0.0	0.0	0.0
Volume, L/hr	1722.5	0.0	0.0	0.0
Enthalpy, kJ/hr	-3.8700E+07	0.0	0.0	0.0
Density, kg/L	1.1977			
Vapor fraction	0.0	0.0	0.0	0.0
Solid fraction	0.0	0.0	0.0	0.0
Organic fraction	0.0	0.0	0.0	0.0
Osmotic Pres, atm	0.0			
Redox Pot, volts	0.0			
E-Con, 1/ohm-cm	0.0			
E-Con, cm2/ohm-mol	0.0			
Ionic Strength	.25408			

STREAM: 50% NaOH 1
TO : Tank 27-3 Separator
FROM :

Phases---------->	Aqueous	Solid	Vapor	Organic
Temperature, C	7.0000	7.0000	7.0000	7.0000
Pressure, atm	1.0000	1.0000	1.0000	1.0000
pH	18.354			
Total mol/hr	3.7033E+05	4402.1	0.0	0.0
----------	mol/hr--------	mol/hr--------	mol/hr--------	mol/hr--------
H2O	1.9737E+05	0.0	0.0	0.0
OHION	86479.	0.0	0.0	0.0
HION	4.0757E-15	0.0	0.0	0.0
NAION	86479.	0.0	0.0	0.0
NAOH.1H2O	0.0	4402.1	0.0	0.0
	==========	==========	==========	==========
Total kg/hr	7014.6	255.38	0.0	0.0
Volume, L/hr	4012.5	0.0	0.0	0.0
Enthalpy, kJ/hr	-9.5646E+07	-3.2425E+06	0.0	0.0
Density, kg/L	1.7482			
Vapor fraction	0.0	0.0	0.0	0.0
Solid fraction	0.0	1.0000	0.0	0.0
Organic fraction	0.0	0.0	0.0	0.0
Osmotic Pres, atm	4802.7			
Redox Pot, volts	0.0			
E-Con, 1/ohm-cm	0.0			
E-Con, cm2/ohm-mol	0.0			
Ionic Strength	24.322			

STREAM: Sludge 27-3
TO :
FROM : Tank 27-3 Separator

Phases---------->	Aqueous	Solid	Vapor	Organic
Temperature, C	7.0000	7.0000	7.0000	7.0000
Pressure, atm	1.0000	1.0000	1.0000	1.0000
pH	13.171			
Total mol/hr	3.3549E+05	25846.	0.0	0.0
----------	mol/hr--------	mol/hr--------	mol/hr--------	mol/hr--------
H2O	3.2611E+05	0.0	0.0	0.0
H3PO4	1.2664E-17	0.0	0.0	0.0
OHION	289.11	0.0	0.0	0.0
H2PO4ION	4.5500E-06	0.0	0.0	0.0
H3P2O7ION	3.7977E-29	0.0	0.0	0.0
HION	5.7865E-10	0.0	0.0	0.0
HP2O7ION	9.2122E-10	0.0	0.0	0.0
HPO4ION	29.840	0.0	0.0	0.0
NAION	6880.9	0.0	0.0	0.0
H2P2O7ION	2.3841E-17	0.0	0.0	0.0
P2O7ION	7.1897E-04	0.0	0.0	0.0
PO4ION	2177.4	0.0	0.0	0.0
NAPHOH.12H2O	0.0	25846.	0.0	0.0
	==========	==========	==========	==========
Total kg/hr	6247.8	10083.	0.0	0.0
Volume, L/hr	5832.6	6221.4	0.0	0.0
Enthalpy, kJ/hr	-9.8173E+07	-1.4518E+08	0.0	0.0
Density, kg/L	1.0712	1.6207		
Vapor fraction	0.0	0.0	0.0	0.0
Solid fraction	0.0	1.0000	0.0	0.0
Organic fraction	0.0	0.0	0.0	0.0
Osmotic Pres, atm	0.0			
Redox Pot, volts	0.0			
E-Con, 1/ohm-cm	0.0			
E-Con, cm2/ohm-mol	0.0			
Ionic Strength	2.2882			

ESP V-5.4 PROCESS:b-plant 12-Mar-98 PAGE

STREAM: 50% NaOH 2
TO : Tank 28-3 Separator
FROM :

Phases---------->	Aqueous	Solid	Vapor	Organic
Temperature, C	7.0000	7.0000	7.0000	7.0000
Pressure, atm	1.0000	1.0000	1.0000	1.0000
pH	18.354			
Total mol/hr	2.3687E+05	2815.6	0.0	0.0
----------	mol/hr	mol/hr	mol/hr	mol/hr
H2O	1.2624E+05	0.0	0.0	0.0
OHION	55313.	0.0	0.0	0.0
HION	2.6069E-15	0.0	0.0	0.0
NAION	55313.	0.0	0.0	0.0
NAOH.1H2O	0.0	2815.6	0.0	0.0
Total kg/hr	4486.7	163.34	0.0	0.0
Volume, L/hr	2566.4	0.0	0.0	0.0
Enthalpy, kJ/hr	-6.1178E+07	-2.0740E+06	0.0	0.0
Density, kg/L	1.7482			
Vapor fraction	0.0	0.0	0.0	0.0
Solid fraction	0.0	1.0000	0.0	0.0
Organic fraction	0.0	0.0	0.0	0.0
Osmotic Pres, atm	4802.7			
Redox Pot, volts	0.0			
E-Con, 1/ohm-cm	0.0			
E-Con, cm2/ohm-mol	0.0			
Ionic Strength	24.322			

STREAM: Water Heel
TO : Tank 28-3 Separator
FROM :

Phases---------->	Aqueous	Solid	Vapor	Organic
Temperature, C	7.0000	7.0000	7.0000	7.0000
Pressure, atm	1.0000	1.0000	1.0000	1.0000
pH	7.3187			
Total mol/hr	1.8912E+05	0.0	0.0	0.0
----------	mol/hr	mol/hr	mol/hr	mol/hr
H2O	1.8912E+05	0.0	0.0	0.0
OHION	1.6360E-04	0.0	0.0	0.0
HION	1.6360E-04	0.0	0.0	0.0
Total kg/hr	3407.0	0.0	0.0	0.0
Volume, L/hr	3404.9	0.0	0.0	0.0
Enthalpy, kJ/hr	-5.4308E+07	0.0	0.0	0.0
Density, kg/L	1.0006			
Vapor fraction	0.0	0.0	0.0	0.0
Solid fraction	0.0	0.0	0.0	0.0
Organic fraction	0.0	0.0	0.0	0.0
Osmotic Pres, atm	0.0			
Redox Pot, volts	0.0			
E-Con, 1/ohm-cm	1.8943E-08			
E-Con, cm2/ohm-mol	0.0			
Ionic Strength	4.8018E-08			

ESP V-5.4 PROCESS:b-plant 12-Mar-98 PAGE 1

STREAM: Tank 30-3
TO : Tank 28-3 Separator
FROM :

Phases---------->	Aqueous	Solid	Vapor	Organic
Temperature, C	7.0000	7.0000	7.0000	7.0000
Pressure, atm	1.0000	1.0000	1.0000	1.0000
pH	.73915			
Total mol/hr	1.5981E+05	0.0	0.0	0.0
----------	mol/hr	mol/hr	mol/hr	mol/hr
H2O	1.4762E+05	0.0	0.0	0.0
H3PO4	10861.	0.0	0.0	0.0
OHION	4.5369E-11	0.0	0.0	0.0
H2PO4ION	653.06	0.0	0.0	0.0
H3P2O7ION	10.950	0.0	0.0	0.0
HION	665.71	0.0	0.0	0.0
HP2O7ION	4.3317E-06	0.0	0.0	0.0
HPO4ION	5.5838E-04	0.0	0.0	0.0
H2P2O7ION	.84808	0.0	0.0	0.0
P2O7ION	1.3508E-13	0.0	0.0	0.0
PO4ION	4.4061E-15	0.0	0.0	0.0
	==========	==========	==========	==========
Total kg/hr	3789.9	0.0	0.0	0.0
Volume, L/hr	3174.6	0.0	0.0	0.0
Enthalpy, kJ/hr	-7.0906E+07	0.0	0.0	0.0
Density, kg/L	1.1938			
Vapor fraction	0.0	0.0	0.0	0.0
Solid fraction	0.0	0.0	0.0	0.0
Organic fraction	0.0	0.0	0.0	0.0
Osmotic Pres, atm	94.823			
Redox Pot, volts	0.0			
E-Con, 1/ohm-cm	3.9456E-02			
E-Con, cm2/ohm-mol	10.857			
Ionic Strength	.25064			

STREAM: Liquid 28-3
TO :
FROM : Tank 28-3 Separator

Phases---------->	Aqueous	Solid	Vapor	Organic
Temperature, C	7.0000	7.0000	7.0000	7.0000
Pressure, atm	1.0000	1.0000	1.0000	1.0000
pH	13.345			
Total mol/hr	2.1186E+05	0.0	0.0	0.0
----------	mol/hr	mol/hr	mol/hr	mol/hr
H2O	2.0613E+05	0.0	0.0	0.0
H3PO4	2.4524E-18	0.0	0.0	0.0
OHION	273.72	0.0	0.0	0.0
H2PO4ION	1.2818E-06	0.0	0.0	0.0
H3P2O7ION	3.2751E-30	0.0	0.0	0.0
HION	2.4576E-10	0.0	0.0	0.0
HP2O7ION	1.6658E-10	0.0	0.0	0.0
HPO4ION	12.187	0.0	0.0	0.0
NAION	4156.3	0.0	0.0	0.0
H2P2O7ION	2.9619E-18	0.0	0.0	0.0
P2O7ION	1.8148E-04	0.0	0.0	0.0
PO4ION	1286.1	0.0	0.0	0.0
	==========	==========	==========	==========
Total kg/hr	3937.1	0.0	0.0	0.0
Volume, L/hr	3687.7	0.0	0.0	0.0
Enthalpy, kJ/hr	-6.1906E+07	0.0	0.0	0.0
Density, kg/L	1.0676			
Vapor fraction	0.0	0.0	0.0	0.0
Solid fraction	0.0	0.0	0.0	0.0
Organic fraction	0.0	0.0	0.0	0.0
Osmotic Pres, atm	0.0			
Redox Pot, volts	0.0			
E-Con, 1/ohm-cm	0.0			
E-Con, cm2/ohm-mol	0.0			
Ionic Strength	2.1615			

ESP V-5.4 PROCESS:b-plant 12-Mar-98 PAGE

STREAM: Sludge 28-3
TO :
FROM : Tank 28-3 Separator

Phases---------->	Aqueous	Solid	Vapor	Organic
Temperature, C	7.0000	7.0000	7.0000	7.0000
Pressure, atm	1.0000	1.0000	1.0000	1.0000
pH	13.345			
Total mol/hr	2.1530E+05	15307.	0.0	0.0
----------	mol/hr	mol/hr	mol/hr	mol/hr
H2O	2.0948E+05	0.0	0.0	0.0
H3PO4	2.4922E-18	0.0	0.0	0.0
OHION	278.17	0.0	0.0	0.0
H2PO4ION	1.3027E-06	0.0	0.0	0.0
H3P2O7ION	3.3283E-30	0.0	0.0	0.0
HION	2.4975E-10	0.0	0.0	0.0
HP2O7ION	1.6928E-10	0.0	0.0	0.0
HPO4ION	12.385	0.0	0.0	0.0
NAION	4223.9	0.0	0.0	0.0
H2P2O7ION	3.0100E-18	0.0	0.0	0.0
P2O7ION	1.8443E-04	0.0	0.0	0.0
PO4ION	1307.0	0.0	0.0	0.0
NAPHOH.12H2O	0.0	15307.	0.0	0.0
	==========	==========	==========	==========
Total kg/hr	4001.1	5971.8	0.0	0.0
Volume, L/hr	3747.6	3684.6	0.0	0.0
Enthalpy, kJ/hr	-6.2911E+07	-8.5981E+07	0.0	0.0
Density, kg/L	1.0676	1.6207		
Vapor fraction	0.0	0.0	0.0	0.0
Solid fraction	0.0	1.0000	0.0	0.0
Organic fraction	0.0	0.0	0.0	0.0
Osmotic Pres, atm	0.0			
Redox Pot, volts	0.0			
E-Con, 1/ohm-cm	0.0			
E-Con, cm2/ohm-mol	0.0			
Ionic Strength	2.1615			

STREAM: Tank 26-1 Acid
TO : Tank 26-1 Splitter
FROM :

Solid	Scale Tend.	Temperature Range		
P4O10PPT	2.36251E-08			

STREAM: Feed to 27-3
TO : Tank 27-3 Separator
FROM : Tank 26-1 Splitter

Solid	Scale Tend.	Temperature Range		
P4O10PPT	2.36251E-08			

STREAM: Feed to 28-3
TO : Tank 28-3 Separator
FROM : Tank 26-1 Splitter

Solid	Scale Tend.	Temperature Range		
P4O10PPT	2.36251E-08			

STREAM: 50% NaOH 1
TO : Tank 27-3 Separator
FROM :

Solid	Scale Tend.	Temperature Range		
NAOH.1H2O	9.99999E-01	5.000	55.000	
NAOHPPT	1.16553E-02	300.000	300.000	EXCL TR

STREAM: Vapor 27-3
TO :
FROM : Tank 27-3 Separator

STREAM: Liquid 27-3
TO :
FROM : Tank 27-3 Separator

STREAM: 50% NaOH 2
TO : Tank 28-3 Separator
FROM :

Solid	Scale Tend.	Temperature Range		
NAOH.1H2O	9.99999E-01	5.000	55.000	
NAOHPPT	1.16553E-02	300.000	300.000	EXCL TR

STREAM: Tank 30-3
TO : Tank 28-3 Separator
FROM :

Solid	Scale Tend.	Temperature Range		
P4O10PPT	2.33662E-08			

STREAM: Vapor 28-3
TO :
FROM : Tank 28-3 Separator

STREAM: Liquid 28-3
TO :
FROM : Tank 28-3 Separator

Solid	Scale Tend.	Temperature Range		
NA3PO4.6H2O	1.58255E+24	70.000	121.000	EXCL TR
NA3PO4.8H2O	6.00777E+01	40.010	70.000	EXCL TR
NAPHOH.12H2O	1.00000E+00	.000	40.000	
NA2HPO4.12H2O	4.92198E-02	.000	34.700	
NA2HPO4.7H2O	2.72291E-03	35.400	48.100	EXCL TR
NA2HPO4.2H2O	3.62101E-04	48.100	95.100	EXCL TR
NAOH.1H2O	1.09724E-06	5.000	55.000	
NA3PO4.1H2O	5.62700E-08	121.000	215.000	EXCL TR
NAOHPPT	1.35495E-09	300.000	300.000	EXCL TR
NAH2PO4.2H2O	6.17991E-11	.000	40.000	
NAH2PO4.1H2O	4.42753E-11	41.000	58.000	EXCL TR
NAH2PO4PPT	2.48750E-11	60.000	100.000	EXCL TR
P4O10PPT	4.85531E-17			
NA2HPO4PPT	8.57123E-29	95.100	120.000	EXCL TR
NA3PO4PPT	1.00000E-35	215.000	350.000	EXCL TR

ESP V-5.4 PROCESS:b-plant 12-Mar-98

Block Heat Duties

Positive sign - heat added to the unit

Negative sign - heat removed from the unit

Block Type	Unit Name	Duty, kJ/hr
SPLIT	TANK 26-1 SPLITTER	0.00000E+00
SEPARATE	TANK 27-3 SEPARATOR	2.55140E+07
SEPARATE	TANK 28-3 SEPARATOR	1.63690E+07

VALIDATED RESULTS SHORT REPORT 25
Jun 1998

Customer ID: BON1Y0 TK100 DIR LIQUID PARENT Sample Date: 02/20/98
12:00
Lab Sample#: S98B000063 Recv. Date: 02/20/98
15:05

PARAMETER		RESULTS	UNITS
Alpha in Liquid Samples			
Alpha Liq.- Rel. % Count Error		5.00E+02	% Ct. Err
or			
Alpha in Liquid Samples	<	8.19E-08	uCi/mL
Anions by IC-Dionex 4000i/4500			
Bromide by Ion Chromatograph	<	1.375e+00	ug/mL
Chloride-IC-Dionex 4000/4500		1.682e+01	ug/mL
Fluoride-IC-Dionex 4000/4500	<	1.320e-01	ug/mL
Nitrate by IC-Dionex 4000/4500		2.527e+00	ug/mL
Nitrite-IC - Dionex 4000/4500	<	1.188e+00	ug/mL
Oxalate-IC-Dionex 4000/450	<	1.155e+00	ug/mL
Phosphate-IC-Dionex 4000/4500		5.190e+02	ug/mL
Sulfate by IC-Dionex 4000/4500		8.011e+00	ug/mL
Break down samples/dose&appear			
Amt of Sam/Present sample prep		125	mL
Appearance of Sample-Smpl Prep		complete	
Color of Sample		colorless	
Dose Rate in mrad/hour		<0.5	mrad/hour
Etched Number on Vial		n/a	
Organic Vol Present/sampleprep		none	mL
Seal Number		n/a	
Volume % Settled Solids		none	%
GEA for Co60, Cs137			
Cesium-137 by GEA		1.090e-02	uCi/mL
Co-60 GEA Rel. % Count Error		n/a	% Ct. Err
or			
Cobalt-60 by GEA	<	1.711e-05	uCi/mL
Cs-137 GEA Rel. % Count Error		1.22	% Ct. Err
or			
Sr-89/90 High Level			
Sr-89/90 Carrier Recovery		8.69E+01	% Recover
y			
Sr-89/90 Rel. % Count Error		2.20E+00	% Ct. Err
or			
Strontium-89/90 High Level		9.42E-04	uCi/mL
OTHER ANALYSIS			
Mercury by CVAA (Perkin Elmer)	<	0.010	ug/mL

Customer ID: BON1Y0 TK100 ACID DIGEST Sample Date: 02/20/98
12:00

0.020 ug/ml
0.02 g/l
0.02g | mol / l | 35.453g
= 5.64 x 10^-4 mol/l

30-mar-1998 11:19:14
A-0002-1

Data Summary Table
WESF TK-100

SAMPLING EVENT: 1
SEGMENT #: BON1N5

SEGMENT PORTION: N/A

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S98B000075			Aroclor-1016	ug/Kg	n/a	<37.10	< 37.10	<37.1	n/a	n/a	n/a	1.000	n/a
S98B000075			Aroclor-1221	ug/Kg	n/a	<74.20	< 74.20	<74.2	n/a	n/a	n/a	1.000	n/a
S98B000075			Aroclor-1232	ug/Kg	n/a	<37.10	< 37.10	<37.1	n/a	n/a	n/a	1.000	n/a
S98B000075			Aroclor-1242	ug/Kg	n/a	<37.10	< 37.10	<37.1	n/a	n/a	n/a	1.000	n/a
S98B000075			Aroclor-1248	ug/Kg	n/a	<37.10	< 37.10	<37.1	n/a	n/a	n/a	1.000	n/a
S98B000075			Aroclor-1254	ug/Kg	111.0	<37.10	9.41e+03	8.08e+03	8.74e+03	15.2	102.1	1.000	n/a
S98B000075			Aroclor-1260	ug/Kg	n/a	<37.10	< 37.10	<37.1	n/a	n/a	n/a	1.000	n/a
S98B000075			Tetrachloro-m-xylene Surr	% Recovery	118.3	123.8	98.50	99.25	98.88	99.2	104.4	1.000	n/a
S98B000075			Decachlorobiphenyl Surr	% Recovery	116.0	116.2	97.62	127.0	112.3	127	517.1	1.000	n/a
S98B000095		F	Strontium-89/90 High Level	uCi/g	106.6	3.00e-03	12.60	n/a	n/a	n/a	n/a	5.00e-03	8.27E-01
S98B000095		F	Cesium-137 by GEA	uCi/g	100.9	<1.87e-02	36.53	n/a	n/a	n/a	n/a	n/a	0.460
S98B000095		F	Alpha of Digested Solid	uCi/g	93.41	<4.56e-03	7.39e-03	n/a	n/a	n/a	n/a	9.00e-03	1.26E+02
S98B000098		W	Fluoride-IC-Dionex 4000/4500	ug/g	108.0	<1.20e-02	< 2.379	n/a	n/a	n/a	n/a	2.379	n/a
S98B000098		W	Chloride-IC-Dionex 4000/4500	ug/g	102.8	6.20e-02	2.95e+02	n/a	n/a	n/a	n/a	3.370	n/a
S98B000098		W	Nitrite-IC - Dionex 4000/4500	ug/g	100.6	1.61e-01	87.61	n/a	n/a	n/a	n/a	21.41	n/a
S98B000098		W	Nitrate by IC-Dionex 4000/4500	ug/g	102.4	1.45e-01	46.58	n/a	n/a	n/a	n/a	27.55	n/a
S98B000098		W	Phosphate-IC-Dionex 4000/4500	ug/g	102.4	<1.20e-01	1.30e+03	n/a	n/a	n/a	n/a	23.79	n/a
S98B000098		W	Sulfate by IC-Dionex 4000/4500	ug/g	103.6	1.68e-01	59.07	n/a	n/a	n/a	n/a	27.35	n/a
S98B000101		T	Mercury by CVAA (Perkin Elmer)	ug/mL	50.72	<5.00e-03	<5.00e-03	<0.005	n/a	n/a	91.20	5.00e-03	n/a
S98B000104		B	Silver -ICP-Acid Digest-Liquid	ug/mL	97.60	<1.00e-02	1.01e-01	9.26e-02	9.68e-02	8.68	92.40	3.70e-02	n/a
S98B000104		B	Arsenic -ICP-Acid Digest-Liq	ug/mL	98.20	<1.00e-01	<3.75e-01	<3.75e-1	n/a	n/a	95.60	3.75e-01	n/a
S98B000104		B	Barium -ICP-Acid Digest-Liquid	ug/mL	101.4	<5.00e-02	<1.88e-01	<1.88e-1	n/a	n/a	107.0	1.88e-01	n/a
S98B000104		B	Cadmium -ICP-Acid Digest-Liq	ug/mL	97.00	<5.00e-03	3.66e-02	3.13e-02	3.40e-02	15.6	96.50	1.90e-02	n/a
S98B000104		B	Chromium -ICP-Acid Digest-Liq	ug/mL	96.60	<1.00e-02	<3.75e-02	<3.75e-2	n/a	n/a	95.40	3.70e-02	n/a
S98B000104		B	Lead -ICP-Acid Digest-Liquid	ug/mL	93.60	<1.00e-01	<3.75e-01	<3.75e-1	n/a	n/a	97.80	3.75e-01	n/a
S98B000104		B	Selenium -ICP-Acid Digest-Liq	ug/mL	92.20	<1.00e-01	<3.75e-01	<3.75e-1	n/a	n/a	101.0	3.75e-01	n/a

30-mar-1998 11:19:38
A-0002-1

Data Summary Table
WESF TK-100

SAMPLING EVENT: 1
SEGMENT #: BON1N6

SEGMENT PORTION: N/A

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S98B000076			Aroclor-1016	ug/Kg	n/a	<37.10	< 37.10	n/a	n/a	n/a	n/a	1.000	n/a
S98B000076			Aroclor-1221	ug/Kg	n/a	<74.20	< 74.20	n/a	n/a	n/a	n/a	1.000	n/a
S98B000076			Aroclor-1232	ug/Kg	n/a	<37.10	2.13e+03	n/a	n/a	n/a	n/a	1.000	n/a
S98B000076			Aroclor-1242	ug/Kg	n/a	<37.10	< 37.10	n/a	n/a	n/a	n/a	1.000	n/a
S98B000076			Aroclor-1248	ug/Kg	n/a	<37.10	1.81e+03	n/a	n/a	n/a	n/a	1.000	n/a
S98B000076			Aroclor-1254	ug/Kg	111.0	<37.10	3.47e+03	n/a	n/a	n/a	n/a	1.000	n/a
S98B000076			Aroclor-1260	ug/Kg	n/a	<37.10	< 37.10	n/a	n/a	n/a	n/a	1.000	n/a
S98B000076			Tetrachloro-m-xylene Surr	% Recovery	118.3	123.8	87.55	n/a	n/a	n/a	n/a	1.000	n/a
S98B000076			Decachlorobiphenyl Surr	% Recovery	116.0	116.2	4.94e+02	n/a	n/a	n/a	n/a	4.00e-03	7.59E-01
S98B000096	F		Strontium-89/90 High Level	uCi/g	106.6	3.00e-03	13.40	n/a	n/a	n/a	n/a	n/a	0.750
S98B000096	F		Cesium-137 by GEA	uCi/g	100.9	<1.87e-02	12.71	n/a	n/a	n/a	n/a	4.00e-03	6.66E+01
S98B000096	F		Alpha of Digested Solid	uCi/g	93.41	<4.56e-03	5.29e-03	n/a	n/a	n/a	n/a	2.354	n/a
S98B000099	W		Fluoride-IC-Dionex 4000/4500	ug/g	108.0	<1.20e-02	< 2.354	n/a	n/a	n/a	n/a	3.335	n/a
S98B000099	W		Chloride-IC-Dionex 4000/4500	ug/g	102.8	6.20e-02	94.57	n/a	n/a	n/a	n/a	21.19	n/a
S98B000099	W		Nitrite-IC - Dionex 4000/4500	ug/g	100.6	1.61e-01	77.69	n/a	n/a	n/a	n/a	27.27	n/a
S98B000099	W		Nitrate by IC-Dionex 4000/4500	ug/g	102.4	1.45e-01	42.57	n/a	n/a	n/a	n/a	23.54	n/a
S98B000099	W		Phosphate-IC-Dionex 4000/4500	ug/g	102.4	<1.20e-01	1.48e+03	n/a	n/a	n/a	n/a	27.07	n/a
S98B000099	W		Sulfate by IC-Dionex 4000/4500	ug/g	103.6	1.68e-01	44.34	n/a	n/a	n/a	n/a	5.00e-03	n/a
S98B000102	T		Mercury by CVAA (Perkin Elmer)	ug/mL	50.72	<5.00e-03	<5.00e-03	<0.005	n/a	n/a	n/a	3.70e-02	n/a
S98B000105	B		Silver -ICP-Acid Digest-Liquid	ug/mL	97.60	<1.00e-02	9.88e-02	1.01e-01	9.99e-02	2.20	n/a	3.75e-01	n/a
S98B000105	B		Arsenic -ICP-Acid Digest-Liq	ug/mL	98.20	<1.00e-01	<3.75e-01	<3.75e-1	n/a	n/a	n/a	1.88e-01	n/a
S98B000105	B		Barium -ICP-Acid Digest-Liquid	ug/mL	101.4	<5.00e-02	<1.88e-01	<1.88e-1	n/a	n/a	n/a	1.90e-02	n/a
S98B000105	B		Cadmium -ICP-Acid Digest-Liq	ug/mL	97.00	<5.00e-03	4.07e-02	4.15e-02	4.11e-02	1.95	n/a	3.70e-02	n/a
S98B000105	B		Chromium -ICP-Acid Digest-Liq	ug/mL	96.60	<1.00e-02	<3.75e-02	<3.75e-2	n/a	n/a	n/a	3.75e-01	n/a
S98B000105	B		Lead -ICP-Acid Digest-Liquid	ug/mL	93.60	<1.00e-01	<3.75e-01	<3.75e-1	n/a	n/a	n/a	3.75e-01	n/a
S98B000105	B		Selenium -ICP-Acid Digest-Liq	ug/mL	92.20	<1.00e-01	<3.75e-01	<3.75e-1	n/a	n/a	n/a	3.75e-01	n/a

000020

30-mar-1998 11:20:01
A-0002-1

Data Summary Table
WESF TK-100

SAMPLING EVENT: 1
SEGMENT #: BON1N7

SEGMENT PORTION: N/A

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S98B000077			Aroclor-1016	ug/Kg	n/a	<37.10	< 37.10	n/a	n/a	n/a	n/a	1.000	n/a
S98B000077			Aroclor-1221	ug/Kg	n/a	<74.20	< 74.20	n/a	n/a	n/a	n/a	1.000	n/a
S98B000077			Aroclor-1232	ug/Kg	n/a	<37.10	< 37.10	n/a	n/a	n/a	n/a	1.000	n/a
S98B000077			Aroclor-1242	ug/Kg	n/a	<37.10	< 37.10	n/a	n/a	n/a	n/a	1.000	n/a
S98B000077			Aroclor-1248	ug/Kg	n/a	<37.10	3.13e+03	n/a	n/a	n/a	n/a	1.000	n/a
S98B000077			Aroclor-1254	ug/Kg	111.0	<37.10	5.28e+03	n/a	n/a	n/a	n/a	1.000	n/a
S98B000077			Aroclor-1260	ug/Kg	n/a	<37.10	< 37.10	n/a	n/a	n/a	n/a	1.000	n/a
S98B000077			Tetrachloro-m-xylene Surr	% Recovery	118.3	123.8	1.05e+02	n/a	n/a	n/a	n/a	1.000	n/a
S98B000077			Decachlorobiphenyl Surr	% Recovery	116.0	116.2	2.74e+02	n/a	n/a	n/a	n/a	1.000	n/a
S98B000097	F		Strontium-89/90 High Level	uCi/g	106.6	3.00e-03	7.260	n/a	n/a	n/a	n/a	2.00e-03	7.27E-01
S98B000097	F		Cesium-137 by GEA	uCi/g	100.9	<1.87e-02	7.488	n/a	n/a	n/a	n/a	n/a	0.970
S98B000097	F		Alpha of Digested Solid	uCi/g	93.41	<4.56e-03	<2.75e-03	n/a	n/a	n/a	n/a	4.00e-03	2.02E+02
S98B000100	W		Fluoride-IC-Dionex 4000/4500	ug/g	108.0	<1.20e-02	< 2.282	n/a	n/a	n/a	n/a	2.282	n/a
S98B000100	W		Chloride-IC-Dionex 4000/4500	ug/g	102.8	6.20e-02	55.14	n/a	n/a	n/a	n/a	3.233	n/a
S98B000100	W		Nitrite-IC - Dionex 4000/4500	ug/g	100.6	1.61e-01	96.22	n/a	n/a	n/a	n/a	20.54	n/a
S98B000100	W		Nitrate by IC-Dionex 4000/4500	ug/g	102.4	1.45e-01	47.35	n/a	n/a	n/a	n/a	26.43	n/a
S98B000100	W		Phosphate-IC-Dionex 4000/4500	ug/g	102.4	<1.20e-01	1.24e+03	n/a	n/a	n/a	n/a	22.82	n/a
S98B000100	W		Sulfate by IC-Dionex 4000/4500	ug/g	103.6	1.68e-01	67.88	n/a	n/a	n/a	n/a	26.24	n/a
S98B000103	T		Mercury by CVAA (Perkin Elmer)	ug/mL	50.72	<5.00e-03	<5.00e-03	<0.005	n/a	n/a	n/a	5.00e-03	n/a
S98B000106	B		Silver -ICP-Acid Digest-Liquid	ug/mL	97.60	<1.00e-02	1.04e-01	1.01e-01	1.03e-01	2.93	n/a	3.70e-02	n/a
S98B000106	B		Arsenic -ICP-Acid Digest-Liq	ug/mL	98.20	<1.00e-01	<3.75e-01	<3.75e-1	n/a	n/a	n/a	3.75e-01	n/a
S98B000106	B		Barium -ICP-Acid Digest-Liquid	ug/mL	101.4	<5.00e-02	<1.88e-01	<1.88e-1	n/a	n/a	n/a	1.88e-01	n/a
S98B000106	B		Cadmium -ICP-Acid Digest-Liq	ug/mL	97.00	<5.00e-03	2.99e-02	2.58e-02	2.78e-02	14.7	n/a	1.90e-02	n/a
S98B000106	B		Chromium -ICP-Acid Digest-Liq	ug/mL	96.60	<1.00e-02	<3.75e-02	<3.75e-2	n/a	n/a	n/a	3.70e-02	n/a
S98B000106	B		Lead -ICP-Acid Digest-Liquid	ug/mL	93.60	<1.00e-01	<3.75e-01	<3.75e-1	n/a	n/a	n/a	3.75e-01	n/a
S98B000106	B		Selenium -ICP-Acid Digest-Liq	ug/mL	92.20	<1.00e-01	<3.75e-01	<3.75e-1	n/a	n/a	n/a	3.75e-01	n/a

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Data Summary Table
WESF TK-100

SAMPLING EVENT: 1
SEGMENT #: BON1Y0

SEGMENT PORTION: N/A

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S98B000063			Mercury by CVAA (Perkin Elmer)	ug/mL	94.30	<5.00e-03	<1.00e-02	<0.010	n/a	n/a	78.30	1.00e-02	n/a
S98B000063			Strontium-89/90 High Level	uCi/mL	103.4	<2.32e-06	9.42e-04	n/a	n/a	n/a	n/a	2.62e-06	2.20E+00
S98B000063			Fluoride-IC-Dionex 4000/4500	ug/mL	104.1	<1.20e-02	<1.32e-01	n/a	n/a	n/a	n/a	1.32e-01	n/a
S98B000063			Chloride-IC-Dionex 4000/4500	ug/mL	103.4	3.10e-02	16.82	n/a	n/a	n/a	n/a	1.87e-01	n/a
S98B000063			Nitrite-IC - Dionex 4000/4500	ug/mL	99.26	<1.08e-01	< 1.188	n/a	n/a	n/a	n/a	1.188	n/a
S98B000063			Nitrate by IC-Dionex 4000/4500	ug/mL	100.2	2.19e-01	2.527	n/a	n/a	n/a	n/a	1.529	n/a
S98B000063			Phosphate-IC-Dionex 4000/4500	ug/mL	99.45	<1.20e-01	5.19e+02	n/a	n/a	n/a	n/a	1.320	n/a
S98B000063			Sulfate by IC-Dionex 4000/4500	ug/mL	98.74	<1.38e-01	8.011	n/a	n/a	n/a	n/a	1.518	n/a
S98B000063			Cesium-137 by GEA	uCi/mL	98.06	<3.62e-05	1.09e-02	n/a	n/a	n/a	n/a	n/a	1.22
S98B000063			Alpha in Liquid Samples	uCi/mL	82.97	<8.32e-08	<8.19e-08	n/a	n/a	n/a	n/a	1.94e-07	5.00E+02
S98B000065			Aroclor-1016	ug/L	n/a	<1.20e-01	< 1.200	<1.20	n/a	n/a	89.88	1.000	n/a
S98B000065			Aroclor-1221	ug/L	n/a	<2.40e-01	< 2.400	<2.40	n/a	n/a	n/a	1.000	n/a
S98B000065			Aroclor-1232	ug/L	n/a	<1.20e-01	< 1.200	<1.20	n/a	n/a	n/a	1.000	n/a
S98B000065			Aroclor-1242	ug/L	n/a	<1.20e-01	< 1.200	<1.20	n/a	n/a	n/a	1.000	n/a
S98B000065			Aroclor-1248	ug/L	n/a	<1.20e-01	< 1.200	<1.20	n/a	n/a	n/a	1.000	n/a
S98B000065			Aroclor-1254	ug/L	79.76	<1.20e-01	< 1.200	<1.20	n/a	n/a	n/a	1.000	n/a
S98B000065			Aroclor-1260	ug/L	n/a	<1.20e-01	< 1.200	<1.20	n/a	n/a	66.91	1.000	n/a
S98B000065			Tetrachloro-m-xylene Surr	% Recovery	72.05	60.90	68.20	57.05	62.62	57.0	57.45	1.000	n/a
S98B000065			Decachlorobiphenyl Surr	% Recovery	91.42	62.47	75.13	66.28	70.70	66.3	59.90	1.000	n/a
S98B000067		B	Silver -ICP-Acid Digest-Liquid	ug/mL	100.0	<1.00e-02	<1.00e-01	<1.00e-1	n/a	n/a	117.2	1.00e-01	n/a
S98B000067		B	Arsenic -ICP-Acid Digest-Liq	ug/mL	101.4	<1.00e-01	< 1.000	<1.00e0	n/a	n/a	100.4	1.000	n/a
S98B000067		B	Barium -ICP-Acid Digest-Liquid	ug/mL	102.0	<5.00e-02	<5.00e-01	<5.00e-1	n/a	n/a	106.0	5.00e-01	n/a
S98B000067		B	Cadmium -ICP-Acid Digest-Liq	ug/mL	99.60	<5.00e-03	<5.00e-02	<5.00e-2	n/a	n/a	119.0	5.00e-02	n/a
S98B000067		B	Chromium -ICP-Acid Digest-Liq	ug/mL	97.80	<1.00e-02	<1.00e-01	<1.00e-1	n/a	n/a	105.2	1.00e-01	n/a
S98B000067		B	Lead -ICP-Acid Digest-Liquid	ug/mL	96.00	<1.00e-01	< 1.000	<1.00e0	n/a	n/a	115.2	1.000	n/a
S98B000067		B	Selenium -ICP-Acid Digest-Liq	ug/mL	94.80	<1.00e-01	< 1.000	<1.00e0	n/a	n/a	117.5	1.000	n/a

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Data Summary Table
WESF TK-100

SAMPLING EVENT: 1
SEGMENT #: BON2V2

SEGMENT PORTION: N/A

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S9880000064			Mercury by CVAA (Perkin Elmer)	ug/mL	94.30	<5.00e-03	<1.00e-02	<0.010	n/a	n/a	n/a	1.00e-02	n/a
S9880000064			Strontium-89/90 High Level	uCi/mL	103.4	<2.32e-06	1.96e-06	n/a	n/a	n/a	n/a	2.71e-06	1.08E+02
S9880000064			Fluoride-IC-Dionex 4000/4500	ug/mL	104.1	<1.20e-02	<1.20e-02	n/a	n/a	n/a	n/a	1.20e-02	n/a
S9880000064			Chloride-IC-Dionex 4000/4500	ug/mL	103.4	3.10e-02	1.26e-01	n/a	n/a	n/a	n/a	1.70e-02	n/a
S9880000064			Nitrite-IC - Dionex 4000/4500	ug/mL	99.26	<1.08e-01	1.59e-01	n/a	n/a	n/a	n/a	1.08e-01	n/a
S9880000064			Nitrate by IC-Dionex 4000/4500	ug/mL	100.2	2.19e-01	2.47e-01	n/a	n/a	n/a	n/a	1.39e-01	n/a
S9880000064			Phosphate-IC-Dionex 4000/4500	ug/mL	99.45	<1.20e-01	1.89e-01	n/a	n/a	n/a	n/a	1.20e-01	n/a
S9880000064			Sulfate by IC-Dionex 4000/4500	ug/mL	98.74	<1.38e-01	1.67e-01	n/a	n/a	n/a	n/a	1.38e-01	n/a
S9880000064			Cesium-137 by GEA	uCi/mL	98.06	<3.62e-05	<3.55e-05	n/a	n/a	n/a	n/a	3.55e-05	n/a
S9880000064			Alpha in Liquid Samples	uCi/mL	82.97	<8.32e-08	<8.05e-08	n/a	n/a	n/a	n/a	1.91e-07	5.00E+02
S9880000066			Aroclor-1016	ug/L	n/a	<1.20e-01	< 1.200	n/a	n/a	n/a	n/a	1.000	n/a
S9880000066			Aroclor-1221	ug/L	n/a	<2.40e-01	< 2.400	n/a	n/a	n/a	n/a	1.000	n/a
S9880000066			Aroclor-1232	ug/L	n/a	<1.20e-01	< 1.200	n/a	n/a	n/a	n/a	1.000	n/a
S9880000066			Aroclor-1242	ug/L	n/a	<1.20e-01	< 1.200	n/a	n/a	n/a	n/a	1.000	n/a
S9880000066			Aroclor-1248	ug/L	n/a	<1.20e-01	< 1.200	n/a	n/a	n/a	n/a	1.000	n/a
S9880000066			Aroclor-1254	ug/L	79.76	<1.20e-01	< 1.200	n/a	n/a	n/a	n/a	1.000	n/a
S9880000066			Aroclor-1260	ug/L	n/a	<1.20e-01	< 1.200	n/a	n/a	n/a	n/a	1.000	n/a
S9880000066			Tetrachloro-m-xylene Surr	% Recovery	72.05	60.90	59.90	n/a	n/a	n/a	n/a	1.000	n/a
S9880000066			Decachlorobiphenyl Surr	% Recovery	91.42	62.47	53.45	n/a	n/a	n/a	n/a	1.000	n/a
S9880000068		B	Silver -ICP-Acid Digest-Liquid	ug/mL	100.0	<1.00e-02	<5.00e-02	<5.00e-2	n/a	n/a	n/a	5.00e-02	n/a
S9880000068		B	Arsenic -ICP-Acid Digest-Liq	ug/mL	101.4	<1.00e-01	<5.00e-01	<5.00e-1	n/a	n/a	n/a	5.00e-01	n/a
S9880000068		B	Barium -ICP-Acid Digest-Liquid	ug/mL	102.0	<5.00e-02	<2.50e-01	<2.50e-1	n/a	n/a	n/a	2.50e-01	n/a
S9880000068		B	Cadmium -ICP-Acid Digest-Liq	ug/mL	99.60	<5.00e-03	<2.50e-02	<2.50e-2	n/a	n/a	n/a	2.50e-02	n/a
S9880000068		B	Chromium -ICP-Acid Digest-Liq	ug/mL	97.80	<1.00e-02	<5.00e-02	<5.00e-2	n/a	n/a	n/a	5.00e-02	n/a
S9880000068		B	Lead -ICP-Acid Digest-Liquid	ug/mL	96.00	<1.00e-01	<5.00e-01	<5.00e-1	n/a	n/a	n/a	5.00e-01	n/a
S9880000068		B	Selenium -ICP-Acid Digest-Liq	ug/mL	94.80	<1.00e-01	<5.00e-01	<5.00e-1	n/a	n/a	n/a	5.00e-01	n/a

20-may-1998 14:41:16
A-0002-1

INTERIM

interim results 5/20/98
24-1(MAY 98)

CORE NUMBER: n/a
SEGMENT #: N/A

SEGMENT PORTION: CENTRIFUGED SOLIDS

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Comment
S98B000178			Dose Rate(samp prep)in mrad/hr	mrad/hour	n/a	2.50e-01	1.35e+02	2.050	68.53	0.97	n/a	1.00e-01	n/a
S98B000178		F	Fusion With KOH	g/L	n/a	2.50e-01	2.070	2.050	2.060	0.97	n/a	1.00e-05	n/a
S98B000178		F	Alpha of Digested Solid	uCi/g	90.56	<1.25e-01	3.02e-01	3.73e-01	3.38e-01	21.0	85.94	3.24e-01	9.65E+01
S98B000178		F	Beta of Solid Sample	uCi/g	100.0	4.760	7.62e+03	8.13e+03	7.88e+03	6.48	104.7	1.560	2.94E-01
S98B000178		F	Beta of Solid Sample	uCi/g	100.0	4.760	7.62e+03	8.13e+03	7.88e+03	6.48	104.7	1.560	2.94E-01
S98B000180		X	Archive aliq of sample/hotcell	g	n/a	n/a		n/a	n/a	n/a	n/a	n/a	n/a

INTERIM

Post-it™ Fax Note 7671	Date 5/18	# of pages ▶ 3
To Todd Blonk	From	
Co./Dept.	Co.	
Phone #	Phone #	
Fax # 373-0171	Fax #	

INTERIM

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S98B000169		D	Neodymium-ICP-Acid Dil.	ug/mL	94.80	<1.00e-01	< 40.10	<4.01e1	n/a	n/a	91.80	40.10	n/a
S98B000169		D	Nickel-ICP-Acid Dil.	ug/mL	98.80	<2.00e-02	< 8.020	<8.02e0	n/a	n/a	96.40	8.020	n/a
S98B000169		D	Phosphorus-ICP-Acid Dil.	ug/mL	102.2	<2.00e-01	7.82e+02	778.0	780.0	0.51	96.00	80.20	n/a
S98B000169		D	Lead-ICP-Acid Dil.	ug/mL	99.20	<1.00e-01	< 40.10	<4.01e1	n/a	n/a	104.0	40.10	n/a
S98B000169		D	Sulfur-ICP-Acid Dil.	ug/mL	100.8	<1.00e-01	< 40.10	<4.01e1	n/a	n/a	105.0	40.10	n/a
S98B000169		D	Antimony-ICP-Acid Dil.	ug/mL	96.80	<6.00e-02	< 24.10	<2.41e1	n/a	n/a	99.10	24.10	n/a
S98B000169		D	Selenium-ICP-Acid Dil.	ug/mL	93.40	<1.00e-01	< 40.10	<4.01e1	n/a	n/a	92.90	40.10	n/a
S98B000169		D	Silicon-ICP-Acid Dil.	ug/mL	96.80	<5.00e-02	55.60	55.70	55.65	0.18	102.0	20.10	n/a
S98B000169		D	Samarium-ICP-Acid Dil.	ug/mL	94.00	<1.00e-01	< 40.10	<4.01e1	n/a	n/a	91.70	40.10	n/a
S98B000169		D	Strontium-ICP-Acid Dil.	ug/mL	98.80	<1.00e-02	< 4.010	<4.01e0	n/a	n/a	95.60	4.010	n/a
S98B000169		D	Titanium-ICP-Acid Dil.	ug/mL	98.00	<1.00e-02	< 4.010	<4.01e0	n/a	n/a	n/a	4.010	n/a
S98B000169		D	Thallium-ICP-Acid Dil.	ug/mL	96.20	<2.00e-01	< 80.20	<8.02e1	n/a	n/a	91.20	80.20	n/a
S98B000169		D	Uranium-ICP-Acid Dil.	ug/mL	94.50	<5.00e-01	<2.00e+02	<2.00e2	n/a	n/a	94.80	200.0	n/a
S98B000169		D	Vanadium-ICP-Acid Dil.	ug/mL	101.8	<5.00e-02	< 20.10	<2.01e1	n/a	n/a	100.0	20.10	n/a
S98B000169		D	Zinc-ICP-Acid Dil.	ug/mL	103.2	<1.00e-02	10.70	11.10	10.90	3.67	104.0	4.010	n/a
S98B000169		D	Zirconium-ICP-Acid Dil.	ug/mL	99.00	<1.00e-02	5.910	6.050	5.980	2.34	96.80	4.010	n/a
S98B000169			Fluoride-IC-Dionex 4000/4500	ug/mL	92.88	<1.20e-02	13.33	<1.33e1	n/a	n/a	118.6	13.33	n/a
S98B000169			Chloride-IC-Dionex 4000/4500	ug/mL	93.12	<1.70e-02	3.11e+02	302.0	306.4	2.94	95.12	18.89	n/a
S98B000169			Nitrite-IC - Dionex 4000/4500	ug/mL	92.44	<1.08e-01	9.55e+03	9.63e+03	9.59e+03	0.83	106.8	120.0	n/a
S98B000169			Bromide by Ion Chromatograph	ug/mL	100.0	<1.25e-01	<1.39e+02	<1.39e2	n/a	n/a	100.2	138.9	n/a
S98B000169			Nitrate by IC-Dionex 4000/4500	ug/mL	100.8	<1.39e-01	9.54e+02	965.0	959.7	1.15	98.15	154.4	n/a
S98B000169			Phosphate-IC-Dionex 4000/4500	ug/mL	98.35	<1.20e-01	2.40e+03	2.43e+03	2.41e+03	1.24	95.78	133.3	n/a
S98B000169			Sulfate by IC-Dionex 4000/4500	ug/mL	98.73	<1.38e-01	<1.53e+02	<1.53e2	n/a	n/a	100.0	153.3	n/a
S98B000169			Oxalate-IC-Dionex 4000/450	ug/mL	96.24	<1.05e-01	1.68e+02	181.0	174.6	7.45	96.43	116.7	n/a
S98B000169			Cobalt-60 by GEA	uCi/mL	105.0	<7.30e-05	<8.30e-04	<8.69e-4	n/a	n/a	n/a	1.00e-03	n/a
S98B000169			Cesium-137 by GEA	uCi/mL	104.9	<1.28e-04	13.60	13.60	13.60	0.00	n/a	n/a	0.260
S98B000169			Am-241 by Extraction	uCi/mL	77.09	<3.87e-06	5.28e-05	5.41e-05	5.34e-05	2.43	n/a	6.93e-06	2.70E+00
S98B000183			Dose Rate(hotcell) in mrad/hr	mrad/hour	n/a	n/a	30.00	n/a	n/a	n/a	n/a	1.00e-01	n/a
S98B000183			Ammonia by ISE-Std Additions	ug/mL	92.52	<20.00	< 20.00	<20	n/a	n/a	92.00	1.00e-02	n/a
S98B000183			OH- by Pot. Titration	ug/mL	97.09	<5000.0	buffered	n/a	n/a	n/a	n/a	125.0	n/a
S98B000183			Amount of Sam/Present/hotcell	g	n/a	n/a	10.30	n/a	n/a	n/a	n/a	n/a	n/a
S98B000183			Specific Gravity	Spc.G.	99.79	n/a	1.153	1.189	1.171	3.07	n/a	1.00e-03	n/a
S98B000183			% Water by Gravimetric	%	95.96	n/a	81.00	80.80	80.90	0.25	n/a	1.00e-02	n/a
S98B000183			Uranium by Phosphorescence	ug/mL	98.24	1.50e-02	3.340	3.520	3.430	5.25	89.63	1.00e-03	3.40E+00
S98B000183			U-Phosphorescence Inst Error	% Inst Error	3.35	1.400	3.400	3.450	3.425	3.45	n/a	n/a	n/a
S98B000183			TIC by Acid/Coulometry	ug/mL	94.19	3.980	1.27e+02	124.0	125.5	2.39	98.00	5.000	n/a
S98B000183			TOC by Persulfate/Coulometry	ug/mL	93.67	4.100	1.66e+02	163.0	164.5	1.82	91.50	40.00	n/a

Whole Sample: Whole Sample

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S98B000168			Volume % Solids	%	n/a	n/a	5.300	n/a	n/a	n/a	n/a	n/a	n/a
S98B000168			Dose Rate in mrad/hour	mrad/hour	n/a	n/a	3.00e+04	n/a	n/a	n/a	n/a	1.00e-01	n/a
S98B000168			Seal Number		n/a	n/a	N/A	n/a	n/a	n/a	n/a	n/a	n/a
S98B000168			Etched Number on Vial		n/a	n/a	N/A	n/a	n/a	n/a	n/a	n/a	n/a
S98B000168			Appearance of Sample-Smpl Prep		n/a	n/a	OPAQUE	n/a	n/a	n/a	n/a	n/a	n/a
S98B000168			Amt of Sam/Present sample prep	mL	n/a	n/a	1.25e+02	n/a	n/a	n/a	n/a	n/a	n/a
S98B000168			Volume % Settled Solids	%	n/a	n/a	5.000	n/a	n/a	n/a	n/a	1.00e-01	n/a
S98B000168			Color of Sample		n/a	n/a	BROWN	n/a	n/a	n/a	n/a	n/a	n/a
S98B000168			Organic Vol Present/sampleprep	mL	n/a	n/a	0	n/a	n/a	n/a	n/a	n/a	n/a

INTERIM

interim results 5/20/98
24-1(MAY 98)

CORE NUMBER: n/a
SEGMENT #: n/a

SEGMENT PORTION: CENTRIFUGED SOLIDS

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S98B000177			Dose Rate(hotcell) in mrad/hr	mrad/hour	n/a	n/a		n/a	n/a	n/a	n/a	1.00e-01	n/a
S98B000177			Amount of Sam/Present/hotcell	g	n/a	n/a	4.501	n/a	n/a	n/a	n/a	n/a	n/a
S98B000182			Dose Rate(hotcell) in mrad/hr	mrad/hour	n/a	n/a		n/a	n/a	n/a	n/a	1.00e-01	n/a
S98B000182			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a		n/a	n/a	n/a	n/a	n/a	n/a
S98B000182			DSC Exotherm on Perkin Elmer	Joules/g	n/a	n/a		n/a	n/a	n/a	n/a	n/a	n/a
S98B000182			Amount of Sam/Present/hotcell	g	n/a	n/a	6.00e-01	n/a	n/a	n/a	n/a	n/a	n/a
S98B000182			% Water by TGA on Perkin Elmer	%	n/a	n/a		n/a	n/a	n/a	n/a	n/a	n/a

SUPERNATE: SUPERNATE

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S98B000181		X	Archive aliq of sample/hotcell	g	n/a	n/a	1.48e+02	n/a	n/a	n/a	n/a	n/a	n/a

Supernate: Supernate

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S98B000169			Dose Rate(hotcell) in mrad/hr	mrad/hour	n/a	n/a	45.00	n/a	n/a	n/a	n/a	1.00e-01	n/a
S98B000169			DSC Exotherm on Perkin Elmer	Joules/g	97.47	n/a	0.00e+00	0.00e+00	0.00e+00	0.00	n/a	n/a	n/a
S98B000169			pH Direct	pH	100.6	n/a	13.81	13.82	13.82	0.07	n/a	1.00e-02	n/a
S98B000169			Amount of Sam/Present/hotcell	g	n/a	n/a	16.80	n/a	n/a	n/a	n/a	n/a	n/a
S98B000169			Tot. Organic Carbon by Coul.	ug/mL	103.7	2.300	2.46e+02	244.0	245.0	0.82	95.60	20.00	n/a
S98B000169			Strontium-89/90 High Level	uCi/mL	109.%	<4.74e-04	2.560	2.550	2.555	0.39	n/a	1.00e-03	5.62E-01
S98B000169			Pu-239/240 by TRU-SPEC Resin	uCi/mL	115.2	<3.05e-06	1.09e-03	1.09e-03	1.09e-03	0.00	n/a	5.74e-05	1.53E+00
S98B000169		D	Silver-ICP-Acid Dil.	ug/mL	99.40	<1.00e-02	9.510	9.500	9.505	0.11	96.90	4.010	n/a
S98B000169		D	Aluminium-ICP-Acid Dil.	ug/mL	97.00	<5.00e-02	< 20.10	<2.01e1	n/a	n/a	100.0	20.10	n/a
S98B000169		D	Arsenic-ICP-Acid Dil.	ug/mL	101.6	<1.00e-01	< 40.10	<4.01e1	n/a	n/a	99.00	40.10	n/a
S98B000169		D	Boron-ICP-Acid Dil.	ug/mL	100.0	<5.00e-02	< 20.10	<2.01e1	n/a	n/a	96.60	20.10	n/a
S98B000169		D	Barium-ICP-Acid Dil.	ug/mL	95.60	<5.00e-02	< 20.10	<2.01e1	n/a	n/a	91.50	20.10	n/a
S98B000169		D	Beryllium-ICP-Acid Dil.	ug/mL	99.00	<5.00e-03	< 2.000	<2.00e0	n/a	n/a	95.80	2.000	n/a
S98B000169		D	Bismuth-ICP-Acid Dil.	ug/mL	99.20	<1.00e-01	< 40.10	<4.01e1	n/a	n/a	96.70	40.10	n/a
S98B000169		D	Calcium-ICP-Acid Dil.	ug/mL	102.2	<1.00e-01	< 40.10	<4.01e1	n/a	n/a	101.0	40.10	n/a
S98B000169		D	Cadmium-ICP-Acid Dil.	ug/mL	100.4	<5.00e-03	< 2.000	<2.00e0	n/a	n/a	98.90	2.000	n/a
S98B000169		D	Cerium-ICP-Acid Dil.	ug/mL	98.00	<1.00e-01	< 40.10	<4.01e1	n/a	n/a	95.70	40.10	n/a
S98B000169		D	Cobalt-ICP-Acid Dil.	ug/mL	103.0	<2.00e-02	< 8.020	<8.02e0	n/a	n/a	101.0	8.020	n/a
S98B000169		D	Chromium-ICP-Acid Dil.	ug/mL	97.40	<1.00e-02	< 4.010	<4.01e0	n/a	n/a	96.00	4.010	n/a
S98B000169		D	Copper-ICP-Acid Dil.	ug/mL	93.00	<1.00e-02	< 4.010	<4.01e0	n/a	n/a	90.40	4.010	n/a
S98B000169		D	Iron-ICP-Acid Dil.	ug/mL	97.00	<5.00e-02	< 20.10	<2.01e1	n/a	n/a	98.30	20.10	n/a
S98B000169		D	Potassium-ICP-Acid Dil.	ug/mL	100.0	<5.00e-01	<2.00e+02	<2.00e2	n/a	n/a	124.0	200.0	n/a
S98B000169		D	Lanthanum-ICP-Acid Dil.	ug/mL	97.40	<5.00e-02	< 20.10	<2.01e1	n/a	n/a	94.20	20.10	n/a
S98B000169		D	Lithium-ICP-Acid Dil.	ug/mL	95.00	<1.00e-02	< 4.010	<4.01e0	n/a	n/a	91.90	4.010	n/a
S98B000169		D	Magnesium-ICP-Acid Dil.	ug/mL	100.0	<1.00e-01	< 40.10	<4.01e1	n/a	n/a	98.00	40.10	n/a
S98B000169		D	Manganese-ICP-Acid Dil.	ug/mL	98.20	<1.00e-02	< 4.010	<4.01e0	n/a	n/a	94.90	4.010	n/a
S98B000169		D	Molybdenum-ICP-Acid Dil.	ug/mL	102.2	<5.00e-02	< 20.10	<2.01e1	n/a	n/a	98.20	20.10	n/a
S98B000169		D	Sodium-ICP-Acid Dil.	ug/mL	98.40	<1.00e-01	1.16e+05	1.15e+05	1.16e+05	0.87	-8.850e1	40.10	n/a

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August 7, 1998

Mr. Fen Simmons
Babcock & Wilcox Hanford Company
MSIN S6-51
Richland, WA 99352

Dear Mr. Simmons:

TEST RESULTS FOR AIL GAMMACAM

As you requested, I have completed radiation exposures intended to validate the response of the AIL GammaCam M31 gamma imaging system. The exposures were completed using ^{137}Cs and ^{60}Co sources that provided exposure rates over the range of 200 mR/h to 2,000 R/h. The conclusion is that the GammaCam results are dependent on the time per exposure and the number of exposure pairs. Too few exposure pairs resulted in an under response; too many exposure pairs resulted in an over response. The instrument also demonstrated a photon energy dependence. The results are summarized in the attached table. The files generated are on the GammaCam computer's hard drive.

Exposures were completed using both ^{137}Cs and ^{60}Co sources. Different exposure rates were achieved by varying the distance between the GammaCam and the source. In all cases, the exposure rate recorded was the true exposure rate at the front face of the GammaCam.

A representative from AIL reviewed preliminary data and recommended using a single exposure pair at the maximum exposure time to improve the accuracy of the result. This was attempted at an exposure rate of 200 mR. The maximum exposure time permitted before the CCD saturated was 10 seconds; the result was 52% less than the true exposure rate. Data collected at the same exposure rate but using a shorter exposure time (1 second) and more exposure pairs (20 pairs) resulted in an over response of 45%. The conclusion is that using a single exposure pair at the maximum permitted time does not improve the accuracy of the measurement at 200 mR/h.

After the exposures were complete AIL provided additional information on interpreting the GammaCam results ("GammaCam DOS Advanced Image Acquisition and Interpretation," 6/23/98, Attachment 2). The information provided included a recommendation that the signal to threshold ratio be at least 3:1 with a ratio of 10:1 desired for accurate dose calculations. The signal to threshold ratio for the exposures completed is provided in Attachment 1 and, in nearly all cases, exceed the recommended ratio of 10:1.

The "Advanced Image Acquisition and Interpretation" document included a correction that could be applied to improve the accuracy of the dose measurement. Applying the correction did not significantly improve the accuracy of the exposures completed for this study.

Please call if I can provide any additional assistance.

Sincerely,

Michelle Johnson

Michelle Johnson
Project Manager
Instrumentation Services
Radiation Protection Services

MLJ:jre

Attachments

Summary of AIL GammaCam Testing

GammaCam software version V1.0.9H1
GammaCam sensor head assembly SN 0026

Source Information

	Isotope	Activity	SN	Cal. Exp
Source 1	137Cs	10 Ci	318-040	12/31/98
Source 2	137Cs	100 Ci	318-044	12/31/98
Source 3	60Co	660 Ci	318-037	12/31/98
Source 4	60Co	5890 Ci	318-353	12/31/98

									Gamma Cam Response					
									Uncorrected			Corrected (note 4)		
File Name	Source	Isotope	True Distance (m)	True Rate (R/h)	Time/Exp (s)	Exp. Pairs	Focus (ft)	Signal to Threshold (note 4)	Dose (mrem)	Rate (rem/h)	Bias (note 2)	Rate (rem/h)	Bias	Comments
S1-1M	1	Cs-137	1	2.09	0.1	10	(note 1)	(note 1)	1.3	2.3	10%			
S2-1M	2	Cs-137	1	21	0.1	10	(note 1)	(note 1)	13.5	24.3	16%			
S3-2	3	Co-60	2.14	20	0.01	10	7.1	35 :1	1	18.9	-6%	18.95	-5%	
S4-4	4	Co-60	4.53	200	0.01	10	14.9	52 :1	11.6	208.8	4%	209.04	5%	
S1-3	1	Cs-137	3.214	0.2	1	10	10.56	46 :1	1.5	0.2771	39%	0.28	39%	
S2-3	2	Cs-137	3.215	2	0.1	10	10.62	46 :1	1.5	2.8	40%	2.80	40%	
S3-2	3	Co-60	2.145	20	0.1	10	7.06	35 :1	11.2	20.3	2%	20.35	2%	Same exposure rate: Cs-137 and Co-60
S2-1	2	Cs-137	1.024	20	0.1	10	3.37	27 :1	13.6	24.5	23%	24.61	23%	
CAL_AL	1	Cs-137	3.214	0.2	1	20	10.545	54 :1	3.2	0.2909	45%	0.29	46%	Same exposure rate; different time/exp and exp pairs
200MRS1	1	Cs-137	3.214	0.2	10 (note 3	1	10.56	7 :1	538.2	0.0968	-52%	0.10	-48%	
2RS2	2	Cs-137	3.215	2	1	2	10.56	10 :1	810.5	0.7294	-64%	0.75	-62%	
2RS2-1	2	Cs-137	3.215	2	1	1	10.56	5 :1	273.8	0.4929	-75%	0.57	-72%	

Notes

1. Not recorded and not available due to loss of file as a result of problems with the GammaCam commputer's 3.5 inch drive
2. The Bias is calculated as: (indicated dose rate - true exposure rate) / (true exposure rate)
3. 10 second exposure was the maximum allowed at 0.2 R/h before CCD saturation.
4. The signal to threshold and corrected rate calculated per AIL "GammaCam DOS Advanced Image Acquisition and Interpetation," 6/23/98.

Attachment 2

Page 1 of 9

GammaCam™ DOS
Advanced Image Acquisition and Interpretation ©

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6/23/98

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Effects of Signal to Threshold
Determining Exposure Duration and Number of Iterations
Importance of Range
Dealing with Source Spot Overlap
Temperature Requirements
Discussion of Source Distribution
Discussion of Scene Interpretation
Other Tips

Assumptions

This discussion assumes the following:

1. Isotope calibration file selected and calibrated to the correct isotope.
2. Isotope calibration file with "sigma" set to value of 4.
3. On "Run" dialog: "Sat Pix Lim"=1000, "Filt Low (STD)"=(-5), "Filt Hi (STD)"=5, Autothresh = 5.
4. Single point source.
5. Sensor head and sources are not experiencing motion, like shaking.
6. User specified range must be accurate to within 10% or 5%.
7. Sensor head temperature must remain constant during each exposure pair.

Effects of Signal to Threshold

In general, the higher the signal to threshold collected the better. The signal to threshold (S/Th) can be determined as follows: When looking at the gamma overlaid image, the number at the top of the color bar is divided by the number at the bottom of the color bar and the absolute value is taken of the result, then ":1" is added as a suffix. Typically for visual inspection, a S/Th of 3:1 is considered a minimum to eliminate false targets in the image due to noise (although partial coding and wrap around could still appear). But the dose calculations are more influenced by the S/Th, and thus a minimum of 10:1 is desired (if achievable).

For demonstration, the following ideal table indicates the resulting percent systematic error drop on dose for various signal to thresholds:

S/Th	% Error
2	60
3	33
4	24
5	14
7	7.5
9	5.5
14	3
20	1.7

In practice, for more accuracy you should apply the following formula to all displayed "Integrated Dose" and "Dose Rate" values:

Dose' = Dose * k

Where k = [a1/(S/Th)^4] + [a2/(S/Th)^2] + a3
a1 = 10.986898379
a2 = 3.067489403
a3 = 1.0

Thus if an image has S/Th = 4.03/2.8 = 1.4, and indicates a dose rate of 7.7 mR/hr, then a more accurate dose rate is 7.7 * ([11/(1.4)^4] + [3/(1.4)^2] + 1) = 7.7 * (2.86 + 1.53 + 1) = 42 mR/hr.

Remember, although apparently good looking images can appear early during capture (which are immediately useful for locating the hottest sources), obtaining the proper signal to threshold is necessary to deduce more accurate dose, and to raise additional sources (that are of lower intensity than the peak source) out of the noise. Although we can correct for the aforementioned systematic error (accuracy) as shown, there is also random error (precision) which can only be minimized by increasing the S/Th.

Tip: Sometimes it can be recognized that more exposure is needed by noticing the lack of, or poorly defined green and blue rings about the red centers of hot spots within the image.

Determining Exposure Duration and Number of Iterations

In an ideal world, we would prefer to open the shutter and collect continuously until we obtained the desired signal to threshold to get accurate pictures and calculated dose. In practice, each pixel of the gamma camera can only absorb a limited amount of radiation before it will be pinned to its maximum value (saturate) and any further exposure data will be lost. If too many pixels saturate, the image will become unusable. Saturation can occur for both low level and strong sources (as perceived at the sensor head).

Low level sources exhibit an instantaneous radiation at the sensor head that is near or below the ambient radiation level. For these sources, the shutter must remain open for a long period collect the minimum of 1uR at the sensor to raise its signal away from the noise. Empirically, a normal radiation background of ~20uR often saturates an exposure after 5 minutes. Thus to affect a longer total exposure, a number of exposures each less than 5 minutes may be summed (integrated) together, as is accomplished via the Bulb mode or via the Normal mode set with Exposures greater than one. The trade off is longer total elapsed imaging time due to mechanical and processing overhead of each iteration, and a small amount of processing noise being introduced with each iteration. Therefore, it is desired to maximize the per exposure duration and to iterate/sum until the either the best signal to threshold is achieved (for Bulb mode) or the desired total exposure time is achieved (for Normal mode).

For high level sources, iteration is not necessary where instead a single exposure pair is all that may be required. The shutter's exposure duration (which would equal the total exposure duration) should again be maximized short of saturation. For these hot sources, we may wish to integrate anyway in order to increase the S/Th further to raise additional sources that are of lower level than the peak source in the Field of View. Ideally, the signal to threshold will grow in proportion to the square root of the number of iterations. So if a test shot using a single exposure pair results in a S/Th = 2:1, and the desired S/Th = 10:1, then calculate the number of necessary exposures to integrate as (10/2)^2 = 25. (check 10 = 2 * sqrt(n), where n = 25). The formula is:
Number_of_exposures_needed = ([S/Th_Desired] / [S/Th_Measured]) ^ 2.

To determine maximum exposure time setting that avoids saturation, perform the following:

For a source expected to be detected at the sensor near ambient radiation levels: Take a Normal mode test shot for one exposure pair and 30 seconds. If 30 seconds saturates, retry with lower times until successful. Analyze the Raw

Gamma shadow (EXPERT->ANALYZ->RAW) to get the peak count from the 'max' statistic under the color bar. Divide this number by 2 (because it is from an exposure *pair*). Divide this count by 2^16 (=65536) to determine how close to saturation the corresponding set of averaged over-sampled CCD pixels are. The result is a ratio of saturation of the pixels. Divide the shot exposure time by this ratio, then discount it by 20% (as a safety margin) to determine the exposure time setting to use with Bulb mode. If this number of seconds exceeds 300 (=5 minutes) then limit exposure time to 300 seconds. Use Bulb mode (which has a 20 second minimum per exposure) to collect until the desired S/Th is achieved. If an exposure time of less than 20 seconds was determined, you will not have a reasonable S/Th to determine the number of exposures so you'll have to guess at a number of exposures and use Normal mode. As an example, a 30 second shot is taken which results in a raw max value of 220, then

220/2 = 110 counts per exposure,
110/65536 = 1.7e-3 (that is 0.0017 ratio, or 0.17% saturation)
30/0.0017 = 17873 seconds
17873 * 0.80 = 14299 seconds (which is > 300 seconds)
So use 300 seconds and iterate.
Being greater than 20 seconds, use Bulb mode since it is more flexible than Normal mode.

Note that this example is based upon a real experience. In this case the image identified the location of the hot spot within one minute, but in order to improve dose and attempt to raise other sources more collection should be performed.

For a source expected to be detected strong at the sensor head: Take a Normal mode test shot using 10 msec (the minimum allowed) exposure time. Analyze the raw gamma shadow like for the low level source case, and perform a Normal mode acquire using the resulting exposure time setting for any desired number of iterations. If this exposure time is greater than 20 seconds, then the Bulb mode may be utilized. As an example, a 50 millisecond shot is taken which results in a raw max value of 8.54e3:

8540/2 = 4270 counts per exposure
4270/65536 = 0.065 (that is 6.5% saturation)
0.05/0.065 = 0.77 seconds
0.77 * 0.80 = 0.61 seconds (which is <20 sec, so must use Normal mode, and choose some number of iterations)

Remember, Bulb mode allows viewing the growth of source detection indefinitely until user intervention. Unfortunately, Normal mode does not show results until all specified iterations are completed, and user interruption forsakes any and all collected data.

It must be noted that the characteristic growth of the S/Th over some number of iterations experiences a curve that might be unsettling to the observer. In general, the growth is proportional to the square root of the number of iterations (quick growth at first tapering off to progressively slower growth that eventually

effectively flattens out) with non-linearity's at the extremes. This curve is modulated due to many factors though (random error identified above), which cause fluctuations along this path, and make it appear to the user at times that additional iterations are causing the S/Th to reduce rather than grow. Given additional iterations, the S/Th will resume growth until, eventually the upper end non-linear region is entered.

Importance of Range

The user specified range (estimated distance between the radiation source to the sensor head) can have dramatic effects on the image and the reported dose. The user specifies range on the Run dialog where it is applied to the entire field of view, as well as to specific color spots of the gamma overlaid image during Region/Distance Dose Analysis.

Dose Error Factor = (Specified_Range / Actual_Range) ^ 2

Examples:

Actual Range	Specified Range	Range Ratio	Dose Error Factor	Reported Dose
5'	3'	0.6	0.36	36% of actual
5'	4'	0.8	0.64	64% of actual
5'	5'	1	1	No error
5'	6'	1.2	1.44	44% too high
5'	7'	1.4	1.96	2x too high
5'	10'	2	4	4x too high
25'	20'	0.8	0.64	64% of actual
25'	23'	0.92	0.85	85% of actual
25'	24'	0.96	0.92	92% of actual
25'	25'	1	1	No error
25'	26'	1.04	1.08	8% too high
25'	30'	1.2	1.44	44% too high
25'	50'	2	4	4x too high
100'	90'	0.9	0.81	81% of actual
100'	95'	0.95	0.9	90% of actual
100'	100'	1	1	No error
100'	105'	1.05	1.10	10% too high
100'	110'	1.1	1.21	21% too high

As the Range Ratio diverges from unity, the quality of the reported dose quickly and dramatically degrades. Therefore, as a rule of thumb, every attempt should be made to measure or estimate the range to within 5% (yielding max 11% error in dose) or 10% (yielding max 23% error in dose).

In addition, it has been observed that when the specified range is short (< 5 ft) and the actual sources are further away (> 10 ft) the ability to generate a gamma overlaid image degrades until no image can be obtained at all. The reverse is not true, so specifying a too far range will not prevent image acquisition.

Dealing with Source Spot Overlap

Region/Distance Dose analysis is used to determine dose readings for each specific spot in the image. Each spot requires a specific range applied to it. A problem exists when multiple source's color spots bleed into one another. They can not then be isolated from each other so that different ranges can be applied. The only way to deal with this is to attempt to obtain another image that does not have these overlaps, perhaps at the expense of obtaining the highest signal to threshold as possible. This can be done by reducing total exposure time.

Temperature Requirements

When setting up for image acquisition, the sensor head's CCD is to be allowed to cool until it has reached a steady state temperature. It is expected that this temperature will be below the factory set nominal temperature (around –15° Celsius) which is built into each sensor head. This can be observed with the CCDTMP button. Imaging may proceed under conditions where CCD temperature cannot get below the nominal temperature. This situation can still produce images, but at the expense of lengthening the required total exposure times. But even then, the CCD temperature must be relatively steady during each exposure pair. Rapid CCD temperature changes during a shutter pair sequence will cause erroneous results. The CCD can experience slow temperature fluctuations over longer periods of time without introducing problems. Imaging is not recommended for CCD temperatures above –5° Celsius due to its effect on results, but there is no danger of damaging the equipment if used at higher temperatures.

Discussion of Source Distribution

The algorithms employed are optimized for a single point source within the field of view. Other distributions are found in practice, and have effects on the imaging results.

The multiple point sources distribution can result in multiple color spots in the image when their intensity at the sensor head are similar in magnitude. Recall that the color bar is scaled from the calculated threshold to the peak value. This may cause additional sources that are below threshold to not appear in the image. To discover these, you can attempt to take additional shots with the sensor (1) aimed to avoid the previously discovered hottest sources, or (2) by placing shielding between the sensor and prior discovered sources.

Another effect of multiple point sources is to raise the calculated threshold (whose algorithm is calibrated for a single point source) which causes the reported dose to come out lower than it should be. Further compounding this situation, when the point sources overlap above threshold, the overlapped pixels contribute to the integration only once and splotch centroid placement and weighting are affected, all causing additional reductions in calculated dose during Distance/Region Dose Analysis.

The extended sources distribution can be rod or sheet or some other three dimensional entity that is hot. Recognize that all points of the object are detected at the sensor head with intensity that is a function of its strength and distance. The hottest point(s) as detected at the sensor head will appear as red, with the rest of the object falling off to blue and maybe even below threshold. Thus the entire object may not *appear* hot from the picture.

Extended sources will cause the algorithms to report dose higher that it should be.

As a final word, many tightly packed point sources might appear to be a single point source, or even an extended source.

Discussion of Scene Interpretation

The scene should be studied to interpret all acquired images.

If a color spot appears on an object or container of some length, the orientation of the object must be considered. For instance, if an exhaust tube enters a scene and recedes into the distance, and it has a color spot about halfway down its length, we should not conclude that there is one source right at that location in the scene. We must realize that the rest of the tube can be hot as well. All we can conclude is that no source closer to the sensor head is of higher intensity than the displayed spot. Also, sources that may be more distant down the tube may be of higher intensity, but are not hot enough to be detected at the sensor head as hotter than the identified spot. There may be additional sources in the field of view not even associated with the tube.

Sources may have a shielding obstacle between it and the sensor preventing it from being seen as the hottest point in the scene. In this case, it must be considered that the sensor is a directional receiver and that the source is a directional transmitter and they are not aimed at each other. Yet the source is still out there. The operator should be sensitive to make note of such potential conditions by identifying shielding objects within the field of view. Additional shots from different vantages may be determined as necessary.

Another situation to keep in mind is that radiation may be at the surface of an apparent object within the scene, or possibly penetrating from within, or even

from behind the apparent object. Operator knowledge of the environment should be applied to determine which is the actual condition. This is important when specifying the range to compute an accurate dose. Once again, additional shots from different vantages may be determined as necessary.

Characteristics of this system allow an anomaly of partial coding. Partial coding is effectively phantom sources that are not real at the locations shown, but are real sources that are just outside of the field of view. Sometimes recognizing phantom spots are obvious. For instance, consider a shot that shows a cement wall that occupies the left side of the field of view with a hot spot on it, and the rest of the scene shows lots of potentially hot equipment even to the right of the field of view boarder. This likely indicates that the hot spot is really just outside the right boarder of the field of view on the equipment rather than on the wall. Under less obvious conditions, like potentially hot equipment filling and outside of the entire field of view, again, additional shots from different vantages may be determined as necessary. Phantom spots will not be consistent between shots, while real sources will reinforce their location on scene objects.

Similarly, wrap-around is when a source is so close to one of the field of view boarders that it wraps to the other side of the field of view. For example, a hot valve at the top of the field of view shows a spot that is cut off by the yellow box, and the rest of the spot wraps to enter from the bottom of the yellow box where there is no real source. Wrap around is fairly obvious.

The operator must analyze the scene, consider vantage, and apply knowledge of radiological properties to fully appreciate what insights each image can and can't reveal or prove.

Other Tips

It is always to your advantage to take several shots from several vantages of the same location. This helps resolve issues related to vantage, partial coding, obscured sources (shielding causing directionality of shine), and reveal the true range of potentially obscured sources.

Narrow field of view has inherently more accurate spatial placement of hot spots than Wide. This is because calibration co-aligns the boresights of the video and gamma camera using Narrow. When highly precise object placement is desired, first take a wide field of view image of an area to locate hot objects of interest, then take additional narrow shots centered on these hot spots.

B&W Hanford Co.
a McDermott Company

To

End Point Closure File/ DP 401

From

S. E. Killoy, Team Coordinator
B Plant Canyon D&D

File No.
Or Ref.: 16D00-98-SEK-041

Subj

CLOSEOUT OF END POINTS 04.02.01 AND 04.02.02

Date: July 16, 1998

Scope

B Plant is being deactivated in accordance with end points in B Plant End Points Document, WHC-SD-WM-TPP-054. This letter documents activities performed to support closure of Cell 4 end points, as defined in deactivation Definition Package DP-401 for the 221-B Canyon. The end points are:

1) 04.02.01, "Provide complete waste descriptions (ref. EPTI #7)" and

2) 04.02.02, "Complete waste container inventories (ref. EPTI #7)."

General Information

A video inspection of Cell 4 was completed in support of closure of the following endpoints to inspect the condition of the containers located in Cell 4 storage, and to demonstrate the gas cylinder, that was located in the north east corner of the Cell, has been removed from Cell 4. The Cell 4 video will be provided to the deactivation file for turnover to BHI.

Endpoint 04.02.01 "Provide complete waste descriptions (ref. EPTI #7)."

The Cell 4 containerized waste storage unit is used for the storage of 55-gallon (208-liter) containers of mixed and/or highly radioactive dry waste. Mixed waste stored in Cell 4 consists of light bulbs with lead solder ends. The highly radioactive waste managed in the Cell 4 containerized storage unit is generated as a result of processing operations and maintenance activities in the WESF hot cells.

Cell 4 is approximately 8 meters (27.5 feet) long, 4 meters (13 feet) wide, and 6 meters (20 feet) deep. The maximum container storage process design capacity is 13,475 gallons (51,008 liters). The waste containers stored in Cell 4 are standard 210 liter (55 gallon), DOT 17C steel drums with 15 mil polyethylene liners.

The waste, which has accumulated in the WESF hot cells, is packaged in hot cell "A." The waste is visually inspected prior to being placed in the drums. Only dry solid waste is approved for placement in the drums.

All waste from the WESF hot cells is highly radioactive due to SrF_2 and CsCl contamination. Since the waste being stored is dry, no incompatibility problems with the steel drums are expected. Waste Drum Loading Data Sheets are filled out each time a container is packaged. This sheet lists the material that is being placed in the drums. WESF waste drum packaging is performed under an approved plant operating procedure.

Placement of drums into Cell 4 followed procedure BO-025-020, "Store WESF Waste Drums in Cell 4." Attachment 1 provides a summary inventory of the waste drums in Cell 4 and a schematic indicating drum location.

Waste designations for waste being stored in Cell 4 are based on process knowledge, and are permitted for storage in Cell 4 as described in Hanford Facility Dangerous Waste Part A Permit Application, Form 3, for the B Plant Complex, Revision 4 (WA7890008967).

Endpoint 04.02.02 "Complete waste container inventories (ref. EPTI #7)."

Cell 4 contains 43 drums. Attachment 2 provides inventory data sheets for each drum stored in Cell 4. No additional drums will be added to Cell 4 for storage. Attachment 3 provides EPTI #7.

sek/sah

Attachment

Distribution
SEK File/LB

EPTI #7

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
1315 W. 4th Avenue • Kennewick, Washington 99336-6018 • (509) 735-7581

March 7, 1996

Mr. Rick Gonzalez
U.S. Department of Energy
P.O. Box 555
Richland, WA 99352

Mr. Steve Godfrey
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352

Dear Messrs. Gonzalez and Godfrey:

Re: B-Plant Transition Activities

During the B-Plant Transition technical review meeting on February 29, 1996, the U.S. Department of Energy (USDOE) and Westinghouse Hanford Company (WHC) staff asked the Washington State Department of Ecology (Ecology) to respond to four issues presented thus far by USDOE and WHC relating to B-Plant transition: Containerized Cell 4 Waste, Listed Waste, Tank Management, and Compliance Assessment. This letter provides Ecology's response.

Containerized Cell 4 Waste: USDOE/WHC has proposed leaving highly radioactive and mixed waste containers in Cell 4 until the facility disposition phase. (Reference: February 22, 1996, meeting handout.)

Ecology concurs with USDOE/WHC's proposal provided (1) waste/container inventories are complete and accurate, and (2) complete waste descriptions, associated hazards, and end-point criteria are described within the B-Plant end-point criteria document, surveillance and maintenance plan, and pre-closure workplan. Cell 4 has interim status for storing such waste, as identified in the B-Plant Complex Part A, dated November 22, 1995, and can continue to accept waste from the Waste Encapsulation Storage Facility. Milestones will be needed for submittal of the end-point criteria document, surveillance and maintenance plan, and pre-closure workplan.

Listed Waste: On November 22, 1995, USDOE/WHC modified the B-Plant Complex Part A, Form 3, to include listed waste codes that apply to B-Plant waste. USDOE/WHC has proposed

an approach for managing B-Plant Canyon Waste Streams to meet regulatory requirements for listed waste classification/designation. (Reference: February 8, 1996, meeting handout.)

Ecology concurs with USDOE/WHC's approach for managing liquid waste, organic solvent waste, solid waste, and contaminated equipment, as it relates to listed waste classification/designation. No further permitting action is required at this time with regard to listed waste.

USDOE/WHC's presentation on managing the organic solvent waste included plans for removing the waste to a compliant storage outside the B-Plant Canyon. (Milestone M-32-07-T05 requires disposition of the waste to an offsite disposal facility or compliant interim storage by June 1996.) Ecology is concerned with long-term plans for interim storage outside the B-Plant Canyon when active treatment, storage, and/or disposal (TSD) management is not in B-Plant's future. Ecology requests USDOE/WHC present options for managing this waste elsewhere at Hanford, e.g., at a location where radioactive liquid waste is already being stored or where TSD facility requirements are already in place. Ecology would like to work with USDOE/WHC in developing alternative ideas for management of this waste stream.

Tank Management: USDOE/WHC has proposed guidelines for tank management, including assumptions influencing vessel disposition, and a table of vessel categories and recommendations. (Reference: February 29, 1996, meeting handout.)

Although several critical tank management issues have yet to be discussed in sufficient detail, e.g., adequacy of process knowledge or sample collection/analytical requirements, Ecology concurs thus far with USDOE/WHC's assumptions, as identified in the February 29, 1996, handout. Ecology also concurs with USDOE/WHC's table of vessel categories and recommendations with the following exceptions/clarifications:

- Category C and D: The applicable date for applying mixed waste regulation via RCRA is August 1987.
- Category F: Other process vessels outside the canyon may require RCRA permitting. Determination needs to be based on process knowledge, sample results, vessel status, etc.

USDOE/WHC also presented an idea of puncturing canyon tanks as a means of removing the liquid wastes inside. Ecology encourages innovative thinking and supports this concept; however, additional technical discussions regarding drain system integrity, compatibility, etc., are needed.

Compliance Assessment: Ecology performed a compliance assessment of B-Plant on February 28, 1996. The report is being developed and a response letter is forthcoming. Ecology's goal is to identify, clarify, and resolve interim status compliance issues within the assessment framework, e.g., requirements for labeling, inspection, secondary containment.

I hope this letter helps to clarify Ecology's position on the aforementioned issues. I have been very pleased with communication on this project, and hope to continue in a positive way. Please feel free to contact me at (509) 736-3024 if you have any questions about this letter.

Sincerely,

Laura Russell
B-Area Project Manager
Nuclear Waste Program

LR:mf

cc: Dave Evans, USDOE
Paul Krupin, USDOE
Jim Mecca, USDOE
Chris Midgett, WHC

16D00-98-SEK-041

ATTACHMENT 1

LETTER 16D00-98-SEK-045, "CELL 4 MIXED WASTE INVENTORY"

B&W Hanford Co.
a McDermott Company

To: End Point Closure File/ DP 401

From: S. E. Killoy, Team Coordinator
B Plant Canyon D&D

File No. Or Ref.: 16D00-98-SEK-045

Subj: CELL 4 MIXED WASTE INVENTORY

Date: July 16, 1998

This letter provides a summary inventory of the mixed waste drums stored in the B Plant Cell 4 Container Storage Unit.

Cell 4 contains 43 drums of which 7 contain mixed waste as designated in accordance with the dangerous waste regulations contained in Washington Administrative Code (WAC) 173-303. Those seven drums, which are identified specifically in attachment 1, are managed as mixed waste as they carry a D008 characteristic waste code due to the lead solder on LucaLox light bulbs contained in the containers.

sek

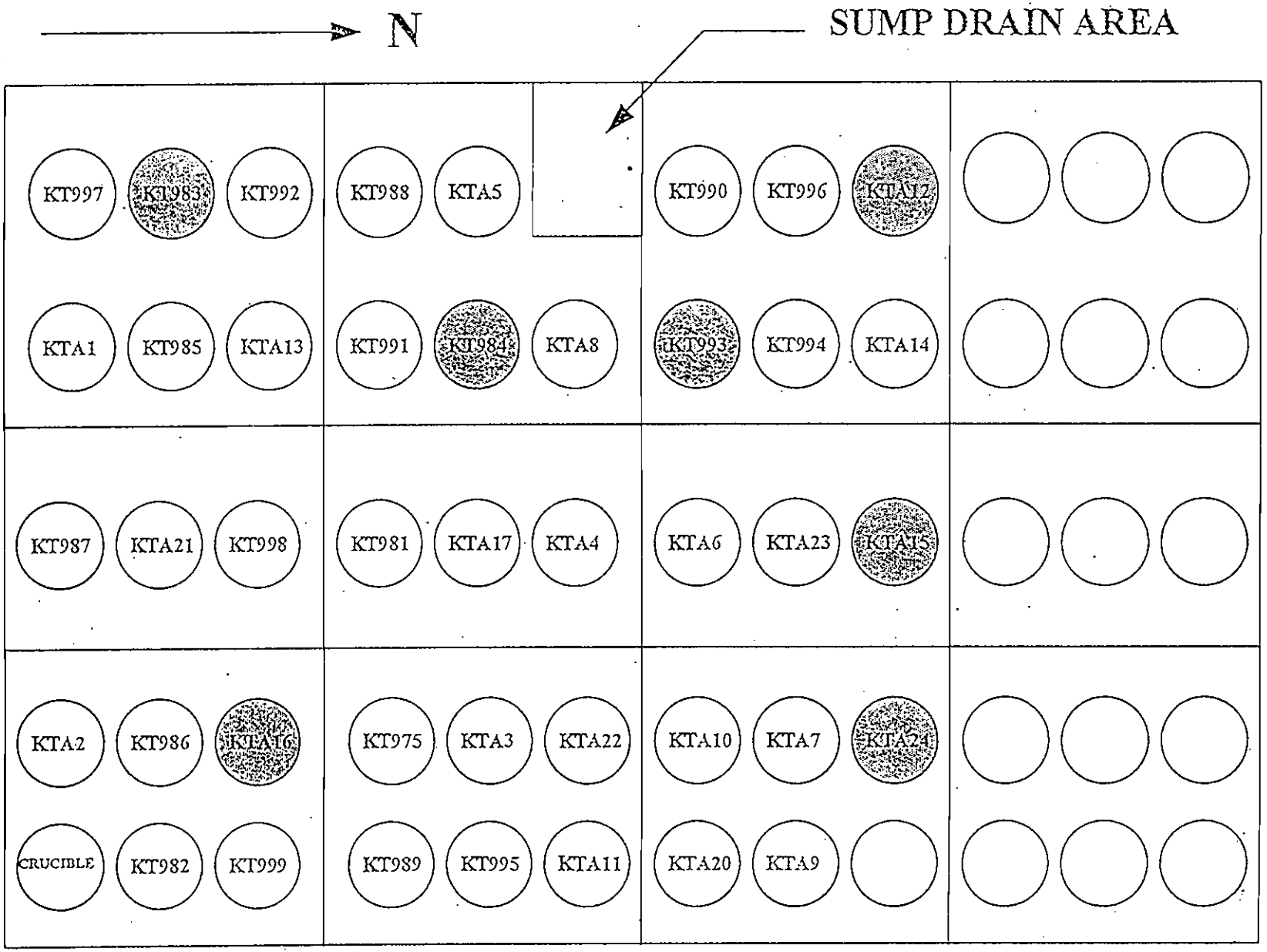
Attachments (2)

Distribution
SEK File/lb

Complete Cell 4 Container Inventory Information

Drum Number	Total Weight (lbs.)	Container Weight (lbs)	Waste Weight (lbs)	LLW or MW?
KT-975	143	77	66	LLW
KT-981	183	77	106	LLW
KT-982	172	77	95	LLW
KT-983	200	77	123	MW
KT-984	177	77	100	MW
KT-985	111	77	34	LLW
KT-986	237	77	160	LLW
KT-987	197	77	120	LLW
KT-988	177	77	100	LLW
KT-989	121	77	44	LLW
KT-990	207	77	130	LLW
KT-991	217	77	140	LLW
KT-992	272	77	195	LLW
KT-993	166	77	89	MW
KT-994	149	77	72	LLW
KT-995	177	77	100	LLW
KT-996	197	77	120	LLW
KT-997	197	77	120	LLW
KT-998	212	77	135	LLW
KT-999	172	77	95	LLW
KT-A1	162	77	85	LLW
KT-A2	212	77	135	LLW
KT-A3	107	77	30	LLW
KT-A4	172	77	95	LLW
KT-A5	187	77	110	LLW
KT-A6	177	77	100	LLW
KT-A7	259	77	182	LLW
KT-A10	192	77	115	LLW
KT-A11	160	77	83	LLW
KT-A12	234	77	157	MW
KT-A14	192	77	115	LLW
KT-A15	167	77	90	MW
KT-A20	133	77	56	LLW
KT-A24	114.5	77	37.5	MW
KT-A16**	123	77	46	MW
KT-A21	112	77	35	LLW
KT-A22	119	77	42	LLW
KT-A17	173	77	96	LLW
KT-A8	207	77	130	LLW
CRUCIBLE***				LLW
KT-A9	177	77	100	LLW
KT-A13	160	77	83	LLW
KT-A23	112	77	35	LLW
Total (lbs.)	7335.5	3234	4101.5	
Total (kg)	3327	1467	1860	

*See accompanying diagram for cell positions
**Weight not provided on inventory, estimate based on Letter 16500-94-059-KAJ
*** Weight unknown


N
SUMP DRAIN AREA
KT997
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KTA23
KTA15
KTA2
KT986
KTA16
KT975
KTA3
KTA22
KTA10
KTA7
KTA24
CRUCIBLE
KT982
KT999
KT989
KT995
KTA11
KTA20
KTA9
MIXED WASTE DRUMS
CELL 4
Current
9/19/97

Inventory of Mixed Waste Drums in Cell 4 Container Storage TSD Unit

Drum Number	Total Weight (lbs.)	Container Weight (lbs)	Waste Weight (lbs)	Description of Regulated Constituent	Approximate Weight of Regulated Constituent (grams)
KT-984	177	77	100	lead solder on light bulb	11.3
KT-993	166	77	89	lead solder on light bulb	11.3
KT-A12	234	77	157	lead solder on light bulb	11.3
KT-A15	167	77	90	lead solder on light bulb	11.3
KT-983	200	77	123	lead solder on light bulb	11.3
KT-A24	114.5	77	37.5	lead solder on light bulb	11.3
KT-A16	123	77	46	lead solder on light bulb	11.3
Total (lbs.)	1181.5	539	642.5		
Total (kg)	536	244	291		0.0791

Approximate weight of lead solder on each light bulb is based on information obtained from vendor in a telephone conservation with M. M. Serkowski of B Plant/WESF Regulatory Compliance

Calculations assume only one light bulb per mixed waste drum as determined from the individual inventory sheets completed at the time of packaging

The entire contents of each drum are managed as mixed waste since segregation did not occur at packaging.

Meeting Minutes

B Plant Project Managers Meeting
Ecology Office - Kennewick
May 11, 1998
7:00 a.m.

The undersigned indicate, by their signatures, that these meeting minutes reflect the actual occurrences of the above-dated meeting.

_____ Date: 18 JUN '98
Gregory J. LeBaron, B Plant Contractor Representative, BWHC

David T. Evans Date: 6/5/98
David T. Evans, Project Manager, DOE-RL

_____ Date: 6/18/98
Ted A. Wooley, Project Manager, Washington State Department of Ecology

_____ Date: 6/18/98
George W. Reddick, PHMC Representative, FDH

DID NOT ATTEND—NO SIGNATURE REQUIRED

_____ Date: _____
Cindy Grant, WDOH Representative

Agenda: The agenda for the May 11, 1998 meeting included the following B Plant Facility Transition topics:

1) Approve Minutes from Previous Project Managers Meeting
2) Formalize the agreement on placing Tk-100 in the B Plant Canyon
3) Formalize the agreement on towers 28 and 30
4) Other items
5) Next meeting June 18, 1998, at 8:00 a.m. in the Ecology Building

DISTRIBUTION:

R. M. Carosino	RL	A4-52*
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S. D. Godfrey	BWHC	S4-49
R. W. Bailey	BWHC	S4-49*
A. M. Hopkins	FDH	N1-26*
M. N. Jaraysi	Ecology	B5-18*
G. J. LeBaron	BWHC	S6-15*
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M. D. Olsen	BWHC	H5-31*
G. W. Reddick	FDH	N1-26
C. D. Sorensen	BWHC	R3-56*
T. A. Wooley	Ecology	B5-18

*Distribution via cc:mail w/o Attachments

ADMINISTRATIVE RECORD [B Plant TS-2-3]: EDMC H6-08

Washington State Department of Ecology Nuclear and Mixed Waste Hanford Files, P.O. Box 47600, Olympia, Washington 98504-7600

Environmental Protection Agency Region 10, Seattle, Washington 98101, Mail Stop HW-070 (Records Center)

Cindy Grant, Washington State Department of Health, 1511 3rd Avenue, Suite 700, Seattle, Washington 98101

Please send comments on the distribution list to Greg LeBaron, BWHC (S6-15), (509) 373-1792 or Steve Godfrey, BWHC (S4-49), (509) 372-0501.

B Plant Project Managers Meeting
Ecology Office - Kennewick
May 11, 1998
7:00 a.m.

SUMMARY OF DISCUSSION AND COMMITMENTS/AGREEMENTS

Approve Minutes from Previous Project Manager Meeting

Mr. Ted Wooley, Washington State Department of Ecology (Ecology); Mr. Dave Evans, Department of Energy, Richland Operations Office (RL); Mr. George Reddick, Fluor Daniel Hanford, Inc. (FDH); and Mr. Greg LeBaron, B&W Hanford Company (BWHC) approved and signed the meeting minutes from the April 16, 1998, B Plant Project Managers Meeting. The minutes were sent out, prior to the meeting, for review and all corrections were incorporated, prior to approval.

Formalize the Agreement on Placing Tk-100 in the B Plant Canyon

It was agreed to place Tk-100 in the B Plant canyon and to do the following:

- Revise the B Plant Part A to include Tk-100
- Revise the Preclosure Work Plan and other documents as needed to reflect this change
- Perform a USQ screening to ensure the increased radiological and chemical inventory added by placing the tank in the canyon is covered in the B Plant BIO.

Formalize the Agreement on Towers 28 and 30

In the previous Project Manager Meeting, the condition concerning the liquid levels in towers 28 and 30 and the difficulty in obtaining a sample to meet the Sample and Analysis Plan (SAP) was discussed. It was agreed that B&W would submit a plan to address the situation **(Action PMM-BP-98-17)**. The plan, "Remaining Liquid in Vessels T-28-1 and T-30-1" (attachment 1), completes this action and identifies what will be done concerning the commitment in the SAP. Agreement of these meeting minutes constitutes agreement to the plan of how to address the commitment in the SAP.

Other Items

The Focus Sheet required to initiate the public comment period on the administrative closure of the ISO west tank was discussed. Mr. Wooley agreed to review and comment on the Focus Sheet before leaving on vacation. Ms. Mattlin will work with Mike Turner of Ecology to initiate the public comment period.

The action items were not statused. Those present addressed items associated with WESF and the Low Level Waste (LLW) project.

The B Plant/WESF Project, HNF-2698, Rev. 0, Sampling and Analysis Plan (SAP) for WESF Drains and TK-100 Sump was discussed. Comments were incorporated into the plan and the SAP was approved for implementation (attachment 2).

Next Meeting

The next meeting will be June 18, at 8:00 a.m. in the Ecology Building as identified in the previous meeting.

OPEN OR RECENTLY CLOSED ACTION ITEMS

Action Item	Responsible Person	Description	Completion Date
PMM-BP-97-12	Steve Godfrey BWHC	Address and resolve issue of insufficient information to adequately identify remaining hazards on B Plant End Point Closure letters.	OPEN
PMM-BP-98-3	Ted Wooley Ecology	Evaluate need for PE stamp for administrative closure of the ISO West Organic Storage Tank	CLOSED 4/98
PMM-BP-98-9	Steve Godfrey BWHC	Place a copy of the End Point Document in the administrative record	CLOSED 3/98
PMM-BP-98-11	Ted Wooley ECOLOGY	Provide comments on Administrative Closure Plan by 4/15/98.	CLOSED 4/98
PMM-BP-98-12	Cindy Grant DOH	Provide Greg LeBaron with the name of the DOH person that needs to be involved in testing of the shrouded probe (W-059 Project).	CLOSED 3/98
PMM-BP-98-13	ALL	Look at the format in the TPA for the Key Transition Documents. Determination to be made at next meeting. Format of documents.	OPEN
PMM-BP-98-14	Greg LeBaron BWHC	Set up Comment Resolution Meeting for the Pre Closure Work Plan.	OPEN
PMM-BP-98-15	Ted Wooley Ecology	Provide a conditional closure letter for the ISO west tank	
PMM-BP-98-16	Kent Smith BWHC	Provide the analytical data already received to Ted Wooley	
PMM-BP-98-17	Kent Smith BWHC	Provide information to Ted about the limitations and benefits of sampling T-28-1 and T-30-1	

Only open items and those, which have been closed since approval of the last meeting minutes, will be listed.

B Plant Project Managers Meeting May 11, 1998

SCHEDULING THE NEXT MEETING

The next B Plant Project Managers Meeting is scheduled for June 18, 1998, at Ecology, Conference Room, in Kennewick, from 8:00 a.m. to 10:00 p.m..

May 11, 1998
ATTENDEE LIST

NAME	ORGANIZATION	PHONE NUMBER
Dave Evans	DOE-RL/TPD	373-9278
Steve Godfrey	BWHC	372-0501
Ted Wooley	Ecology	736-3012
George Reddick	FDH	372-2326
Greg LeBaron	BWHC	373-1792
Ellen Mattlin	DOE-RL/EAP	376-2385
Fen Simmons	BWHC	373-0413
Tom Beam	BWHC	372-0019
Dewey Robbins	BWHC	372-0001

B Plant Project Managers Meeting May 11, 1998

ATTACHMENT 1

Remaining Liquid in Vessels

T-28-1 and T-30-1

B Plant Project Managers Meeting May 11, 1998

Remaining Liquid in Vessels T-28-1 and T-30-1

Summary

The liquid remaining in the solvent extraction towers T-28-1 (~422 gal.) and T-30-1(~175 gal) cannot be easily removed with existing equipment or by other reasonable means. Therefore, these volumes represent the minimum heels for both vessels and will remain in the vessels following deactivation. Previous sample results have shown no exotherms on the DSC analysis which means the solutions are non-reactive. Therefore, further sampling is not required to confirm that the solutions are safe to leave in place following deactivation. Adequate process knowledge, via previous sample results and process history, is available to document the amount of hazardous substance remaining in these vessels.

State of Washington, Department of Ecology has reviewed and concurred with this position.

Background

The liquid remaining in T-28-1 and T-30-1 has been in the towers since the solvent extraction system was placed in wet standby in 1978. These towers are part of the solvent extraction system used to remove strontium from PUREX waste. Evidently all the liquid was not removed when the towers were flushed as liquid was found in two of the four towers when they were checked in 1996. The aqueous flushes from the towers was stored in B Plant along with the organic solutions remaining in T-28-1 and T-30-1 carry the same pedigree as the decant solutions sent to tank farms in 1996. Since no exotherms were shown on the samples, there is no potential for runaway reactions in T-28-1 or T-30-1.

It was agreed per the Sampling and Analysis Plan (SAP) for B Plant Solutions (HNF-SD-WM-EV-118) that the materials in T-28-1 and T-30-1 would be transferred into Tk-24-1 and sampled. A verification split from this sample was also to be sent to 325 Laboratory. This verification sample is one of two agreed to in the SAP. The first verification split was taken in February 1998 from Tk-21-1 and represents the combined materials from Tk-21-1, Tk-18-3, T-18-2, Tk-35-2 and Tk-32-1.

The pump available to transfer the material out of these towers requires personnel on the deck next to the open cells during the transfer. The transfer is expected to take approximately 4 hours. Due to the high dose rates involved in this area of the canyon the personnel exposure could be as high as 700 mRem. This is above the administrative control level of 500 mRem/yr and would require multiple entries to avoid violating this limit.

Justification

Based on the above information, the liquid volume remaining in T-28-1 and T-30-1 is considered to be at minimum heel and does not need to be sampled for the following reasons:

a. DSC analysis on two samples of similar material show no exotherms.

b. The only pump available to transfer the material will leave a 10 inch heel or 130 gallons in each tower.

c. Transfer line holds up is 50 gallons or more.

d. The heel and transfer line volume are more than the volume of T-30-1, and only 250 gallons can be transferred from T-28-1.

e. The 250 gallons transferred from T-28-1 will be added to a 900 gallon heel in Tk-24-1.and the level indicator in Tk-24-1 is only accurate to 167 gallon increments, so it will be difficult to determine how much is actually transferred.

f. Exposure to perform the transfer will be as high as 700 mRem which is not good ALARA practice.

g. Obtaining a sample of this solution will probably not give better results than the samples already taken in Tk-24-1 in 1996.

h. The towers will be left open and the liquid allowed to evaporate.

The reasons listed above justify declaring the material in the towers at minimum heel with no additional sampling required.

Meeting Minutes

B Plant Project Managers Meeting
Ecology Office - Kennewick
June 18, 1998
8:00 a.m.

The undersigned indicate, by their signatures, that these meeting minutes reflect the actual occurrences of the above-dated meeting.

_____ Date: 16 Jul '98
Gregory J. LeBaron, B Plant Contractor Representative, BWHC

_____ Date: 7/16/98
David T. Evans, Project Manager, DOE-RL

_____ Date: 7/16/98
Ted A. Wooley, Project Manager, Washington State Department of Ecology

_____ Date: July 16, 1998
George W. Reddick, PHMC Representative, FDH

_____ Date: _____
Cindy Grant, WDOH Representative

Agenda: The agenda for the June 18, 1998 meeting included the following B Plant Facility Transition topics:

1) Approve Minutes from Previous Project Managers Meeting
2) Vessel Deactivation Update
3) W-059 Project Update
4) End Point Close-out Status
5) Water Addition to Tank 100
6) Hierarchy of Key Transition Documents
7) Review Action Items
8) Other Items
9) Next meeting July 16, 1998.....

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S. D. Godfrey	BWHC	S4-49
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C. D. Sorensen	BWHC	R3-56*
T. A. Wooley	Ecology	B5-18

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ADMINISTRATIVE RECORD [B Plant TS-2-3]: EDMC H6-08

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Cindy Grant, Washington State Department of Health, 1511 3rd Avenue, Suite 700, Seattle, Washington 98101

Please send comments on the distribution list to Greg LeBaron, BWHC (S4-57), (509) 373-1792 or Steve Godfrey, BWHC (S4-49), (509) 372-0501.

B Plant Project Managers Meeting
Ecology Office - Kennewick
June 18, 1998
8:00 a.m.

SUMMARY OF DISCUSSION AND COMMITMENTS/AGREEMENTS

Approve Minutes from Previous Project Manager Meeting

Mr. Ted Wooley, Washington State Department of Ecology (Ecology); Mr. Dave Evans, Department of Energy, Richland Operations Office (RL); Mr. George Reddick, Fluor Daniel Hanford, Inc. (FDH); and Mr. Greg LeBaron, B&W Hanford Company (BWHC) approved and signed the meeting minutes from the May 11, 1998, B Plant Project Managers Meeting. The minutes were sent out, prior to the meeting, for review and all corrections were incorporated, prior to approval.

Vessel Deactivation Update

Mr. LeBaron reported that the canyon vessel deactivation is complete except for some final documentation. The final transfer of liquid waste was made the first week in June and the vessel isolation was completed the week of June 8.

W-059 Project Update

Construction of the W-059 project is essentially complete; there are a few odds and ends to complete. The ATP started this week and the field testing of the stack and sampling system is scheduled to start June 25.

End Point Close-out Status

A summary of the end point status was reviewed (attached). There were 1104 end points completed by the end of May compared to 1155 scheduled. After the first week in June, 1111 end points had been completed. By the end of May, there were 222 end points which had been scheduled to be completed but have not. In many cases, there are good reasons why those 222 end points have not been completed and it is expected that completion of those end points will not impact the end of the project.

Water Addition to Tank 100

Five inches of water (about 370 gallons) was added to Tank 100 to reduce the radiation field by about half (attached notes). This will significantly decrease the radiation exposure to the people who will be working on the top of the tank to cut the pipes connected to the vessel and for those involved in moving the tank into the B Plant canyon. Once the tank is moved into the canyon, the water will be allowed to evaporate which is expected to occur in 6-8 months. This water addition was made following agreement with DOE-RL, BHI and Ecology that the tank could be moved

Hierarchy of Key Transition Documents

Mr. Godfrey lead a discussion about the relationship of five documents associated with B Plant transition and surveillance & maintenance (S&M); 1) Preclosure Work Plan, 2) S&M Plan, 3) the End Point Document, 4) the List of Hazardous Substances and Dangerous Wastes remaining in the facility after transition, and 5) Safety Basis. Mr. Godfrey referenced language within the TPA change package which points out that the Preclosure Work Plan contains the S&M Plan and the End Point Document. Because the S&M Plan contains the List of Hazardous Substances and Dangerous Wastes remaining within B Plant and the Safety Basis Document is required to finalize the S&M Plan, Mr. Wooly agreed that the Preclosure Work Plan is the last document approved and includes the necessary parts of all these other documents.

The Preclosure Work Plan has been submitted to Ecology and Mr. Godfrey stated that he would like to get Ecology's comments. Mr. Wooley agreed to provide the comments. It was later discussed that a meeting to resolve comments on the Preclosure Work Plan would be held following the next PMM. Mr. LeBaron will schedule that meeting.

Review Action Items

Action items were reviewed and the current status of the action items is shown in the attached table.

Other Items

Next Meeting

The next meeting will be July 16, at 9:00 a.m. in MO-414/200E as identified in the previous meeting.

OPEN OR RECENTLY CLOSED ACTION ITEMS

Action Item	Responsible Person	Description	Completion Date
PMM-BP-97-12	Steve Godfrey BWHC	Address and resolve issue of insufficient information to adequately identify remaining hazards on B Plant End Point Closure letters.	CLOSED 4/98
PMM-BP-98-13	ALL	Look at the format in the TPA for the Key Transition Documents. Determination to be made at next meeting. Format of documents.	CLOSED 6/98
PMM-BP-98-14	Greg LeBaron BWHC	Set up Comment Resolution Meeting for the Preclosure Work Plan.	OPEN
PMM-BP-98-15	Ted Wooley Ecology	Provide a conditional closure letter for the ISO west tank	CLOSED 4/98
PMM-BP-98-16	Kent Smith BWHC	Provide the analytical data already received to Ted Wooley	CLOSED 4/98
PMM-BP-98-17	Kent Smith BWHC	Provide information to Ted about the limitations and benefits of sampling T-28-1 and T-30-1	CLOSED 5/98
PMM-BP-98-18	Greg LeBaron BWHC	Provide the final analytical data to Ecology	

Only open items and those, which have been closed since approval of the last meeting minutes, will be listed.

B Plant Project Managers Meeting June 18, 1998

SCHEDULING THE NEXT MEETING

The next B Plant Project Managers Meeting is scheduled for July 16, 1998, at 9:00 in MO-414, from 9:00 a.m. to 10:00 p.m. with a meeting to resolve comments to the Preclosure Work Plan following.

June 18, 1998
ATTENDEE LIST

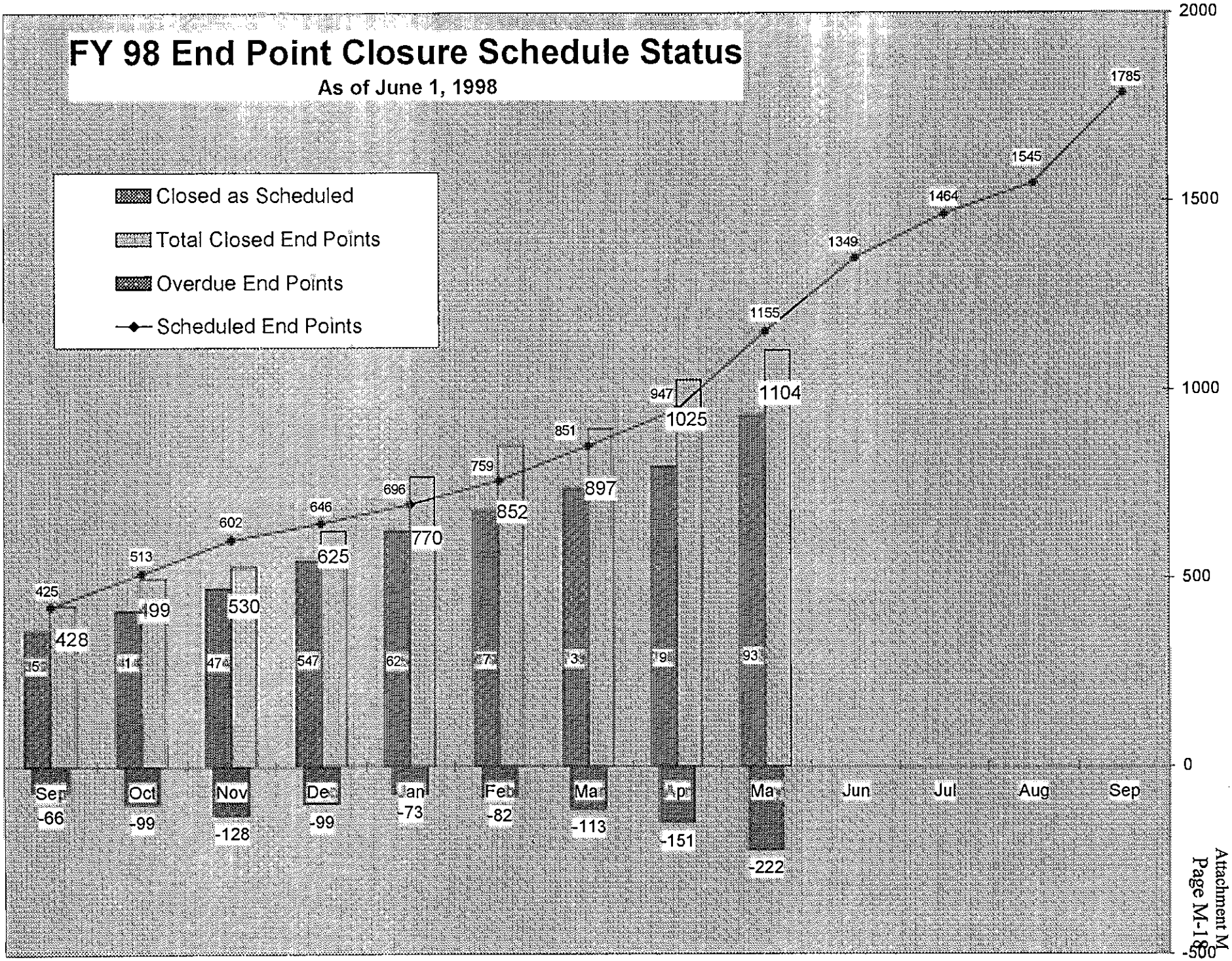
NAME	ORGANIZATION	PHONE NUMBER
Loren Rogers	DOE-RL/TPD	373-9560
Steve Godfrey	BWHC	372-0501
Ted Wooley	Ecology	736-3012
George Reddick	FDH	372-2326
Greg LeBaron	BWHC	373-1792
Ellen Mattlin	DOE-RL/EAP	376-2385
Kim Williams	DOE-RL	373-1646
Tomicka Womack	DOE-RL	
Gail Laws	DOH	736-5713
Andrea Hopkins	FDH	373-5395
Nancy Ballantyne	FDH	372-1547
Tom Beam	BWHC	372-0019
Dewey Robbins	BWHC	372-0001

ATTACHMENT

HANDOUTS

Tank 100 Water Add

- **Prior to Water Addition**
  - **Minimum Heel ~170 gallons**
  - **Dose rates 60mR/hr general**
  - **Estimated 2 ManRem exposure**
- **After 5 Inch Water Addition**
  - **Water heel ~370 gallons**
  - **Dose rates 25-40mR/hr**
- **Ecology approved storage of Tank 100 in canyon with water heel**


FY 98 End Point Closure Schedule Status
As of June 1, 1998
Closed as Scheduled
Total Closed End Points
Overdue End Points
Scheduled End Points
2000
1500
1000
500
0
-500
425
513
602
646
696
759
851
947
1155
1349
1464
1545
1785
428
499
530
625
770
852
897
1025
1104
15
1
47
547
62
7
3
79
93
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
-66
-99
-128
-99
-73
-82
-113
-151
-222

REQUEST FOR SAMPLE ANALYSIS (RSA)

Group ID No. (For lab use only): 98000527

1. Sample Origin	2. Date Sampled	4. Requestor's Name	6. TPCN	7. Org. Code
Plant	06/25/98	Pat Lindsey	KN604	16D00

Customer/Project Code	3. Submitted By	5. Requestor's Phone/MSIN/FAX
B Plant	Pat Lindsey	372-0121 S6-81 372-0269

8. Customer ID No.	9. Laboratory Sample No.	10. Volume of Sample	11. Matrix of Sample	12. Requested Analyses	13. Expected Range
6-2	S98E000602		EACH	Complete Isotopic - Primary Cs Sr	Unknown
10-2	S98E000603		EACH	@AB-02	
				@AEA-02 @GEA-07	

From 222-S LAB
Tom McGinnis
373-2293

14. Does sample have a MSDS?

☐ Yes HEHF assigned MSDS No. _____

☒ No Description of process that produced waste/sample:

Tech Smears from B Plant Canyon

3 sheets
Total

15. Is this sample RCRA listed? ☐ Yes ☒ No

Applicable Listed Waste Codes:

☐ Yes ☐ No P Codes: (list) _____
☐ Yes ☐ No U Codes: (list) _____
☐ Yes ☐ No K Codes: (list) _____
☐ Yes ☐ No F Codes: (list) _____

☐ Yes ☐ No D001: (how determined) _____ Ignitable
☐ Yes ☐ No D002: (how determined) _____ Corrosive
☐ Yes ☐ No D003: (how determined) _____ Reactive
☐ Yes ☐ No Toxic: (list codes) _____

PCB: Does this waste/sample contain PCBs?

☐ Yes Over 500 ppm
☐ Yes Over 50 ppm
☐ Yes PCBs are suspected
☒ No PCBs are suspected

If YES, what is the source of the PCBs?
☐ Transformer, capacitor, or ballast
☐ Other, specify _____
☐ Unknown

16. Sample Disposition

☐ Return to Customer
☐ Samples found to contain PCBs will be returned to the customer
☒ Dispose of per facility procedures with applied charges for analyses and disposal

Sample(s) Dose Rate at Contact: <5 mrem/hr

HPT Signature: [signature]

17. QC Required ☐ Per 222-S Laboratory Quality Assurance Plan (HNF-SD-CP-QAPP-016)

☐ Other (list reference document or attach) N/A

18. Special Instructions (Special Storage Requirements, Reporting format, holding times, etc.)

Process Analysis Report. Contact Steve Killoy at 2-0183 for any questions or authorizations

19. Requested Turnaround Time

☐ 2 Weeks ☐ 4 Weeks

☒ Other ASAP - OT Approved per S.E. Killoy 9/16/98

20. Sample Received By: [signature] Date 9/16/98 Time 11:07

21. Chain of Custody

☒ No ☐ Yes

Number: _____

A-6002-365 (05/97)

18 Sep 1998

VALIDATED RESULTS SHORT REPORT

Customer ID: 6-2
Lab Sample#: S98E000602

Sample Date: 06/25/98 12:00
Recv. Date: 09/16/98 11:07

PARAMETER		RESULTS	UNITS
AEA for peak %			
Bi 212 % by AEA		0	%
Po 212 % by AEA		0	%
Pu 238/ Am 241 % by AEA		0	%
Pu 239/240 % by AEA		0	%
U-234/Np 237 % by AEA		0	%
Uranium 235 % by AEA		0	%
Uranium 238 % by AEA		0	%
ENV GEA-2" mount for Co,Cs,Eu			
Cesium-134 by GEA	<	1.898e-05	uCi/Sample
Cesium-137 by GEA		8.920e-03	uCi/Sample
Co-60 GEA Rel. % Count Error		n/a	% Ct. Error
Cobalt-60 by GEA	<	1.501e-05	uCi/Sample
Cs-134 GEA Rel % Counting Err		n/a	% Ct. Error
Cs-137 GEA Rel % Counting Err		1.11	% Ct. Error
Eu-152 GEA Rel % Counting Err		n/a	% Ct. Error
Eu-154 GEA Rel % Counting Err		n/a	% Ct. Error
Eu-155 GEA Rel % Counting Err		n/a	% Ct. Error
Europium-152 by GEA	<	4.212e-05	uCi/Sample
Europium-154 by GEA	<	5.063e-05	uCi/Sample
Europium-155 by GEA	<	3.534e-05	uCi/Sample
Env Alpha/Beta			
Alpha Env: Each Rel % Cnt Err		1.55E+02	% Ct. Error
Alpha Env: Solid/Misc (Each)	<	5.72E-07	uCi/Sample
Beta Env: Each Rel % Cnt Err		3.57E-01	% Ct. Error
Beta in Env. Samples (Each)		9.36E-03	uCi/Sample

VALIDATED RESULTS SHORT REPORT 18 Sep 1998

Customer ID: 6-10
Lab Sample#: S98E000603

Sample Date: 06/25/98 12:00
Recv. Date: 09/16/98 11:07

PARAMETER	RESULTS	UNITS
AEA for peak %		
Bi 212 % by AEA	0	%
Po 212 % by AEA	0	%
Pu 238/ Am 241 % by AEA	0	%
Pu 239/240 % by AEA	0	%
U-234/Np 237 % by AEA	0	%
Uranium 235 % by AEA	0	%
Uranium 238 % by AEA	0	%
ENV GEA-2" mount for Co,Cs,Eu		
Cesium-134 by GEA	< 1.771e-05	uCi/Sample
Cesium-137 by GEA	5.970e-03	uCi/Sample
Co-60 GEA Rel. % Count Error	n/a	% Ct. Error
Cobalt-60 by GEA	< 1.750e-05	uCi/Sample
Cs-134 GEA Rel % Counting Err	n/a	% Ct. Error
Cs-137 GEA Rel % Counting Err	1.38	% Ct. Error
Eu-152 GEA Rel % Counting Err	n/a	% Ct. Error
Eu-154 GEA Rel % Counting Err	n/a	% Ct. Error
Eu-155 GEA Rel % Counting Err	n/a	% Ct. Error
Europium-152 by GEA	< 3.938e-05	uCi/Sample
Europium-154 by GEA	< 5.537e-05	uCi/Sample
Europium-155 by GEA	< 3.234e-05	uCi/Sample
Env Alpha/Beta		
Alpha Env: Each Rel % Cnt Err	6.59E+01	% Ct. Error
Alpha Env: Solid/Misc (Each)	7.53E-07	uCi/Sample
Beta Env: Each Rel % Cnt Err	3.91E-01	% Ct. Error
Beta in Env. Samples (Each)	7.80E-03	uCi/Sample

PROJECT HANFORD RADIOLOGICAL SURVEY REPORT

Survey Report No: 261612

Date	Time (Start/Stop)	Area/Bldg./Room/Location	F.C.
6-25-98	1530 / 2330	200E / 221-B / Canyon deck (01)	B

RWP Number	Work Package/Job Control Package/JSA	Routine Surveillance Task Number	Radiological Shipping Rec. Number
B-292	N/A	N/A	N/A

Purpose of Survey (check appropriate box(es)): ☐ Job Coverage, ☐ Required Task, ☐ Material Release, ☐ Ram Shipment

Contamination Incident: ☐ Skin, ☐ Clothing, ☐ Spill Alarm Response: ☐ Cam, ☐ ARM, ☐ APM

☐ Exposure Incident ☐ HRA/VHRA Work Other: End point survey of canyon deck

Job Description: Surveyed canyon deck for loose contamination and dose rate.

N/A

DOSE RATE MEASUREMENTS Note 1 F = Field (≥ 30 cm) C = Contact (≤ 1 cm)

	No.	Description	Dist. (cm) Note 1	WO (mR/hr)	WC (mR/hr)	CF_β	CF_γ	Neutron Dose (mrem/hr)	Shallow Dose (mrem/hr)	Deep Dose (mrem/hr)
	117	Cell 1 Block 6	C	200	50	3	1	N/A	500	50
117	~~118~~	Cell 1 Block 6	F	35	15	3	1		75	15
118	~~119~~	Cell 1 Block 1	C	30	10	3	1		70	10
118	~~120~~	Cell 1 Block 1	F	20	7	3	1		46	7
119	~~121~~	Cell 2 North of Block 6	C	1000	200	3	1		2600	200
119	~~122~~	Cell 2 North of Block 6	F	150	30	3	1		390	30
120	~~123~~	Cell 2 Block 4	C	1000	300	3	1		2400	300
120	~~124~~	Cell 2 Block 4	F	200	50	3	1		500	50
121	~~125~~	Cell 4 Block 5	C	150	150	3	1		150	150

SRS 6-26-98

CONTAMINATION (C) MEASUREMENTS

No.	Description	Direct Gross cpm/PA βγ	Direct Gross cpm/PA α	Background βγ	Background α	Total dpm/100 cm² βγ	Total dpm/100 cm² α	Removable dpm/100 cm² βγ	Removable dpm/100 cm² α
1	Cell 1 Block ~~4~~ 6 (6-26-98)			200				450K	NA
2	Cell 1 Block 5			200				650 K	
3	Cell 1 Block 3			200				350 K	
4	Cell 1 Block 1			200				400 K	
5	Cell 2 Block 6			200				75K	
6	Cell 2 Block 4	N/A		200		N/A		450 K	
7	Cell 2 Block 3			200				750 K	
8	Cell 2 Block 1			200				650 K	
9	Cell 4 Block 5			200				80K	
10	Cell 4 Block 3			200				200K	
11	Cell 4 Block 1			200				200K	
12	Cell 4 South of Block 1			200				150K	

AIR SAMPLE MEASUREMENTS (μ Ci/ml)

	BZ	GA	Initial	Decay		BZ	GA	Initial	Decay	Sample Counter Log Number or Sample ID Number
α 1			N/A		α 2			N/A		N/A
βγ 1		X	7.1E-10	N/A	βγ 2					

Concurrence: [signature] 6-30-98
BHI Rad. Engineer

PROJECT HANFORD RADIOLOGICAL SURVEY REPORT

Survey Report No. 261612

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Map/Sketch

See attached maps

LEGEND

(#) Smear (#) Air Sample (#) LAW [#] Neutron * Contact Reading

--------- (designation inside) --------- Radiological Area Boundary Dose Rates in mrem/h unless otherwise noted

COMMENTS: (Additional information as necessary to interpret results)

Smears are listed nnnk dpm, where k is 1000 unless GM overranged, in which case ** uncorrected open window contact dose rate is listed. No smears >50k dpm βγ were checked for alpha to prevent contamination of PAM probe. Instruments listed on page 2 were used for all surveys, all pages. All maps use legend on page 2 above and page 23 (first map).

N/A

Instr./Probe Model	RO-3B (CP)	GM Model g-m probe	PAM	Air sampler H810	RO-3B (CF)	NA
Serial No.	0021	0097	0494	11	0206	↓
	NA	0810	0169	N/A	N/A	
Efficiency (used)	NA	10%	14%	N/A	NA	↓

RCT:
Date: 6/25/98 Payroll No.: 89864 / 48856
Name (Print): Stephen Garinger / Paul Frenzel
Signature: [signature] / [signature]

Reviewer:
Date: 6-29-98 Payroll No.: 58257
Name (Print): SB Malloy
Signature: [signature]

PROJECT HANFORD
RADIOLOGICAL SURVEY REPORT Continuation Sheet

F.C. B | Survey Report No. 261612 | Page N-6 | Page 3 of 52

DOSE RATE MEASUREMENTS Note 1 F = Field (>30 cm) C = Contact (≤1 cm)

No.	Description	Dist. (cm) Note 1	WO (mR/hr)	WC (mR/hr)	CF_β	CF_γ	Neutron Dose (mrem/hr)	Shallow Dose (mrem/hr)	Deep Dose (mrem/hr)
121	Cell 4 Block 5	F	50	30	3	1	N/A	90	30
122	Cell 4 Block 4	C	50	13	3	1		124	13
122	Cell 4 Block 4	F	12	8	3	1		20	8
123	Cell 5 Block 4	C	150	20	3	1		410	20
123	Cell 5 Block 4	F	13	6	3	1		27	6
124	Cell 5 Hot pipe A Block	C	35	10	3	1		85	10
124	Cell 5 Hot pipe A Block	F	14	8	3	1		30	8
125	Cell 6 Block 4	C	100	40	3	1		220	40
125	Cell 6 Block 4	F	25	8	3	1		59	8
126	Cell 6 walkway	C	300	30	3	1		840	30
126	Cell 6 Walk way	F	35	10	3	1		85	10

CONTAMINATION (C) MEASUREMENTS

No.	Description	Direct Gross cpm/PA β γ	Direct Gross cpm/PA α	Background β γ	Background α	Total dpm/100 cm² β γ	Total dpm/100 cm² α	Removable dpm/100 cm² β γ	Removable dpm/100 cm² α
13	Cell 5 Block 4			200	N/A			85K	NA
14	Cell 5 Block 2			200				150K	
15	Cell 5 walkway			200				300K	
16	Cell 5 Hot pipe trench			200				350K	
17	Cell 6 Block 4			200	N/A			500K	
18	Cell 6 block 2			200	3			50K	<20
19	Cell 6 walkway			200	N/A			150K	NA
20	Cell 6 Hot pipe trench			200				250K	
21	Cell 7 Block 3	N/A		200		N/A		200K	
22	Cell 7 Block 1			200				60K	
23	Cell 7 walkway			200				300K	
24	Cell 7 Hot pipe trench			200	N/A			900K	
25	Cell 8 Block 4			200	3			50K	<20
26	Cell 8 Block 2			200	N/A			100K	NA
27	Cell 8 walkway			200				100K	
28	Cell 8 Hot pipe trench			200				300K	
29	Cell 9 Block 3			200				200K	
30	Cell 9 Block 1			200	N/A			250K	

Instr./Probe Model						
Serial No.						
Efficiency (used)						

PROJECT HANFORD
RADIOLOGICAL SURVEY REPORT Continuation Sheet

F.C. B

Survey Report No. 26162

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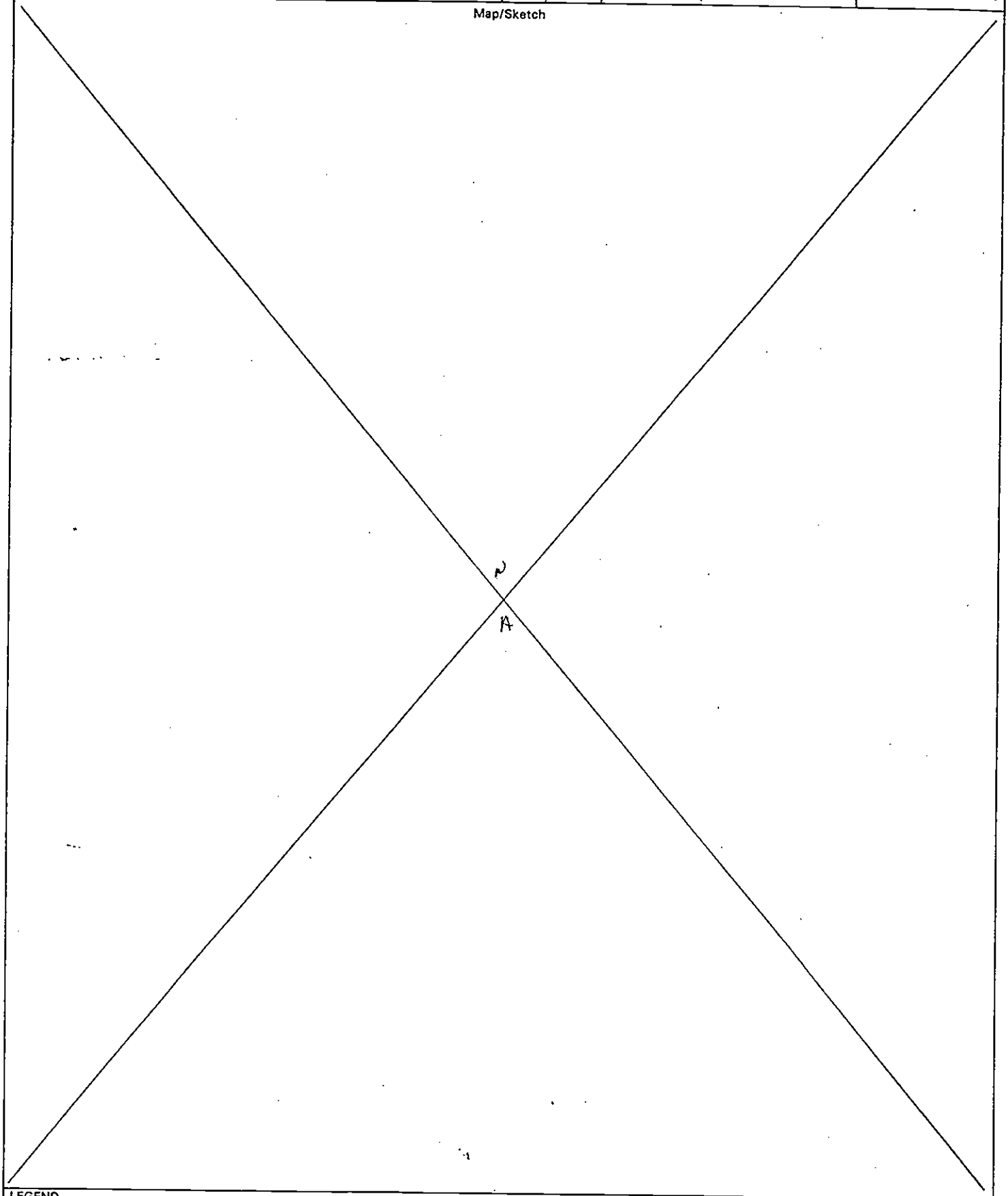
Map/Sketch



LEGEND

(#) Smear (#) Air Sample (#) LAW [#] Neutron * Contact Reading

- - - - - - - - - (designation inside) - - - - - - - - - Radiological Area Boundary

Dose Rates in mrem/h unless otherwise noted

PROJECT HANFORD
RADIOLOGICAL SURVEY REPORT Continuation Sheet

F.C. B | Survey Report No. 261612 | Page N-8 | Page 5 of 52

DOSE RATE MEASUREMENTS Note 1 F = Field (>30 cm) C = Contact (≤1 cm)

No.	Description	Dist. (cm) Note 1	WO (mR/hr)	WC (mR/hr)	CF_β	CF_γ	Neutron Dose (mrem/hr)	Shallow Dose (mrem/hr)	Deep Dose (mrem/hr)
127	Cell 7 Block 3	C	15	.5	3	1	N/A	35	5
127	Cell 7 Block 3	F	8	5	3	1		14	5
128	Cell 7 Hot pipe A Block	C	800	25	3	1		2350	25
128	Cell 7 Hot pipe A Block	F	80	10	3	1		220	10
129	Cell 8 Block 3	C	280	20	3	1		800	20
129	Cell 8 Block 3	F	18	7	3	1		34	7
130	Cell 8 Walkway	C	350	50	3	1		950	50
130	Cell 8 Walkway	F	40	8	3	1		104	8
131	Cell 9 Block 4	C	200	20	3	1		560	20
131	Cell 9 Block 4	F	35	10	3	1		85	10
132	Cell 9 Walkway	C	200	70	3	1		460	70

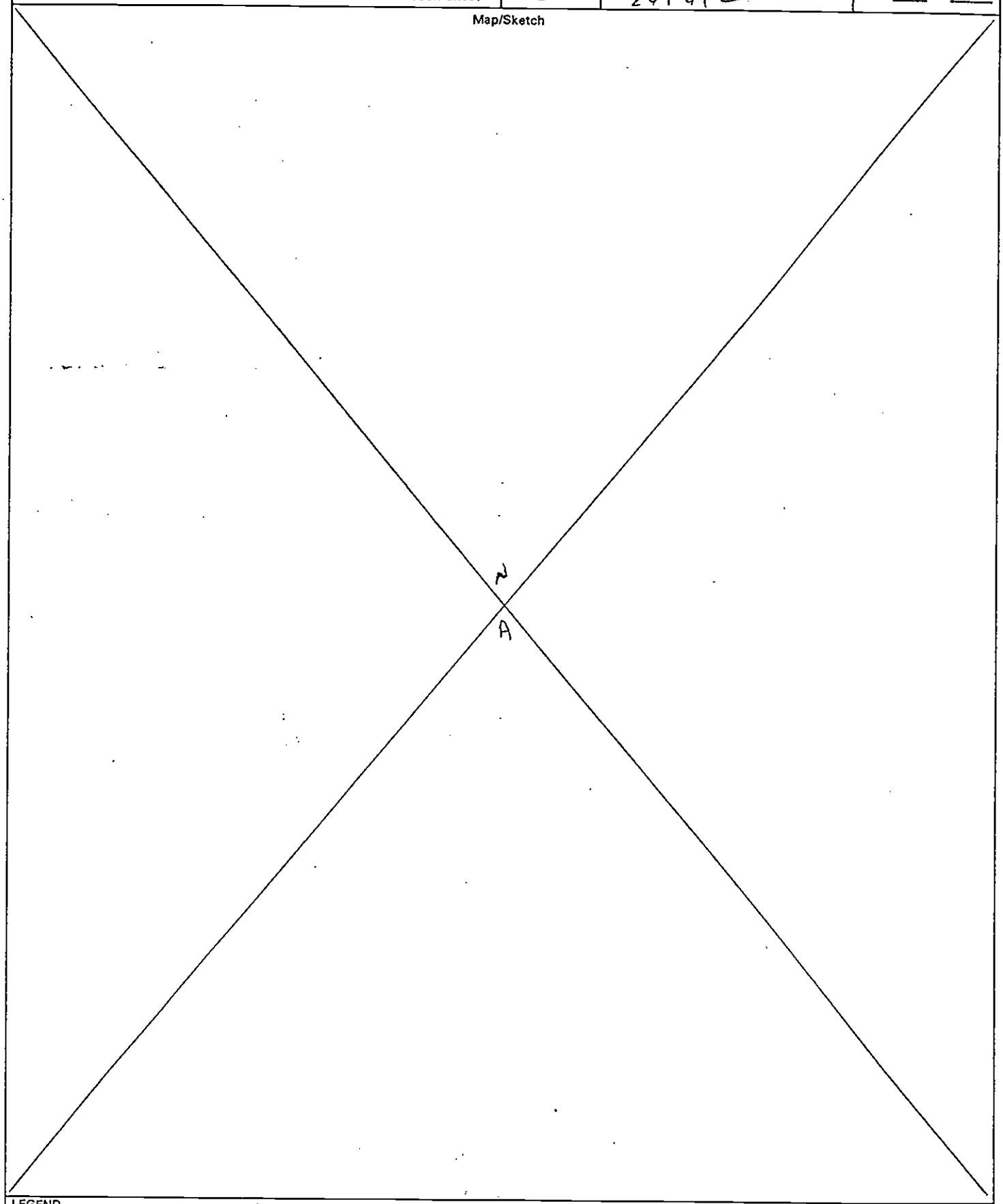
CONTAMINATION (C) MEASUREMENTS

No.	Description	Direct Gross cpm/PA β γ	Direct Gross cpm/PA α	Background β γ	Background α	Total dpm/100 cm² β γ	Total dpm/100 cm² α	Removable dpm/100 cm² β γ	Removable dpm/100 cm² α
31	Cell 9 Walkway			200				300K	N/A
32	Cell 9 Hot pipe trench			200				200K	
33	Cell 10 Block 4			200				150K	
34	Cell 10 Block 2			200	3			35K	<20
35	Cell 10 walkway			200				150K	N/A
36	Cell 10 Hot pipe trench			200				250K	
37	Cell 11 Block 3			200				200K	
38	Cell 11 Block 1			200				250K	
39	Cell 11 walkway	N/A		200		N/A		300K	
40	Cell 11 Hot pipe trench			200				11 mrad/hr **	
41	Cell 12 Block 4			200	3			50K	<20
42	Cell 12 Block 2			200				150K	N/A
43	Cell 12 walkway			200				100K	
44	Cell 12 Hot pipe trench			200				150K	
45	Cell 13 Block 3			200				550K	
46	Cell 13 Block 1			200				800K	
47	Cell 13 walkway			200				300K	
48	Cell 13 Hot pipe trench			200				100K	

Instr./Probe Model						
Serial No.			N/A			
Efficiency (used)						

PROJECT HANFORD RADIOLOGICAL SURVEY REPORT Continuation Sheet	F.C. B	Survey Report No. 24162	Page 6 of 52

Map/Sketch



LEGEND

(#) Smear (#) Air Sample (#) LAW [#] Neutron * Contact Reading

- - - - - - - - - (designation inside) - - - - - - - - - Radiological Area Boundary

Dose Rates in mrem/h unless otherwise noted

PROJECT HANFORD
RADIOLOGICAL SURVEY REPORT Continuation Sheet

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DOSE RATE MEASUREMENTS Note 1 F = Field (>30 cm) C = Contact (≤1 cm)

No.	Description	Dist. (cm) Note 1	WO (mR/hr)	WC (mR/hr)	CF_β	CF_γ	Neutron Dose (mrem/hr)	Shallow Dose (mrem/hr)	Deep Dose (mrem/hr)
132	Cell 9 Walkway	F	25	10	3	1	N/A	55	10
133	Cell 10 Block 3	C	30	15	3	1		60	15
133	Cell 10 Block 3	F	25	12	3	1		51	12
134	Cell 10 Block 2	C	200	150	3	1		300	150
134	Cell 10 Block 2	F	70	50	3	1		110	50
135	Cell 11 Block 3	C	70	30	3	1		150	30
135	Cell 11 Block 3	F	30	7	3	1		76	7
136	Cell 11 Walkway	C	200	80	3	1		440	80
136	Cell 11 Walkway	F	80	10	3	1		220	10
137	Cell 12 Block 3	C	30	10	3	1		70	10
137	Cell 12 Block 3	F	40	10	3	1		100	10

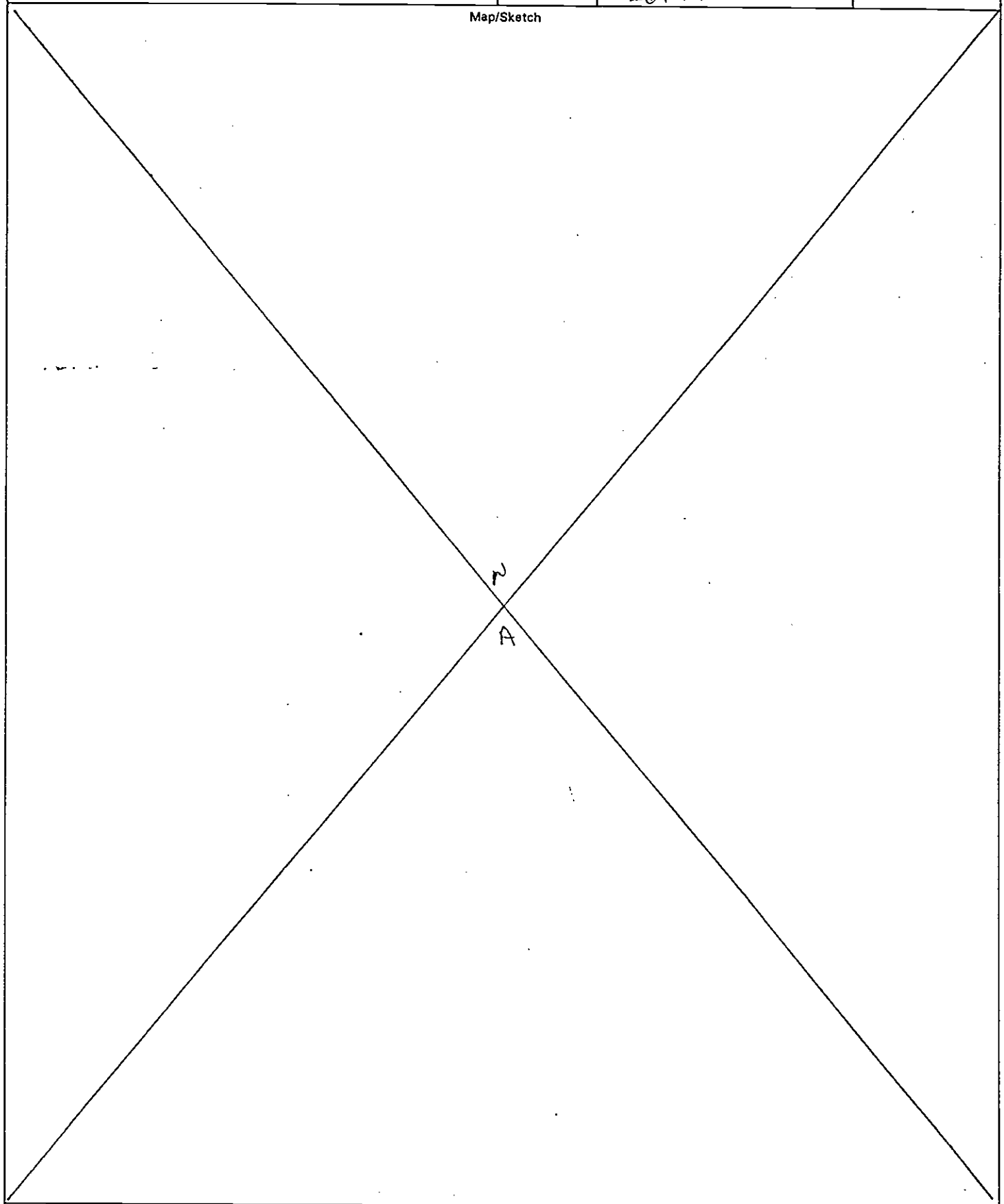
CONTAMINATION (C) MEASUREMENTS

No.	Description	Direct Gross cpm/PA $\beta\gamma$	Direct Gross cpm/PA α	Background $\beta\gamma$	Background α	Total dpm/100 cm² $\beta\gamma$	Total dpm/100 cm² α	Removable dpm/100 cm² $\beta\gamma$	Removable dpm/100 cm² α
49	Cell 14 Block 4			200				80K	N/A
50	Cell 14 Block 2			200				250K	
51	Cell 14 Walkway			200				150K	
52	Cell 14 Hot pipe trench			200				150K	
53	Cell 15 Block 3			200				550K	
54	Cell 15 Block 1			200				350K	
55	Cell 15 Walkway			200				400K	
56	Cell 15 Hot pipe trench			200				250K	
57	Cell 16 Block 4	N/A		200		N/A		100K	
58	Cell 16 Block 2			200				300K	
59	Cell 16 walkway			200				300K	
60	Cell 16 Hot pipe trench			200				150K	
61	Cell 17 Block 4			200				350K	
62	Cell 17 Block 2			200				40 mrad/hr **	
63	Cell 17 Walkway			200				250K	
64	Cell 17 Hot pipe trench			200				100K	
65	Cell 18 Block 3			200				100K	
66	Cell 18 Block 1			200				150K	

Instr./Probe Model			N/A			
Serial No.						
Efficiency (used)						

PROJECT HANFORD RADIOLOGICAL SURVEY REPORT Continuation Sheet	F.C.	Survey Report No. Page N-1	Page
	B	261612	Page 8 of 52

Map/Sketch



LEGEND

(#) Smear (#) Air Sample (#) LAW [#] Neutron * Contact Reading

- - - - - - - - - (designation inside) - - - - - - - - - Radiological Area Boundary

Dose Rates in mrem/h unless otherwise noted

PROJECT HANFORD
RADIOLOGICAL SURVEY REPORT Continuation Sheet

F.C. B | Survey Report No. 261612 Page N-12 | Page 9 of 52

DOSE RATE MEASUREMENTS Note 1 F = Field (>30 cm) C = Contact (≤1 cm)

No.	Description	Dist. (cm) Note 1	WO (mR/hr)	WC (mR/hr)	CF_β	CF_γ	Neutron Dose (mrem/hr)	Shallow Dose (mrem/hr)	Deep Dose (mrem/hr)
138	Cell 12 Hot pipe Block A	C	20	10	3	1	N/A	40	10
138	Cell 12 Hot pipe Block A	F	~~X~~ 10 (L-26-98)	6	3	1		18	6
139	Cell 13 Block 3	C	1000	70	3	1		2860	70
139	Cell 13 Block 3	F	70	25	3	1		160	25
140	Cell 13 Walk way	C	1500	100	3	1		4300	100
140	Cell 13 Walk way	F	20	15	3	1		30	15
141	Cell 14 Block 2	C	120	30	3	1		300	30
~~141~~ 142 (L-26-98)	Cell 14 Block 2	F	40	30	3	1		60	30
142	Cell 14 Hot pipe Block A	C	200	20	3	1		560	20
142	Cell 14 Hot pipe Block A	F	15	10	3	1		25	10
143	Cell 15 Block 3	C	200	60	3	1	↓	480	60

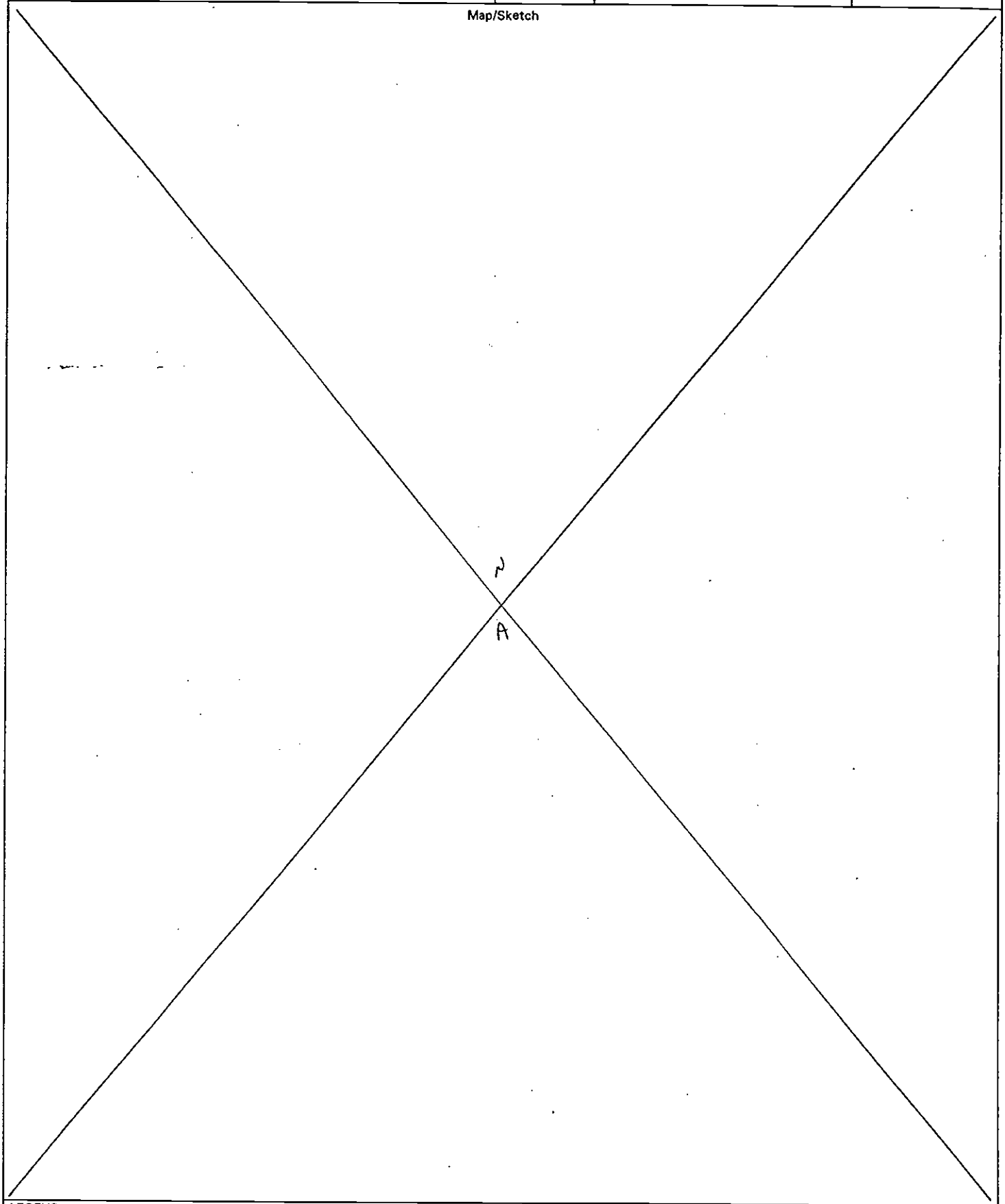
CONTAMINATION (C) MEASUREMENTS

No.	Description	Direct Gross cpm/PA $\beta\gamma$	Direct Gross cpm/PA α	Background $\beta\gamma$	Background α	Total dpm/100 cm² $\beta\gamma$	Total dpm/100 cm² α	Removable dpm/100 cm² $\beta\gamma$	Removable dpm/100 cm² α
67	Cell 18 Walkway			200				250K	N/A
68	cell 18 Hot pipe trench			200				100K	
69	Cell 17 Block 4			200				900K	
70	Cell 19 Block 2			200				~~550~~ ~~555~~ K (L-26-98)	
71	Cell 19 Walkway			200				250K	
72	cell 17 Hot pipe trench			200				500K	
73	Cell 20 Block 3			200				200K	
74	Cell 20 Block 1			200				250K	
75	Cell 20 Walkway	N/A		200		N/A		250K	
76	Cell 20 Hot pipe trench			200				350K	
77	Cell 21 Block 4			200				600K	
78	Cell ~~22~~ 21 (L-26-98) Block 2			200				600K	
79	Cell ~~23~~ 21 (L-26-98) Walkway			200				150K	
80	Cell 21 Hot pipe trench			200				60K	
81	Cell 22 Block 3			200				150K	
82	cell 22 Block 1			200				150K	
83	Cell 22 Walkway			200				150K	
84	cell 22 Hot pipe trench			200				250K	↓

Instr./Probe Model						
Serial No.			N/A			
Efficiency (used)						

PROJECT HANFORD RADIOLOGICAL SURVEY REPORT Continuation Sheet	F.C. B	Survey Report No. 261612	Page 10 of 52

Map/Sketch



LEGEND

(#) Smear (#) Air Sample (#) LAW [#] Neutron * Contact Reading

- - - - - - - - - (designation inside) - - - - - - - - - Radiological Area Boundary Dose Rates in mrem/h unless otherwise noted

PROJECT HANFORD
RADIOLOGICAL SURVEY REPORT Continuation Sheet

F.C. B

Survey Report No. 261612 Page N-14

DOSE RATE MEASUREMENTS Note 1 F = Field (>30 cm) C = Contact (≤1 cm)

No.	Description	Dist. (cm) Note 1	WO (mR/hr)	WC (mR/hr)	CF_β	CF_γ	Neutron Dose (mrem/hr)	Shallow Dose (mrem/hr)	Deep Dose (mrem/hr)
143	Cell 15 Block 3	F	150	30	3	1	N/A	390	30
144	Cell 15 walkway	C	2500	80	3	1		7340	80
144	Cell 15 Walk way	F	80	25	3	1		190	25
145	Cell 16 Block 4	C	5000	500	3	1		14000	500
145	Cell 16 Block 4	F	250	35	3	1		680	35
146	Cell 16 Hot pipe Block A	C	70	20	3	1		170	20
146	Cell 16 Hot pipe Block A	F	25	15	3	1		45	15
147	Cell 17 Block 4	C	35	20	3	1		65	20
147	Cell 17 Block 4	F	34	28	3	1		46	28
148	Cell 17 Block 1	C	>5000	220	3	1		>15,000	220
148	Cell 17 Block 1	F	1500	200	3	1		4100	200

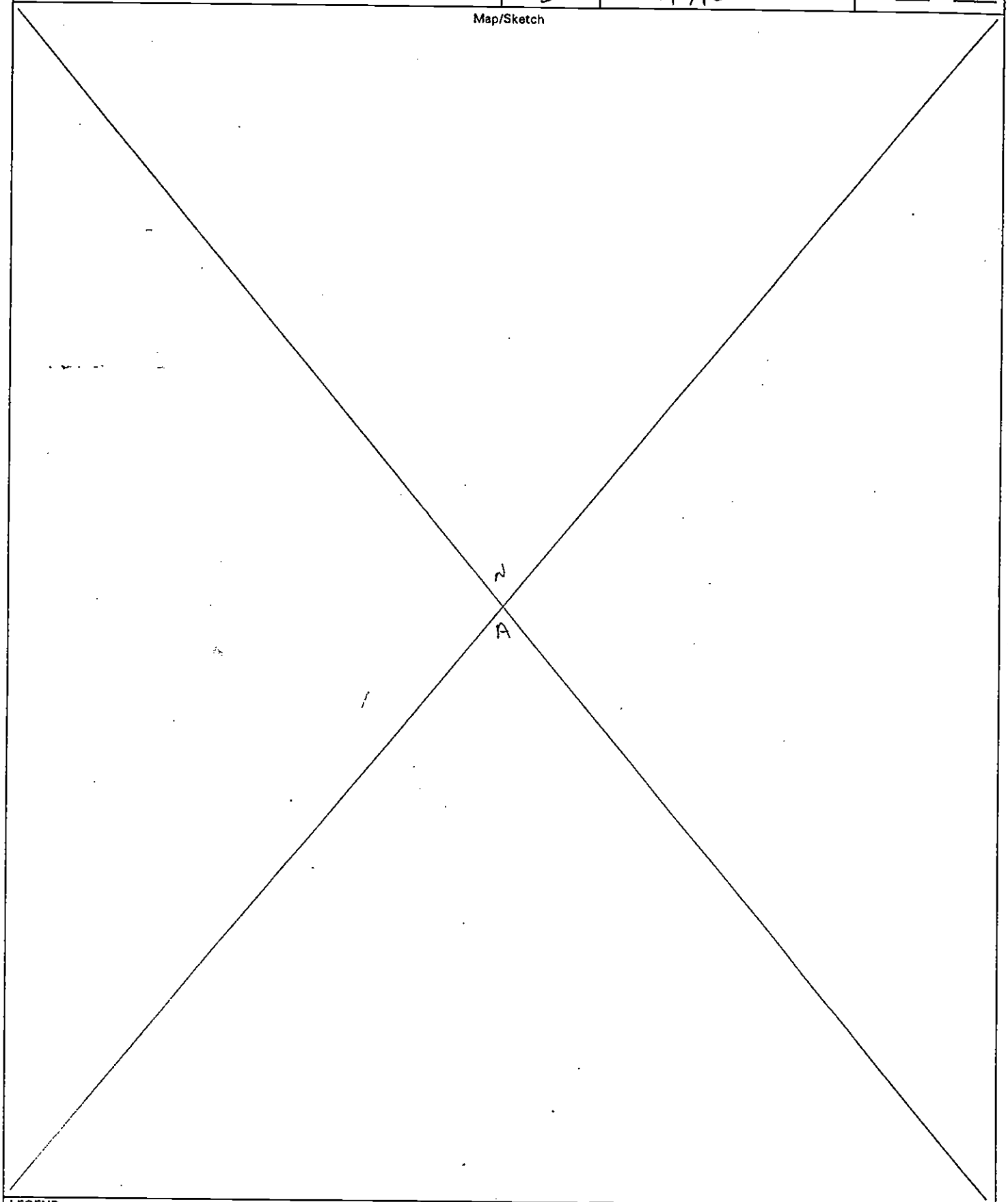
CONTAMINATION (C) MEASUREMENTS

No.	Description	Direct Gross cpm/PA β γ	Direct Gross cpm/PA α	Background β γ	Background α	Total dpm/100 cm² β γ	Total dpm/100 cm² α	Removable dpm/100 cm² β γ	Removable dpm/100 cm² α
85	Cell 23 Block 4			200				150K	N/A
86	Cell 23 Block 2			200				20 mrad/hr **	
87	Cell 23 Walkway			200				650K	
88	Cell 23 Hot pipe trench			200				100K	
89	Cell 24 Block 3			200				100K	
90	Cell 24 Block 1			200				100K	
91	Cell 24 Walkway			200				150K	
92	Cell 24 Hot pipe trench	N/A		200		N/A		200K	
93	Cell 25 Block 4			200				350K	
94	Cell 25 Block 2			200				650K	
95	Cell 25 Walkway			200				100K	
96	Cell 25 Hot pipe trench			200				250K	
97	Cell 26 Block 3			200				300K	
98	Cell 26 Block 1			200				500K	
99	Cell 26 Walkway			200				200K	
100	Cell 26 Hot pipe trench			200				500K	
101	Cell 27 Block 4			200				450K	
102	Cell 27 Block 2			200				130 mrad/hr **	

Instr./Probe Model						
Serial No.			N/A			
Efficiency (used)						

PROJECT HANFORD RADIOLOGICAL SURVEY REPORT Continuation Sheet	F.C. B	Survey Report No. 26162	Page 12 of 52

Map/Sketch



LEGEND

(#) Smear (#) Air Sample (#) LAW [#] Neutron * Contact Reading

- - - - - - - - - (designation inside) - - - - - - - - - Radiological Area Boundary

Dose Rates in mrem/h unless otherwise noted

PROJECT HANFORD
RADIOLOGICAL SURVEY REPORT Continuation Sheet

F.C. B | Survey Report No. 261612 | Page N-16 | Page 13 of 52

DOSE RATE MEASUREMENTS Note 1 F = Field (>30 cm) C = Contact (≤1 cm)

No.	Description	Dist. (cm) Note 1	WO (mR/hr)	WC (mR/hr)	CF_β	CF_γ	Neutron Dose (mrem/hr)	Shallow Dose (mrem/hr)	Deep Dose (mrem/hr)
149	Cell 18 Hot pipe Block A	C	18	12	3	1	N/A	30	12
149	Cell 18 Hot pipe Block A	F	18	10	3	1		34	10
150	Cell 19 ~~18~~ 6-26-98 Block 3	C	200	100	3	1		400	100
150	Cell 19 18 Block 3	F	100	80	3	1		140	80
151	Cell 19 Block 1	C	4000	2000	3	1		8000	2000
151	Cell 19 Block 1	F	130	80	3	1		230	80
152	Cell 20 Block 4	C	50	14	3	1		122	14
152	Cell 20 Block 4	F	21	15	3	1		33	15
153	Cell 20 Block 1	C	30	16	3	1		58	16
153	Cell 20 Block 1	F	25	16	3	1		43	16
154	Cell 21 Block 3	C	35	17	3	1		71	17

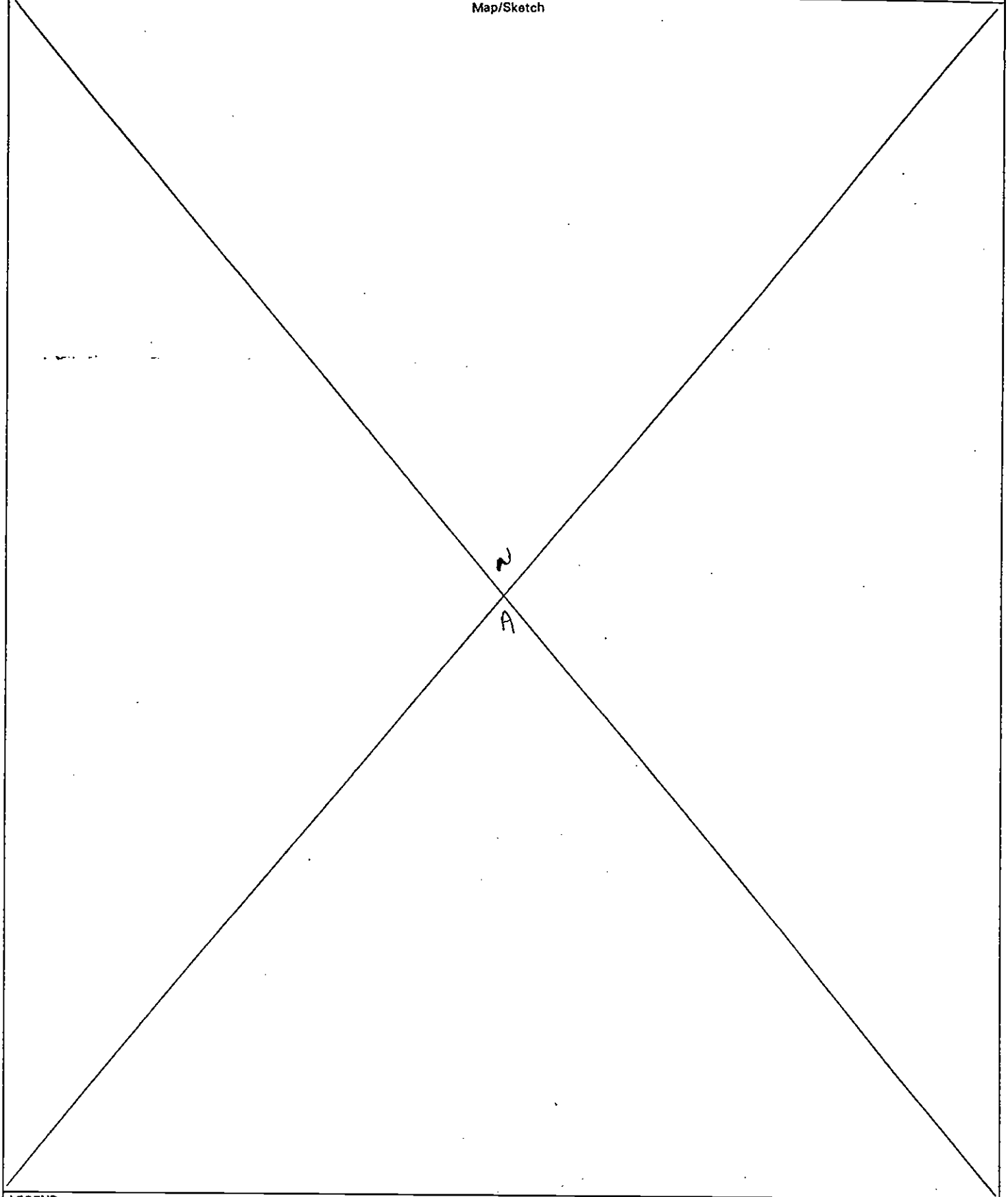
CONTAMINATION (C) MEASUREMENTS

No.	Description	Direct Gross cpm/PA β γ	Direct Gross cpm/PA α	Background β γ	Background α	Total dpm/100 cm² β γ	Total dpm/100 cm² α	Removable dpm/100 cm² β γ	Removable dpm/100 cm² α
103	Cell 27 Walkway			200				700K	N/A
104	Cell 27 Hot pipe trench			200				200K	
105	Cell 28 Block 3			200				150K	
106	Cell 28 Block 1			200				250K	
107	Cell 28 Walkway			200				550K	
108	Cell 28 Hot pipe trench			200				700K	
109	Cell 29 Block 4	N/A		200	6-26-98	N/A		500K	
110	Cell 29 Block ~~3~~ 2 6-26-98			200				17 mrad/hr **	
111	Cell 29 Walkway			200				350K	
112	Cell 29 Hot pipe trench			200				150K	
113	Cell 30 Block 3			200				450K	
114	Cell 30 Block 1			200				600K	
115	Cell 30 Walkway			200				25 mrad/hr **	
116	Cell 30 Hot pipe trench			200				350K	
			N/A						

Instr./Probe Model			N/A			
Serial No.						
Efficiency (used)						

PROJECT HANFORD RADIOLOGICAL SURVEY REPORT Continuation Sheet	F.C. B	Survey Report No. 261612 Page N-1	Page 14 of 52

Map/Sketch



LEGEND

(#) Smear (#) Air Sample (#) LAW [#] Neutron * Contact Reading

--------- (designation inside) --------- Radiological Area Boundary Dose Rates in mrem/h unless otherwise noted

PROJECT HANFORD
RADIOLOGICAL SURVEY REPORT Continuation Sheet

F.C. B

Survey Report No. 241612 Page N-18

DOSE RATE MEASUREMENTS Note 1 F = Field (>30 cm) C = Contact (≤1 cm)

No.	Description	Dist. (cm) Note 1	WO (mR/hr)	WC (mR/hr)	CF_β	CF_γ	Neutron Dose (mrem/hr)	Shallow Dose (mrem/hr)	Deep Dose (mrem/hr)
154	Cell 21 Block 3	F	29	18	3	1	N/A	51	18
155	Cell 21 Hot pipe Block A	C	21	10	3	1		43	10
155	Cell 21 Hot pipe Block A	F	10	8	3	1		14	8
156	Cell 22 Block 4	C	50	20	3	1		110	20
156	Cell 22 Block 4	F	70	22	3	1		166	22
157	Cell 22 Walkway	C	300	40	3	1		820	40
157	Cell 22 Walkway	F	35	15	3	1		75	15
158	Cell 23 Block 3	C	15	13	3	1		39	13
158	Cell 23 Block 3	F	20	10	3	1		40	10
159	Cell 23 Walkway	C	35	20	3	1		65	20
159	Cell 23 Walkway	F	32	15	3	1		66	15

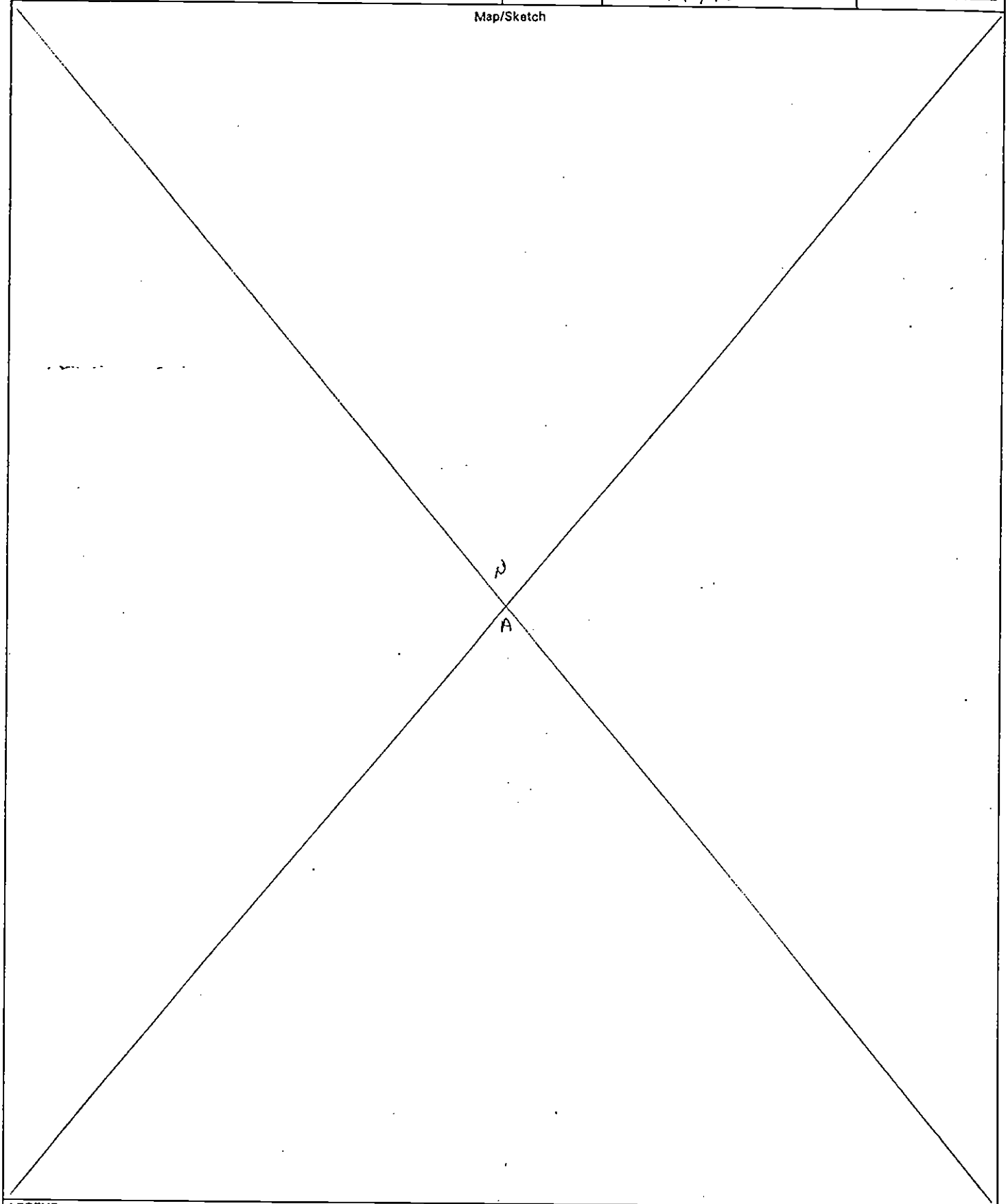
CONTAMINATION (C) MEASUREMENTS

No.	Description	Direct		Background		Total dpm/100 cm²		Removable dpm/100 cm²	
		Gross cpm/PA β γ	Gross cpm/PA α	β γ	α	β γ	α	β γ	α

Instr./Probe Model						
Serial No.						
Efficiency (used)						

PROJECT HANFORD RADIOLOGICAL SURVEY REPORT Continuation Sheet	F.C. B	Survey Report No. 261612 Page N-19	Page 16 of 52

Map/Sketch



LEGEND

(#) Smear (#) Air Sample (#) LAW [#] Neutron * Contact Reading

--------- (designation inside) --------- Radiological Area Boundary Dose Rates in mrem/h unless otherwise noted

PROJECT HANFORD
RADIOLOGICAL SURVEY REPORT Continuation Sheet

F.C. B | Survey Report No. 26162 | Page N-20 | Page 17 of 52

DOSE RATE MEASUREMENTS Note 1 F = Field (>30 cm) C = Contact (≤1 cm)

No.	Description	Dist. (cm) Note 1	WO (mR/hr)	WC (mR/hr)	CF_B	CF_γ	Neutron Dose (mrem/hr)	Shallow Dose (mrem/hr)	Deep Dose (mrem/hr)
160	Cell 24 Block 4	C	23	10	3	1	N/A	49	10
160	Cell 24 Block 4	F	12	8	3	1		20	8
161	Cell 24 Walkway	C	150	50	3	1		350	50
161	Cell 24 Walk way	F	30	20	3	1		50	20
162	Cell 25 Block 2	C	45	23	3	1		89	23
162	Cell 25 Block 2	F	28	15	3	1		54	15
163	Cell 25 Hot pipe Block A	C	30	13	3	1		64	13
163	Cell 25 Hot pipe Block A	F	16	12	3	1		24	12
164	Cell 26 Block 4	C	35	17	3	1		71	17
164	Cell 26 Block 4	F	23	11	3	1		47	11
165	Cell 26 Walkway	C	90	20	3	1		230	20

CONTAMINATION (C) MEASUREMENTS

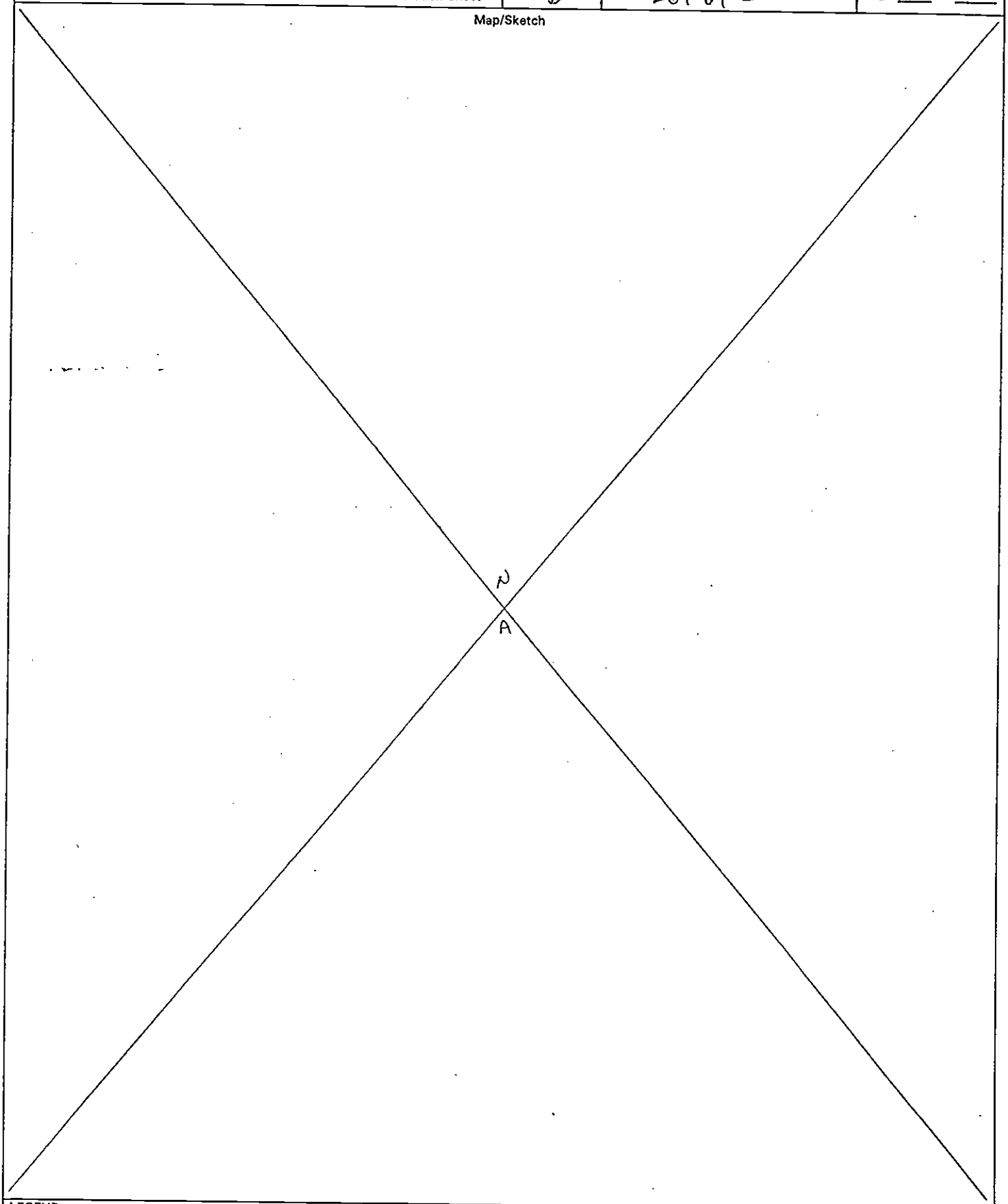
No.	Description	Direct Gross cpm/PA β γ	Direct Gross cpm/PA α	Background β γ	Background α	Total dpm/100 cm² β γ	Total dpm/100 cm² α	Removable dpm/100 cm² β γ	Removable dpm/100 cm² α

N/A

Instr./Probe Model						
Serial No.						
Efficiency (used)						

PROJECT HANFORD RADIOLOGICAL SURVEY REPORT Continuation Sheet	F.C. B	Survey Report No. 26162	Page 18 of 52

Map/Sketch



LEGEND

(#) Smear (#) Air Sample (#) LAW [#] Neutron * Contact Reading

- - - - - - - - - (designation inside) - - - - - - - - - Radiological Area Boundary

Dose Rates in mrem/h unless otherwise noted

PROJECT HANFORD
RADIOLOGICAL SURVEY REPORT Continuation Sheet

F.C. B

Survey Report No. 26116,12 Page N-22

DOSE RATE MEASUREMENTS Note 1 F = Field (>30 cm) C = Contact (≤1 cm)

No.	Description	Dist. (cm) Note 1	WO (mR/hr)	WC (mR/hr)	CF_B	CF_γ	Neutron Dose (mrem/hr)	Shallow Dose (mrem/hr)	Deep Dose (mrem/hr)
165	Cell 26 walkway	F	26	14	3	1	N/A	50	14
166	Cell 27 Block 2	C	450	200	3	1		950	200
166	Cell 27 Block 2	F	250	40	3	1		630	40
167	Cell 27 Hot pipe Block A	C	35	15	3	1		75	15
167	Cell 27 Hot pipe block A	F	15	10	3	1		25	10
168	Cell 28 Block 4	C	60	20	3	1		140	20
168	Cell 28 Block 4	F	25	15	3	1		45	15
169	Cell 28 walkway	C	350	80	3	1		590	80
169	Cell 28 Walkway	F	120	40	3	1		280	40
170	Cell 29 Block 3	C	80	45	3	1		150	45
170	Cell 29 Block 3	F	60	30	3	1		120	30

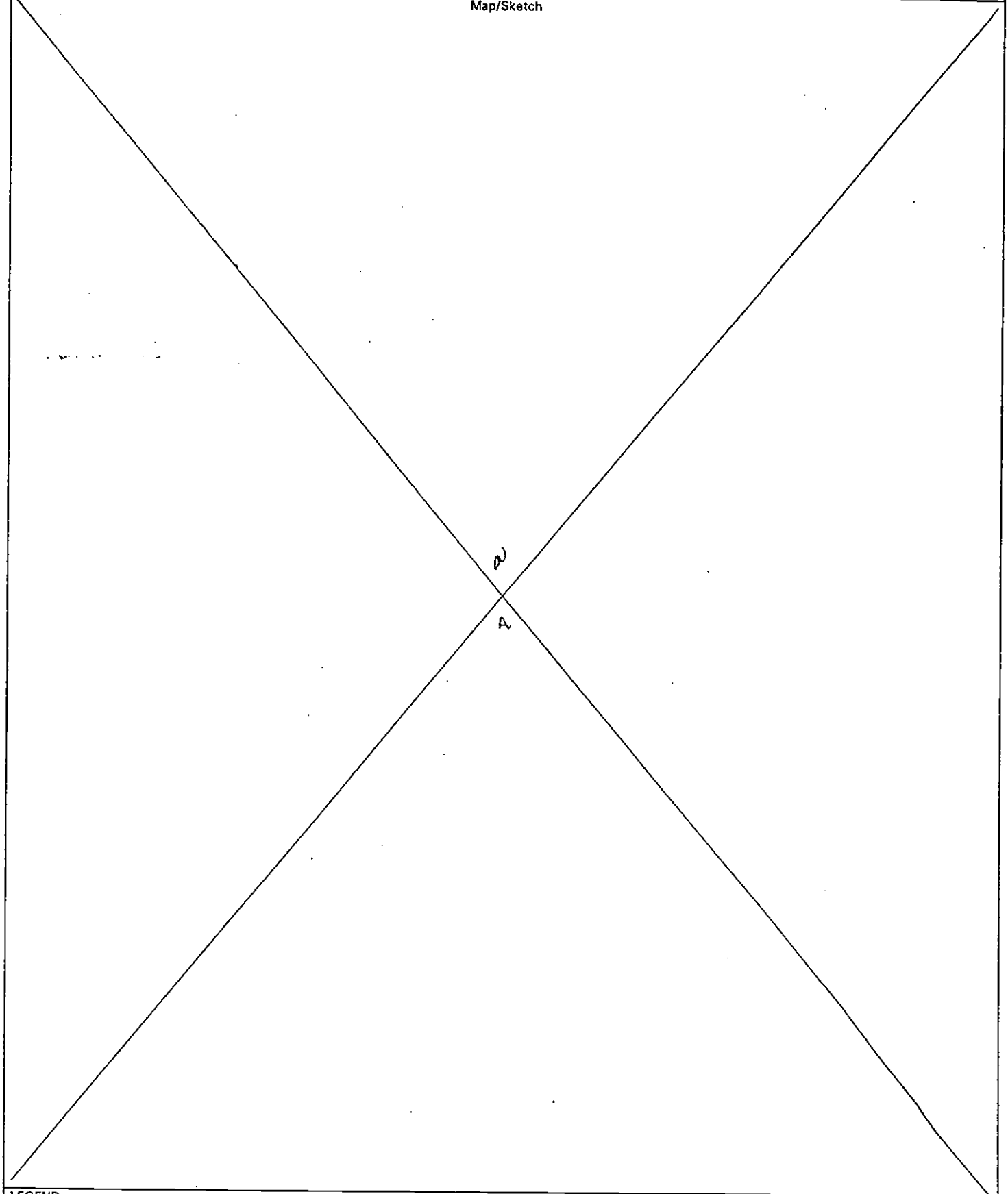
CONTAMINATION (C) MEASUREMENTS

No.	Description	Direct		Background		Total dpm/100 cm²		Removable dpm/100 cm²	
		Gross cpm/PA β γ	Gross cpm/PA α	β γ	α	β γ	α	β γ	α

Instr./Probe Model						
Serial No.						
Efficiency (used)						

PROJECT HANFORD RADIOLOGICAL SURVEY REPORT Continuation Sheet	F.C.	Survey Report No.	Page 20 of 52
	B	261612	

Map/Sketch



LEGEND

(#) Smear (#) Air Sample (#) LAW [#] Neutron * Contact Reading

- - - - - - - - - (designation inside) - - - - - - - - - Radiological Area Boundary

Dose Rates in mrem/h unless otherwise noted

PROJECT HANFORD
RADIOLOGICAL SURVEY REPORT Continuation Sheet

F.C. B

Survey Report No. 26162 Page N-24

DOSE RATE MEASUREMENTS Note 1 F = Field (>30 cm) C = Contact (≤1 cm)

No.	Description	Dist. (cm) Note 1	WO (mR/hr)	WC (mR/hr)	CF_β	CF_γ	Neutron Dose (mrem/hr)	Shallow Dose (mrem/hr)	Deep Dose (mrem/hr)
171	Cell 29 Hot pipe block A	C	30	18	3	1	N/A	54	18
171	Cell 29 Hot pipe block A	F	29	24	3	1		69	24
172	Cell 30 Block 4	C	75	18	3	1		189	18
172	Cell 30 Block 4	F	25	20	3	1		35	20
173	Cell 30 Walkway	C	120	70	3	1		220	70
173	Cell 30 Walkway	F	60	30	3	1		120	30

N/A

CONTAMINATION (C) MEASUREMENTS

No.	Description	Direct		Background		Total dpm/100 cm²		Removable dpm/100 cm²	
		Gross cpm/PA β γ	Gross cpm/PA α	β γ	α	β γ	α	β γ	α

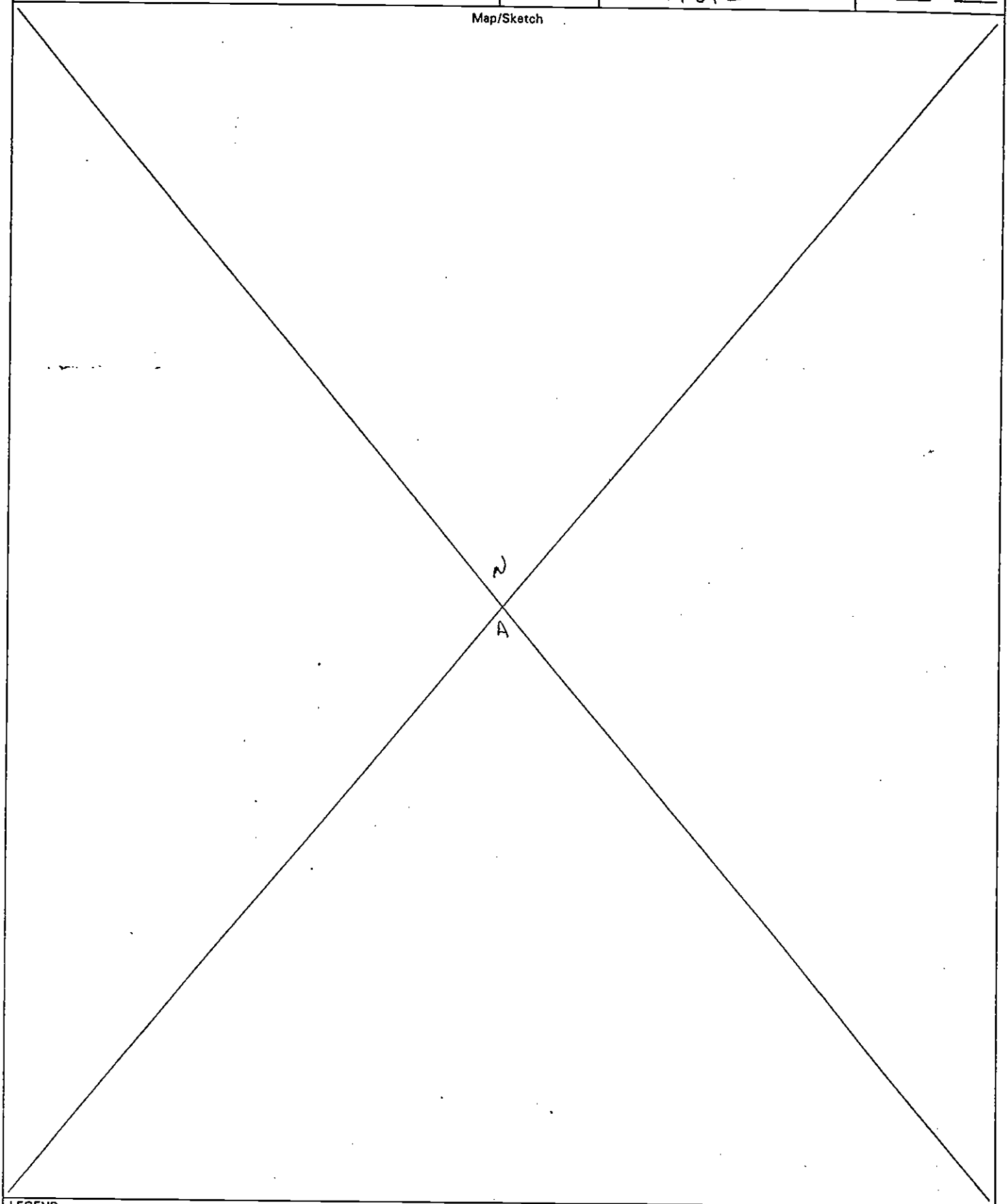
N/A

Instr./Probe Model						
Serial No.						
Efficiency (used)						

N/A

PROJECT HANFORD RADIOLOGICAL SURVEY REPORT Continuation Sheet	F.C. B	Survey Report No. 26162	Page 22 of 52

Map/Sketch



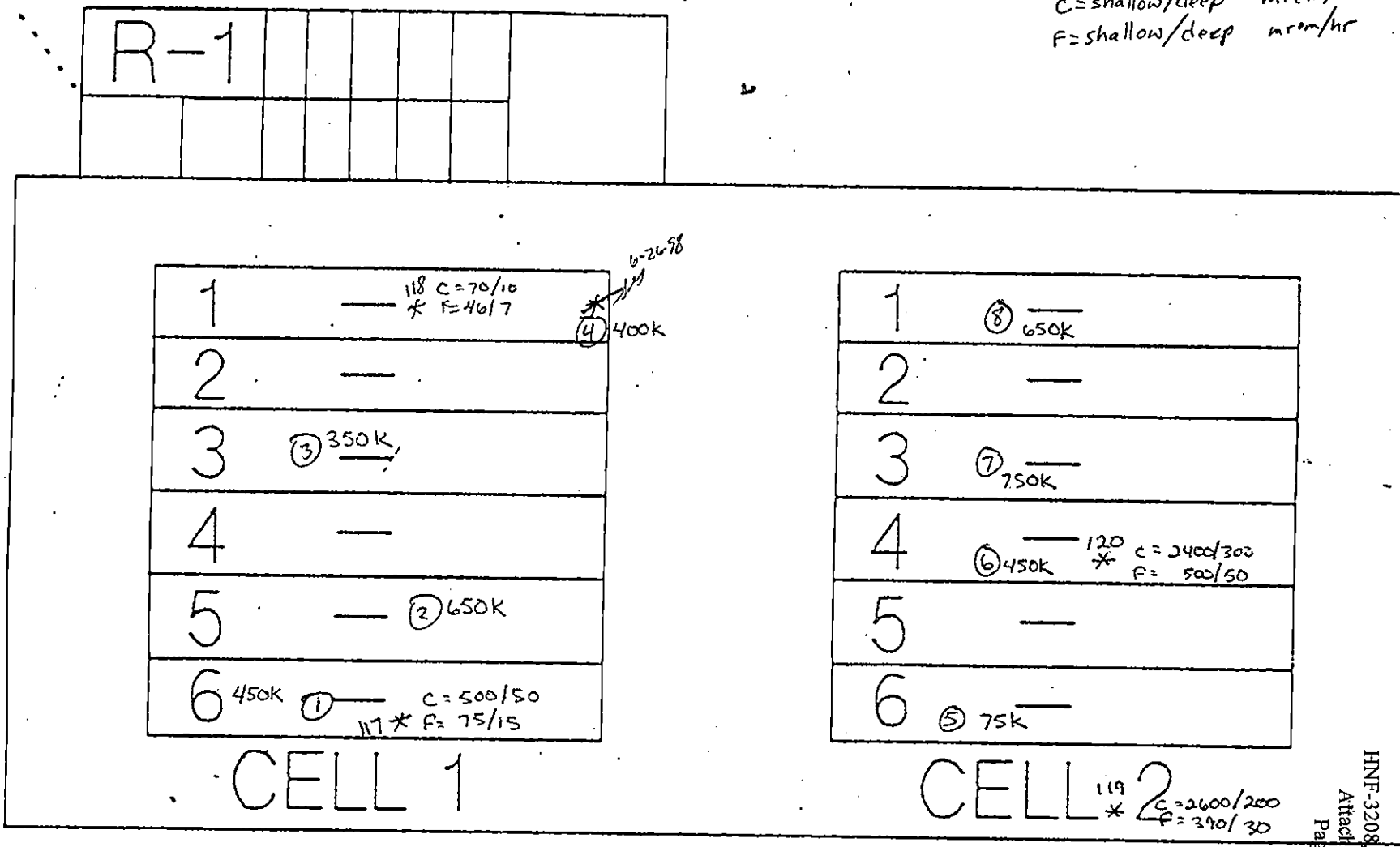
LEGEND

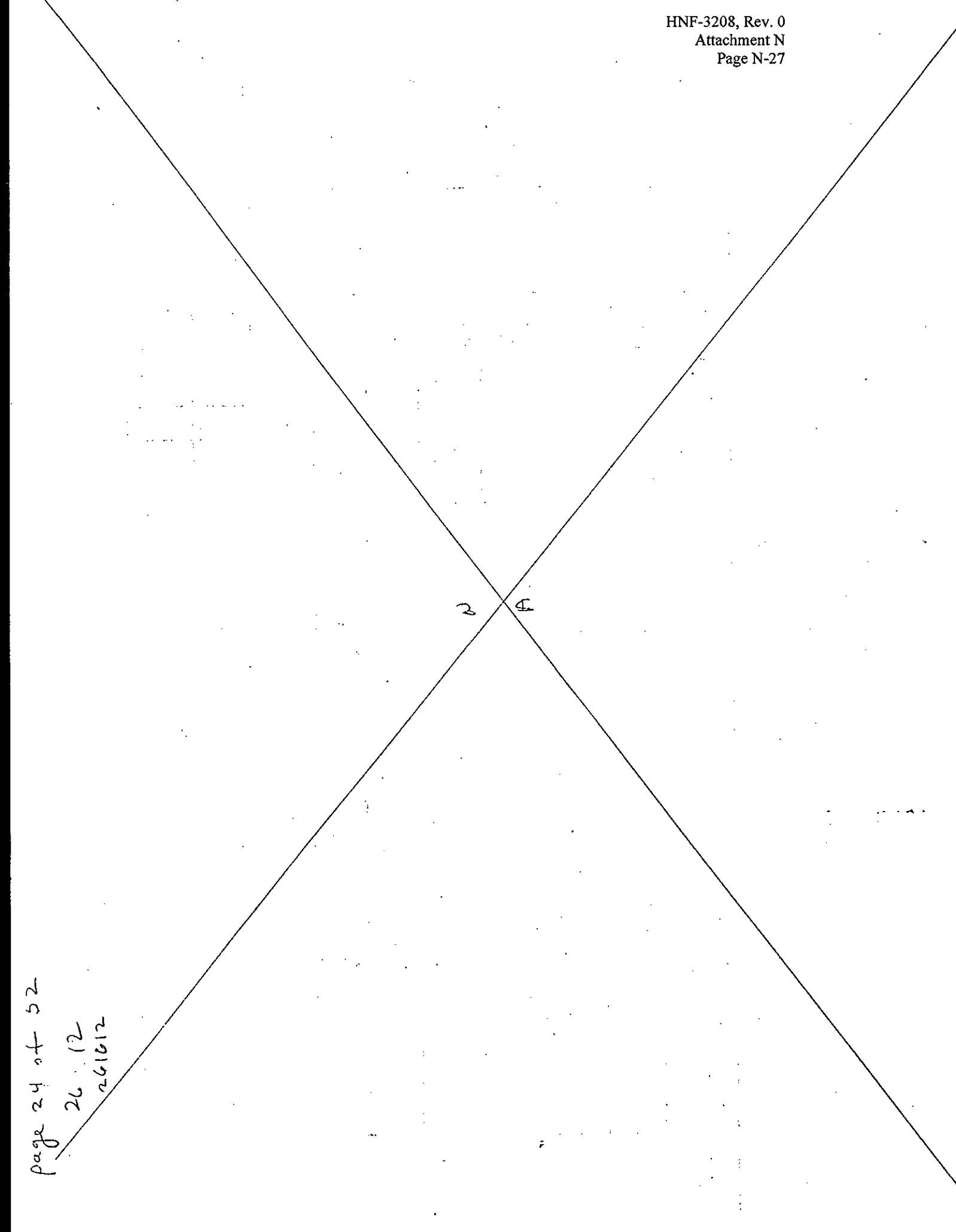
(#) Smear (#) Air Sample (#) LAW [#] Neutron * Contact Reading

- - - - - - - - - (designation inside) - - - - - - - - - Radiological Area Boundary Dose Rates in mrem/h unless otherwise noted

2 /12
2/16/12

All smears are technical and noted in dpm/ cm² βγ unless noted as mrad/hr (K=1000). All dose rates are taken waist height (F) and ½" (C), format is
C = shallow/deep mrem/hr
F = shallow/deep mrem/hr





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26612

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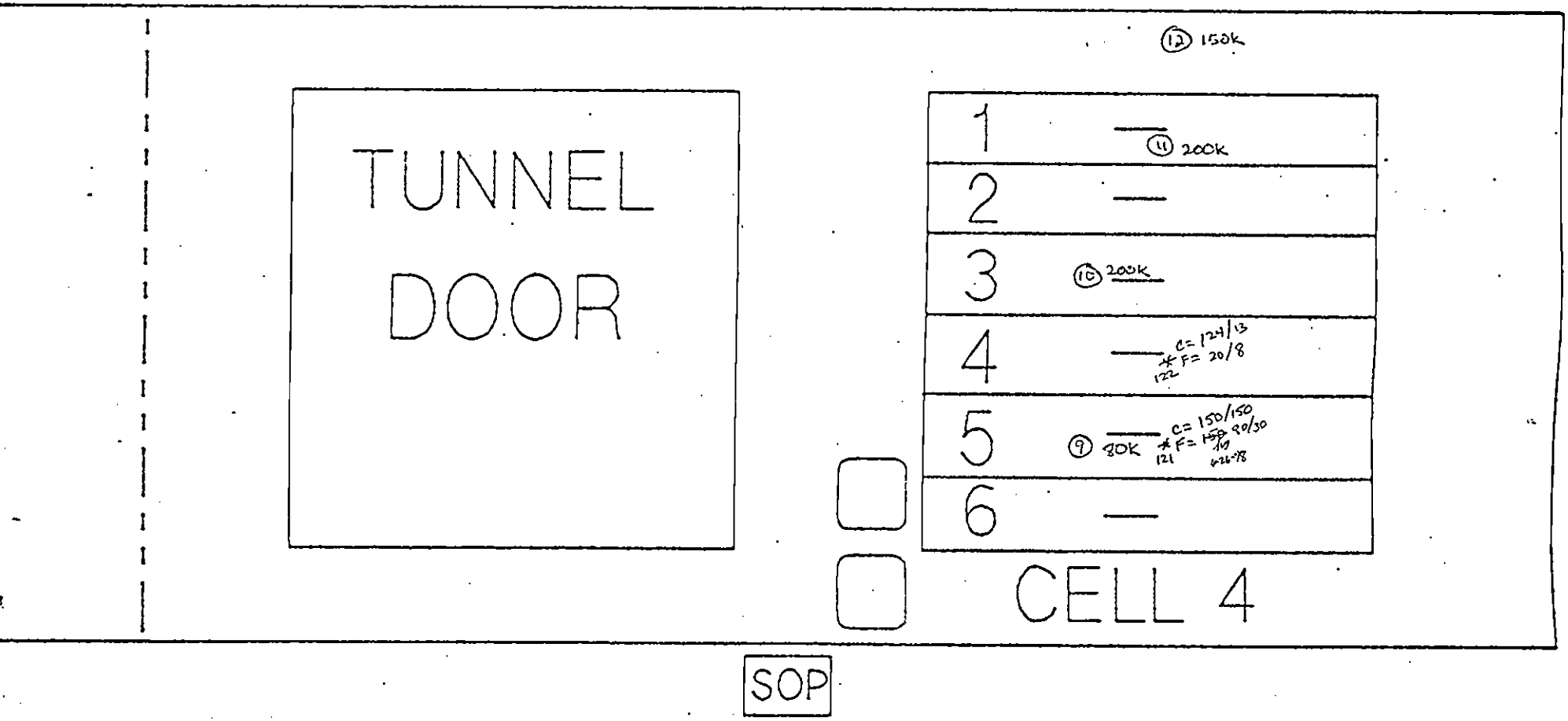
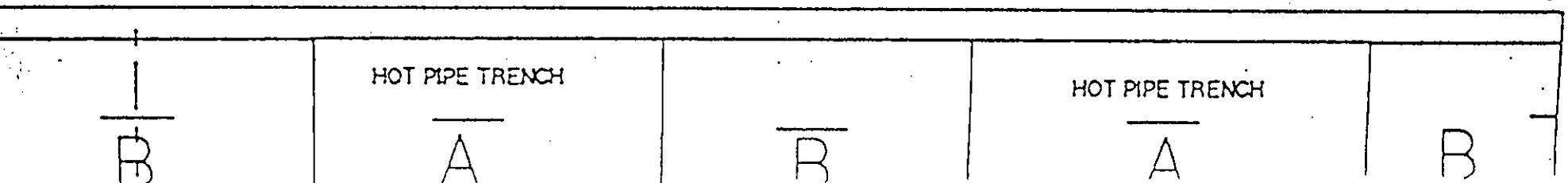
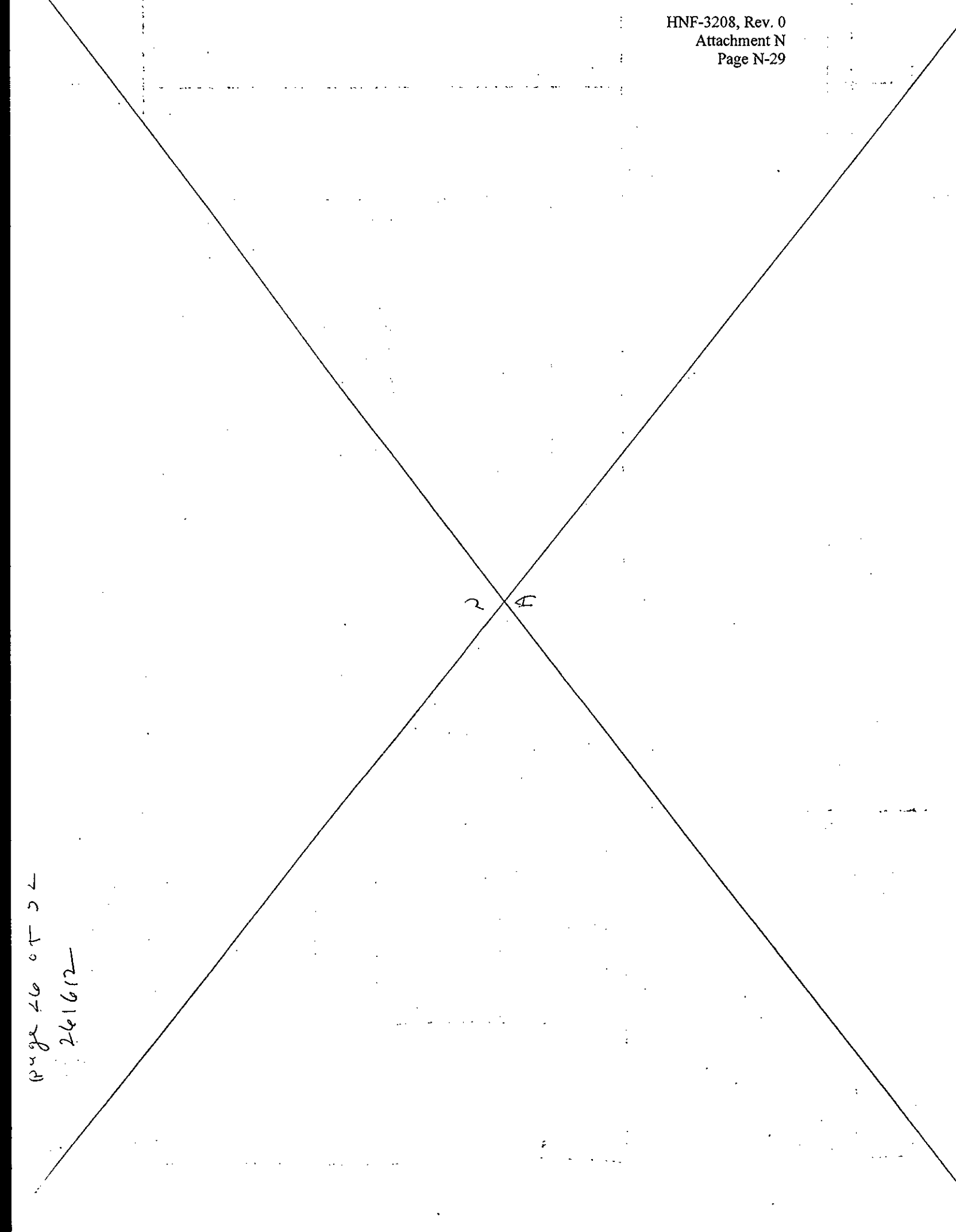
261612







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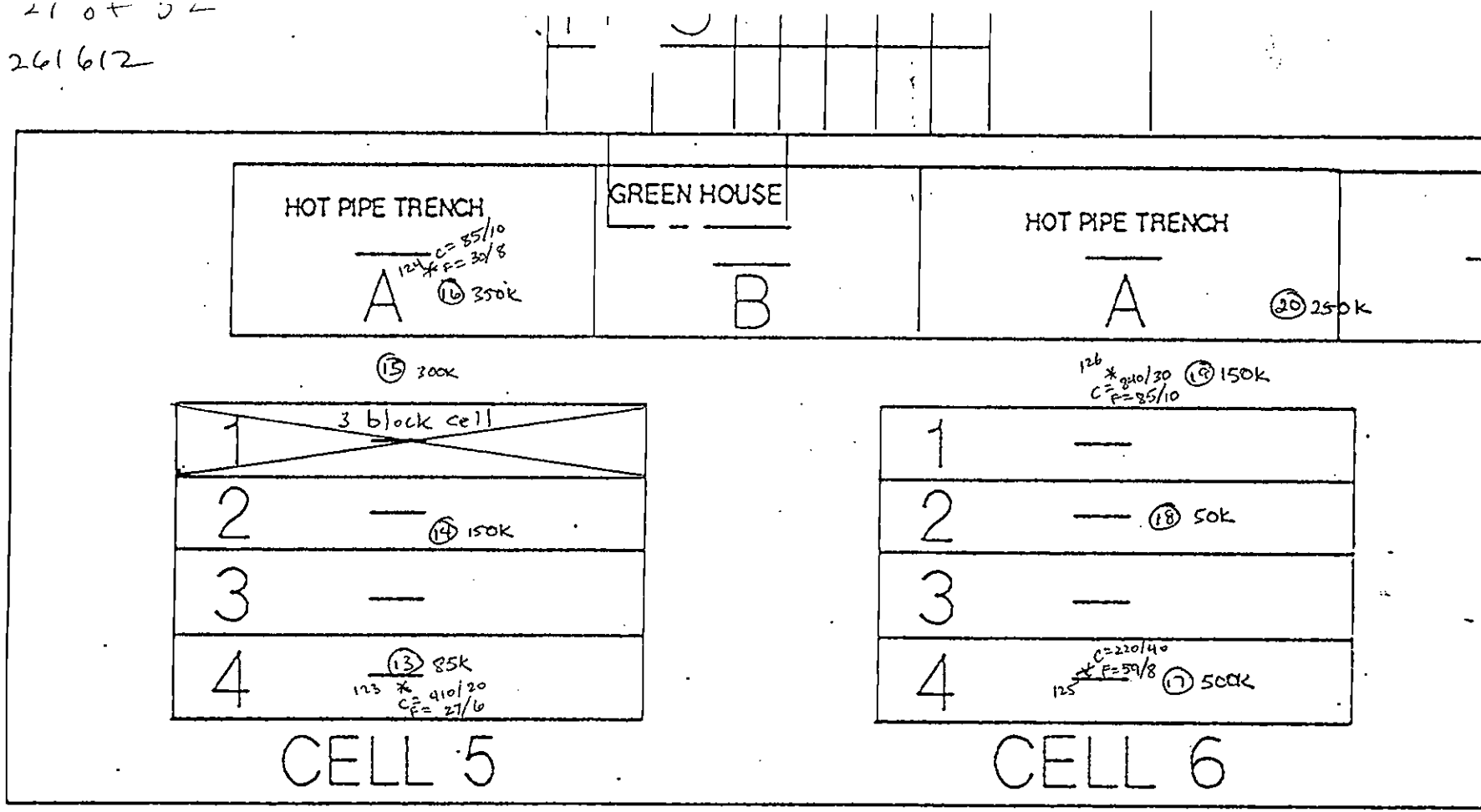

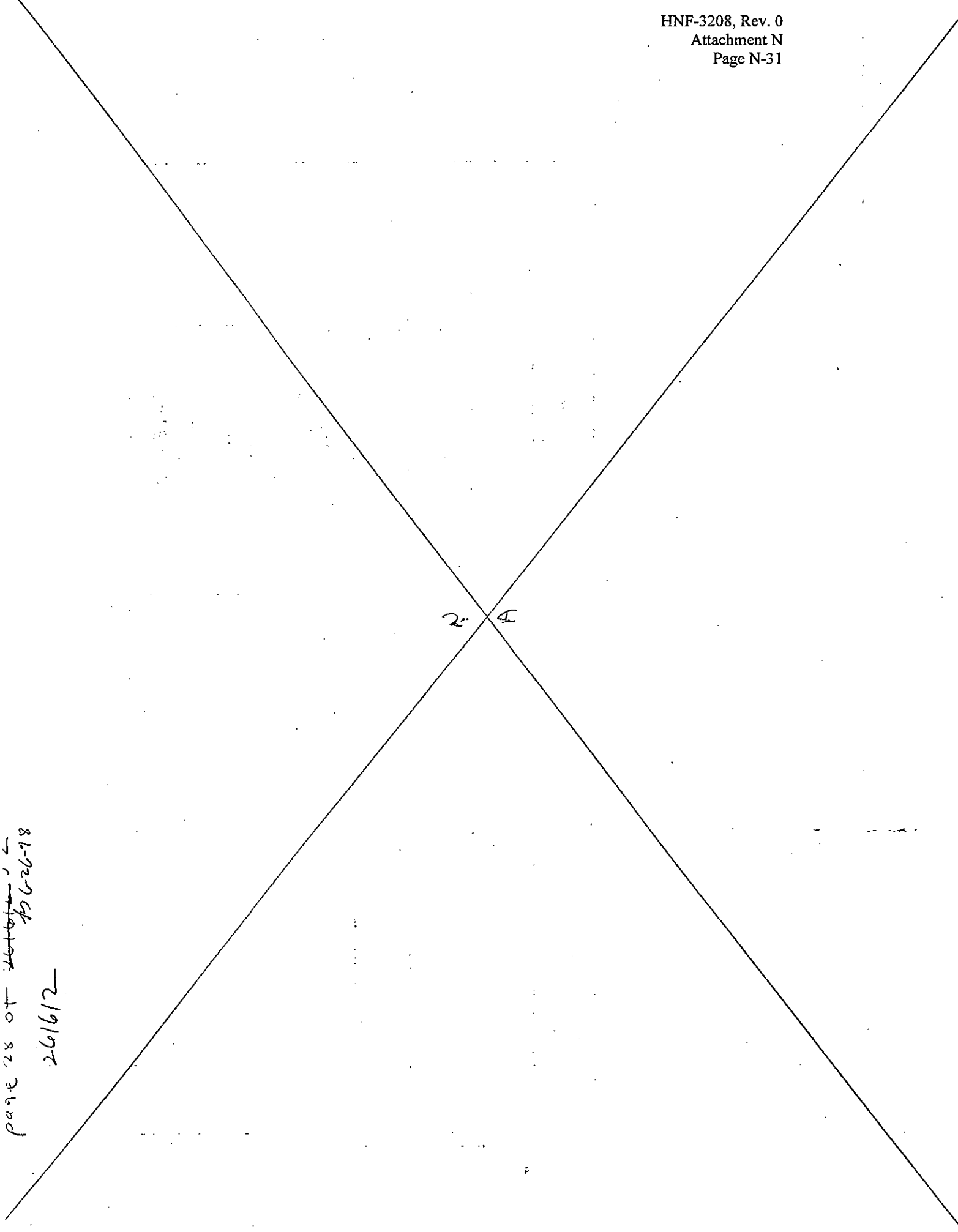

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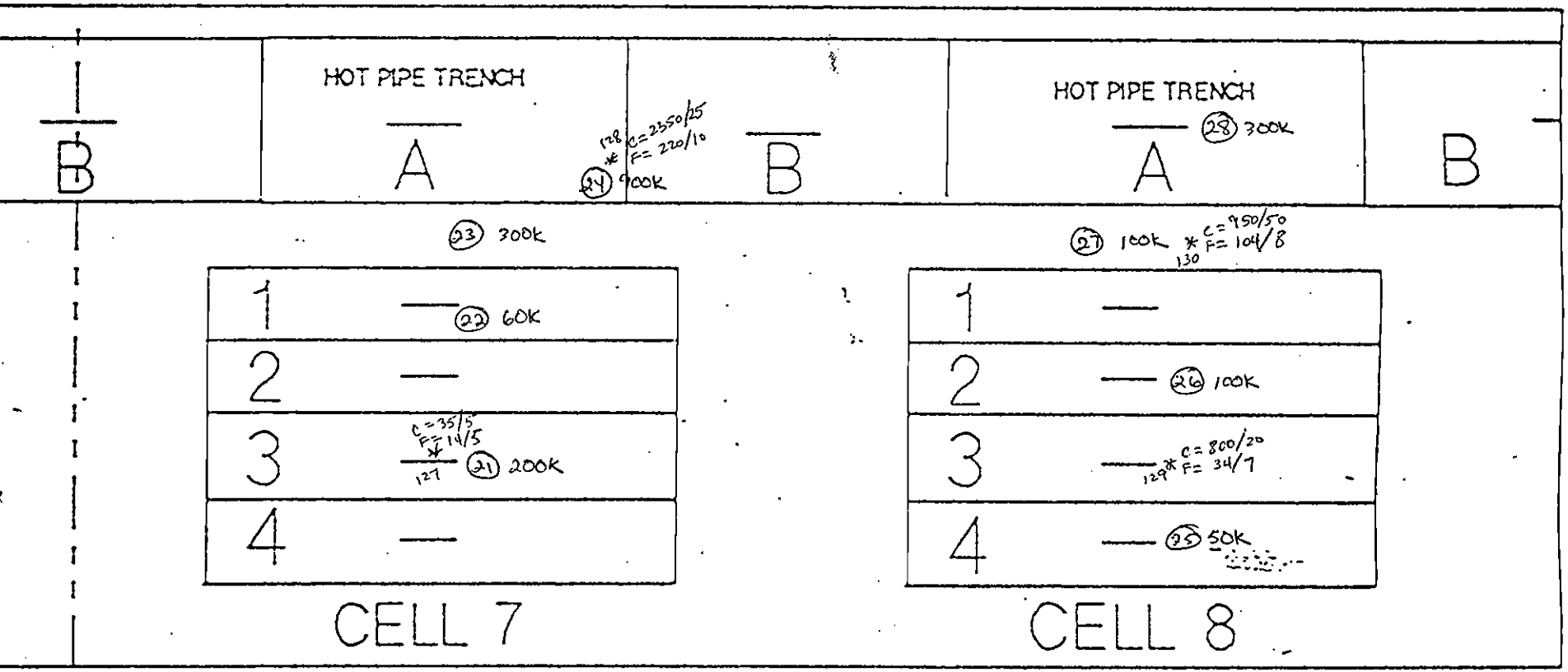
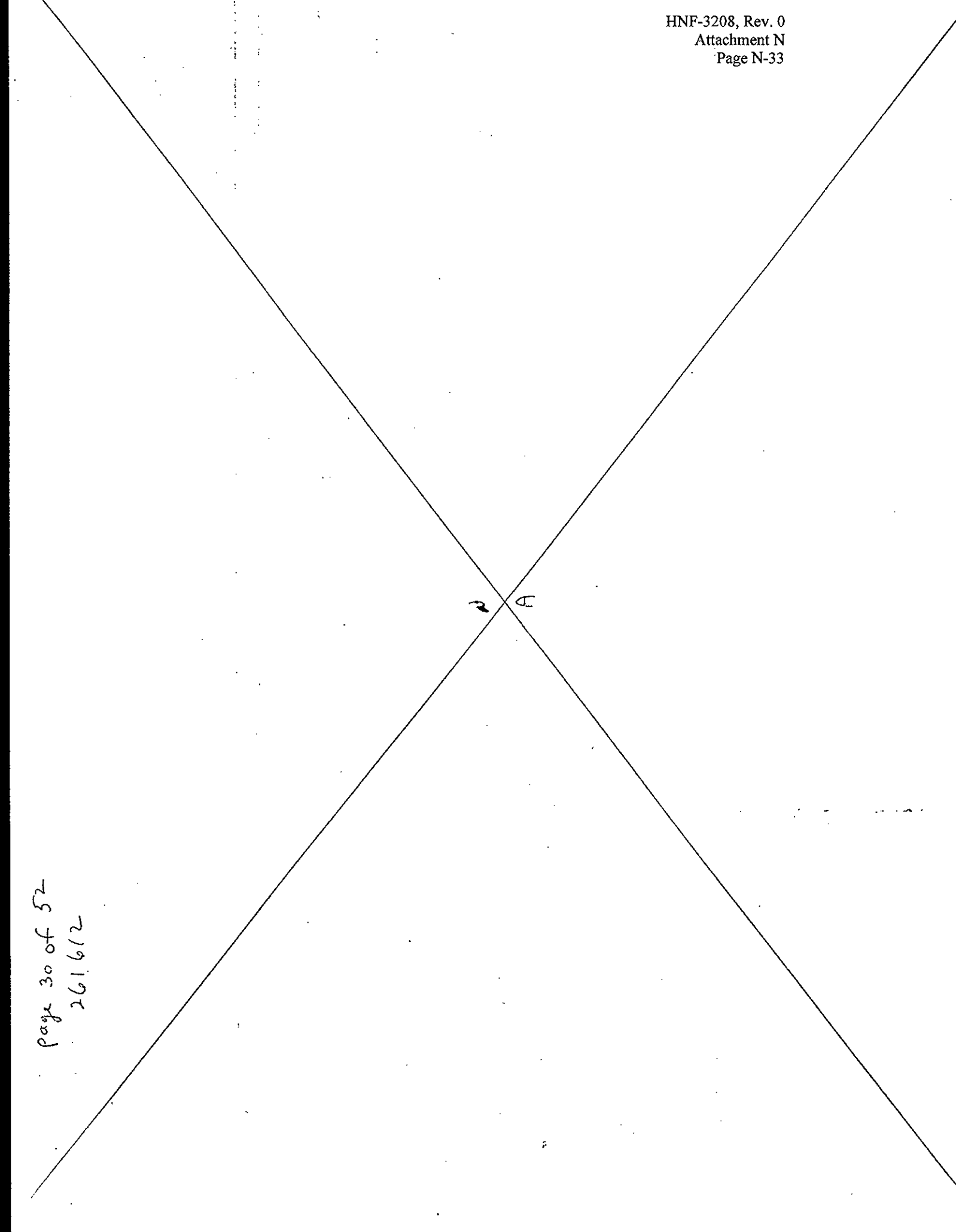
page 28 of ~~[illegible]~~ 26-26-98

26/6/2

SOP


B
HOT PIPE TRENCH
A
128 * C=2350/25 F=220/10
24 900K
B
HOT PIPE TRENCH
28 300K
A
B
23 300K
27 100K * 130 C=950/50 F=104/8
1
22 60K
2
3
C=35/5 F=14/5
127
21 200K
4
CELL 7
1
2
26 100K
3
129 * C=800/20 F=34/7
4
25 50K
CELL 8



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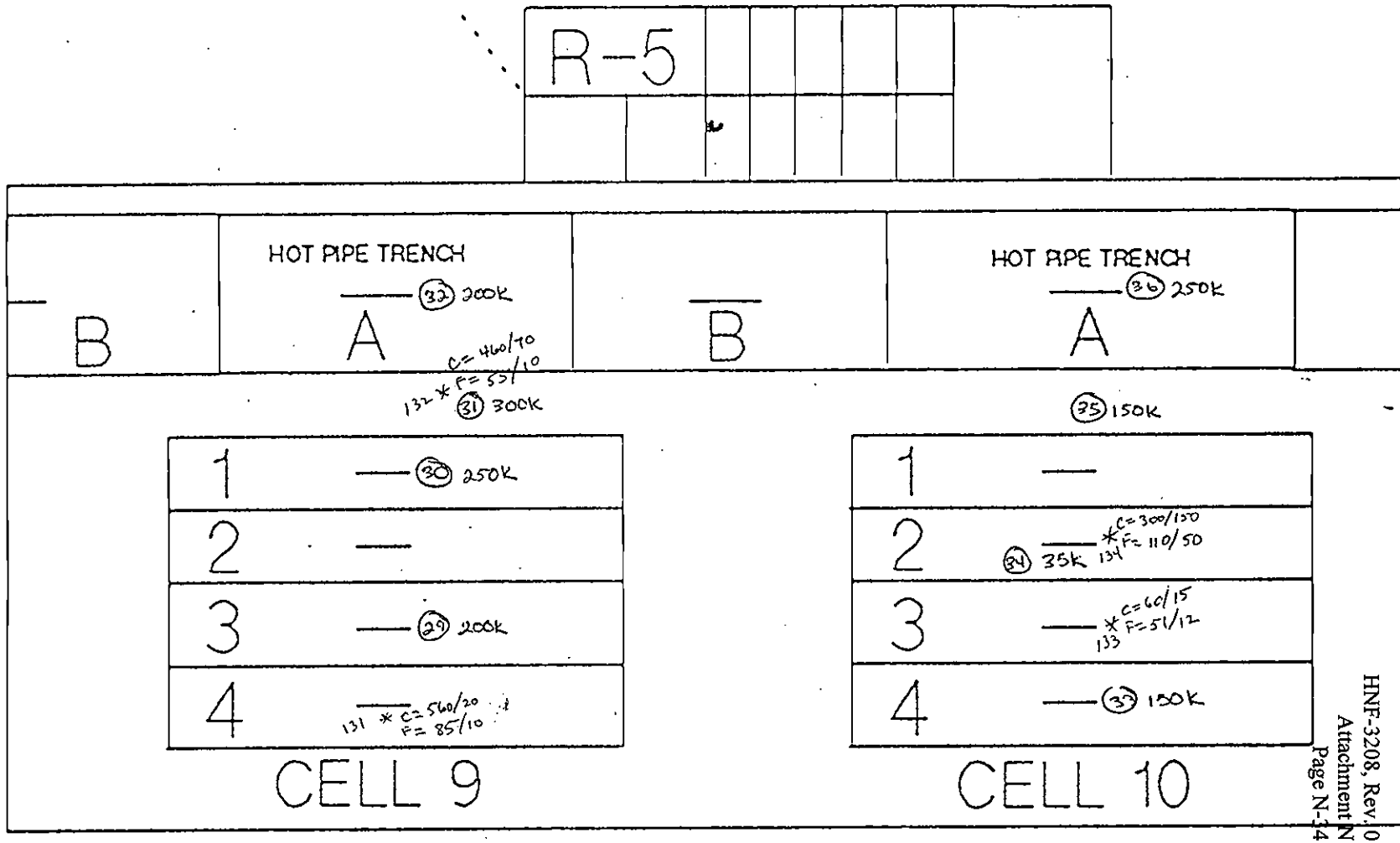

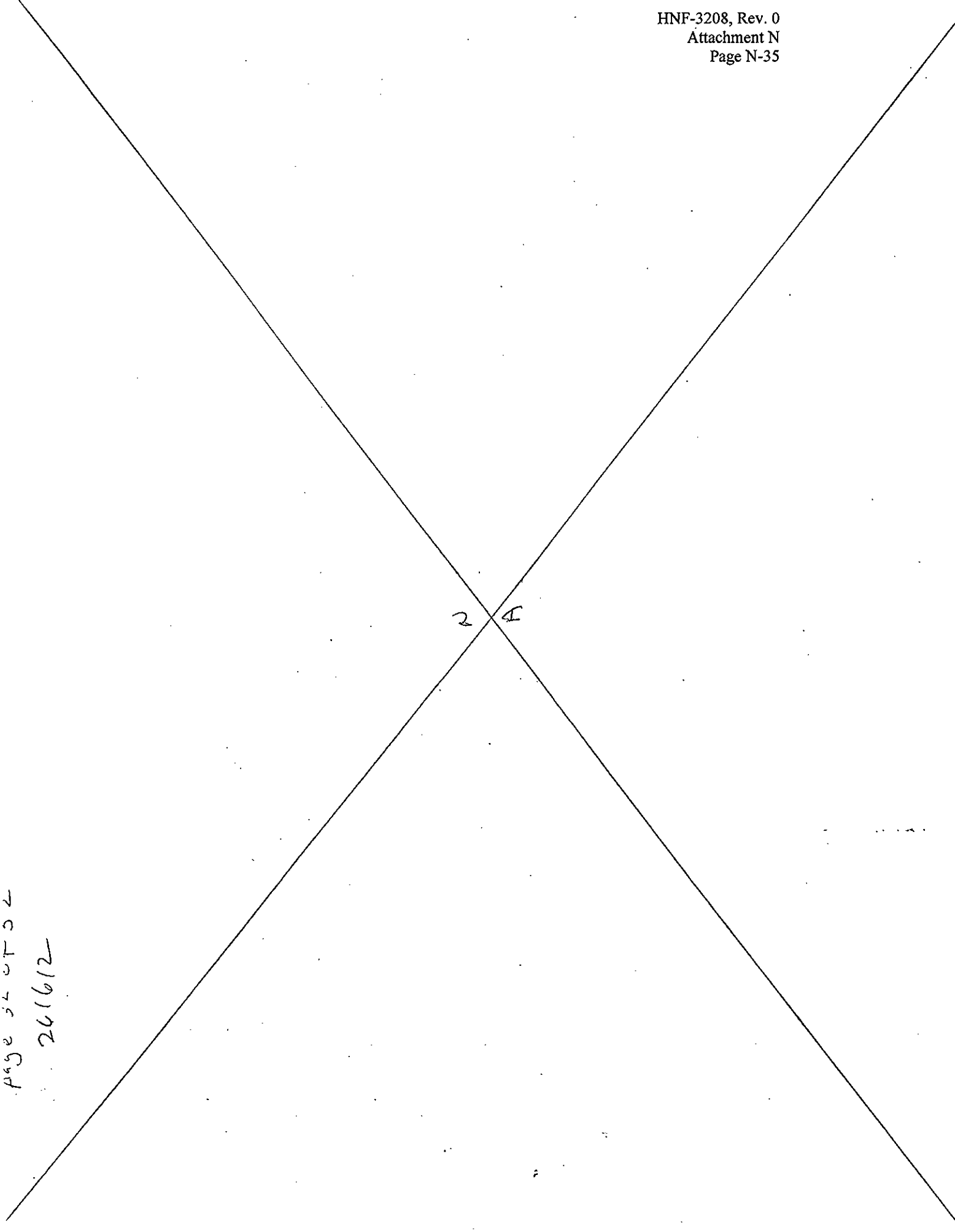

2 A

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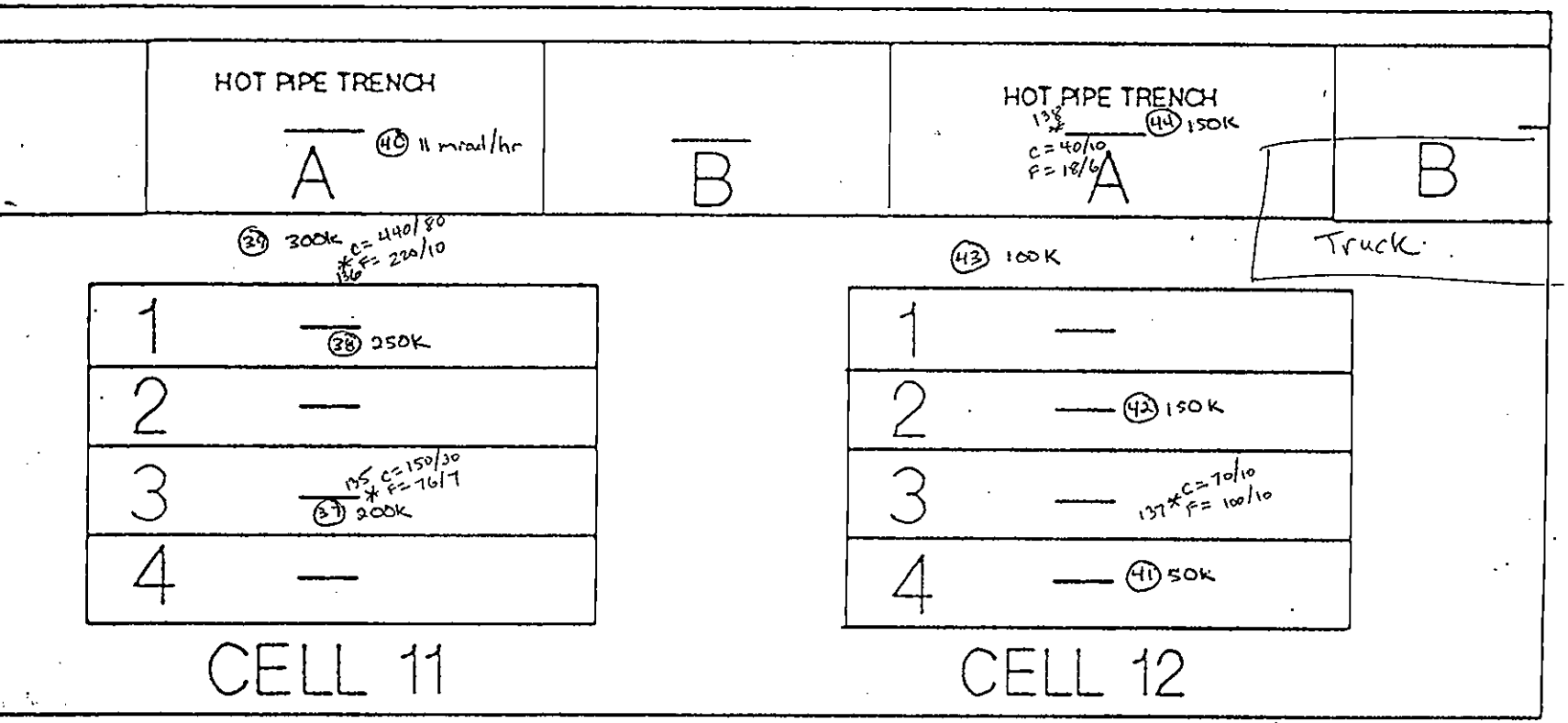
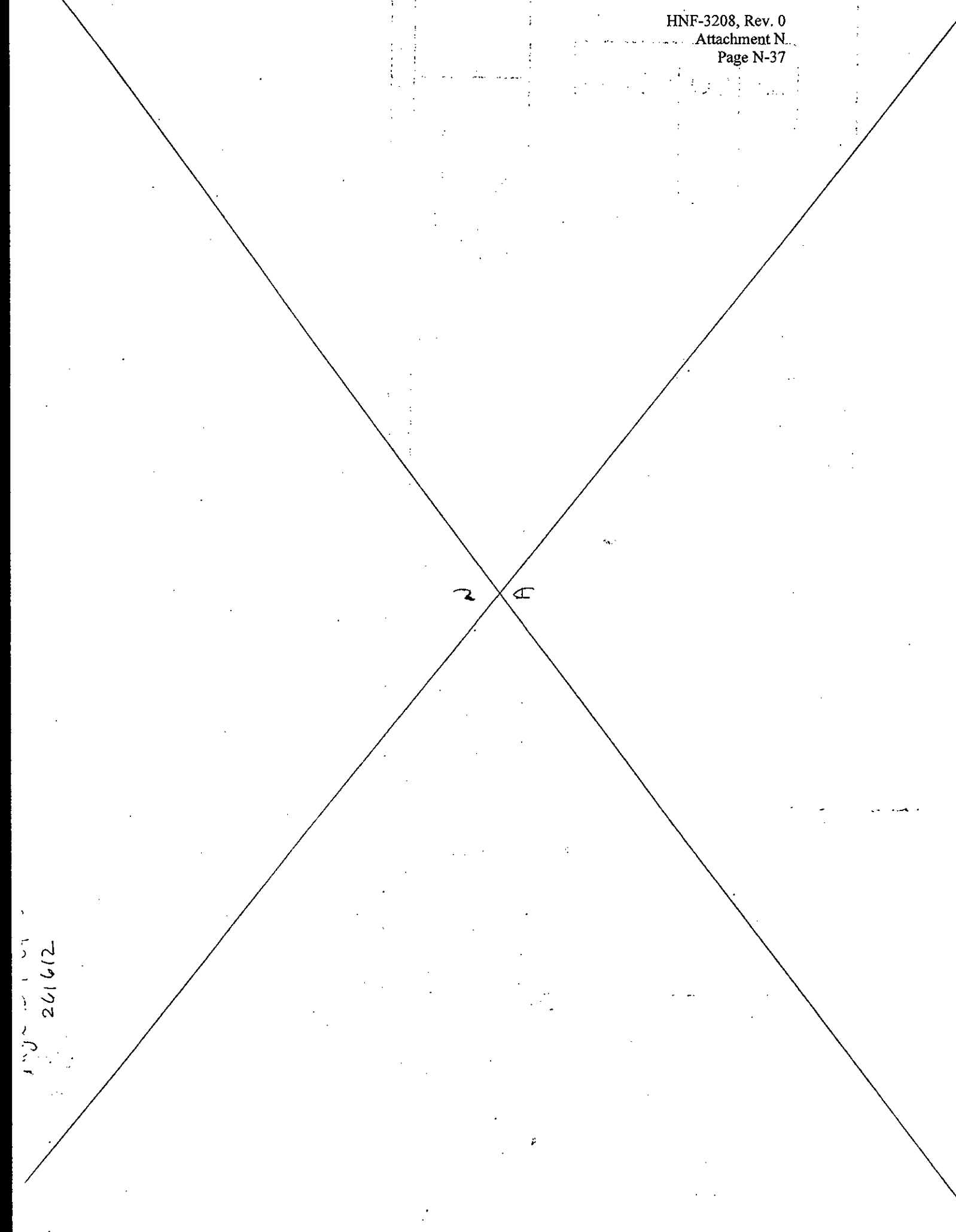
261612

ELLS 9-16


HOT PIPE TRENCH
A
(40) 11 mrad/hr
B
HOT PIPE TRENCH
138*
(44) 150K
C = 40/10
F = 18/6
A
B
Truck
(39) 300K C = 440/80
136* F = 220/10
(43) 100K
1
(38) 250K
2
3
135* C = 150/30
* F = 76/7
(37) 200K
4
1
2
(42) 150K
3
137* C = 70/10
F = 100/10
4
(41) 50K
CELL 11
CELL 12



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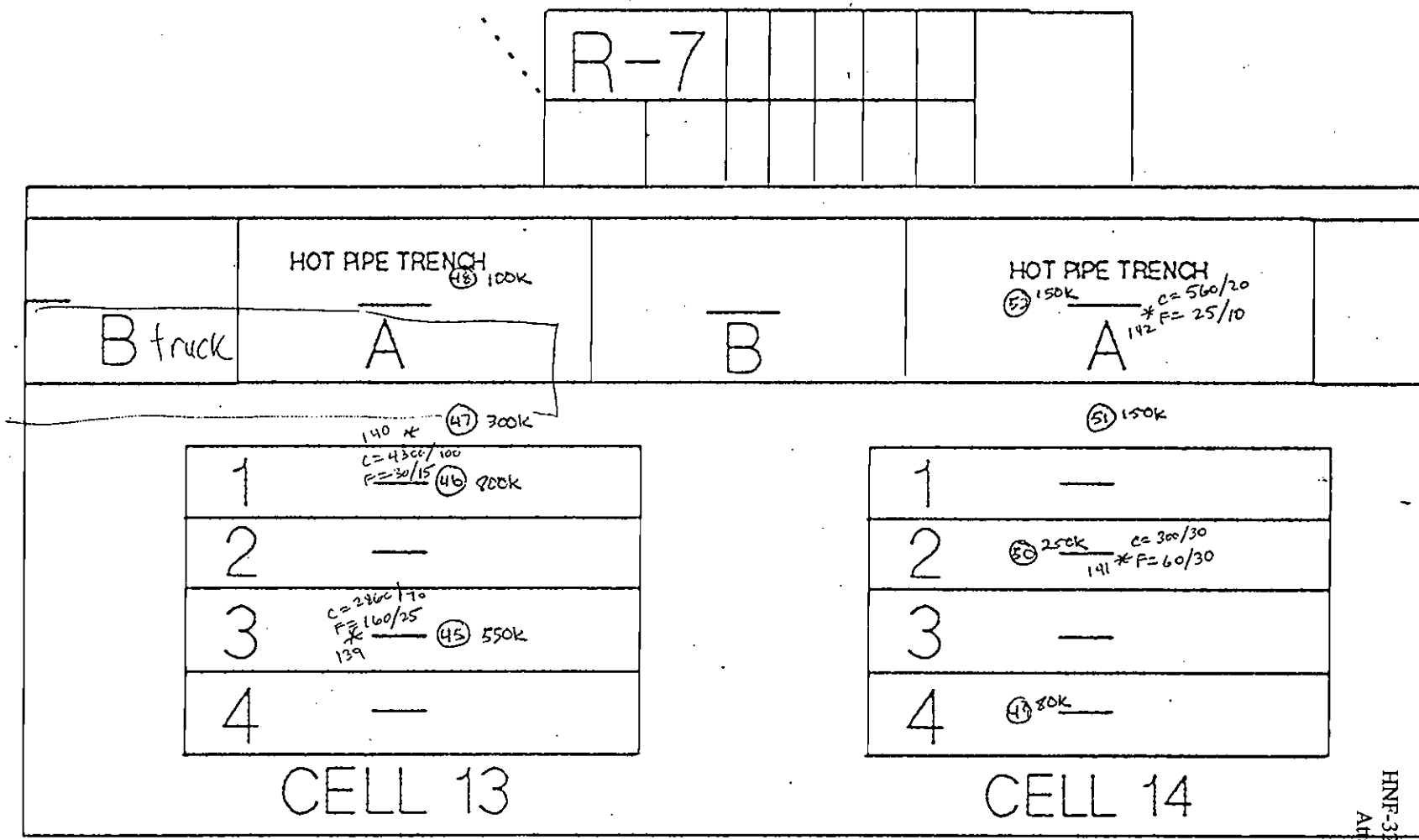

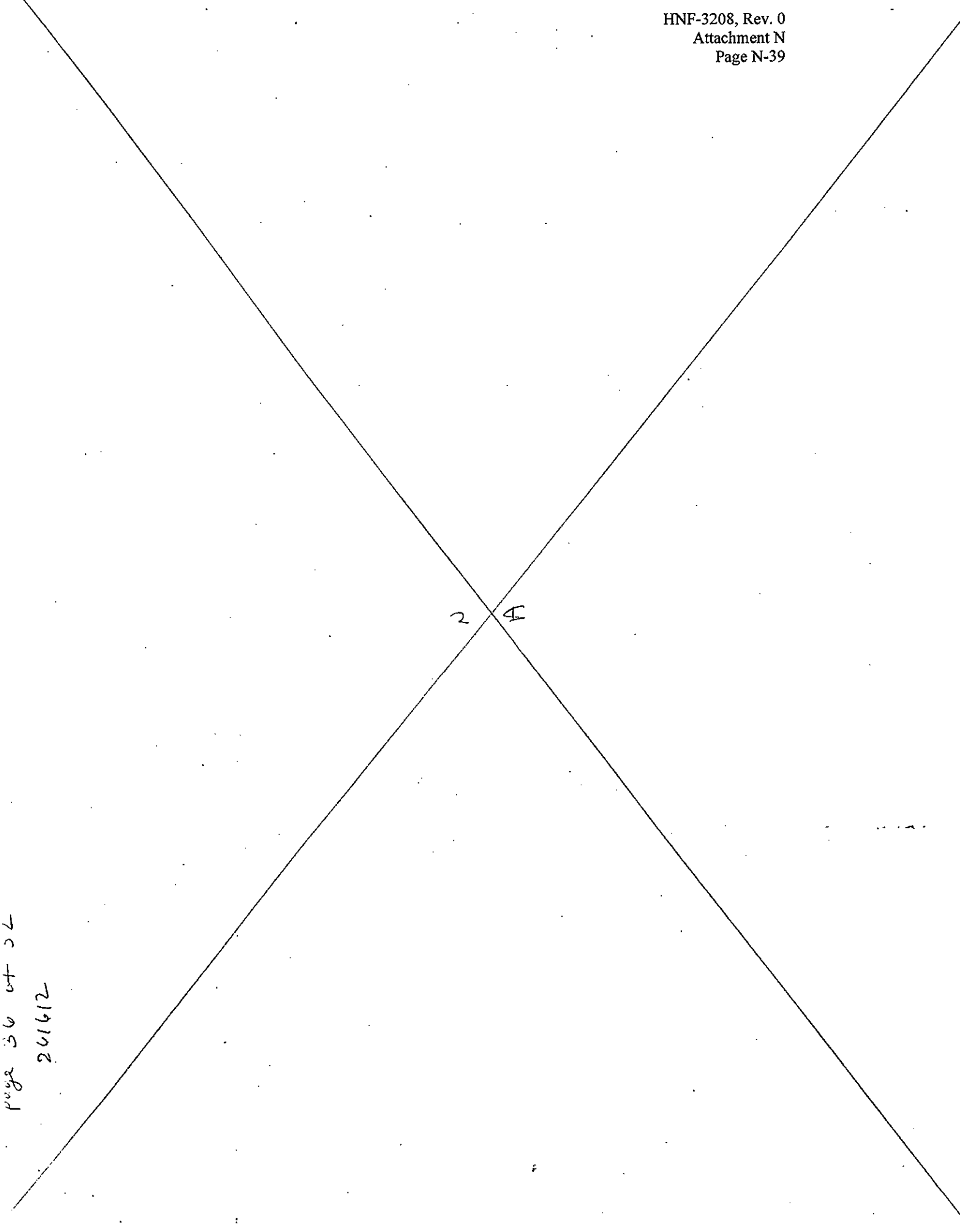

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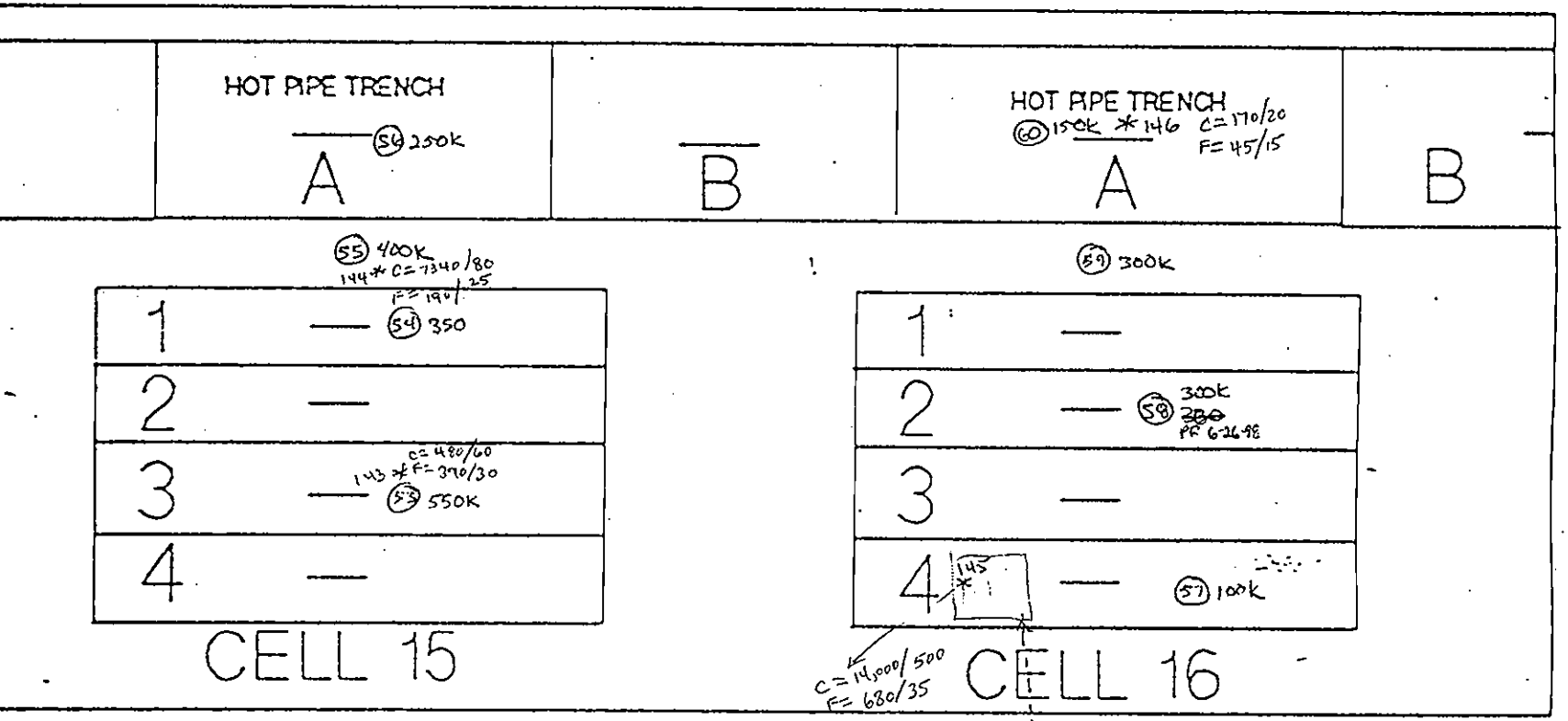
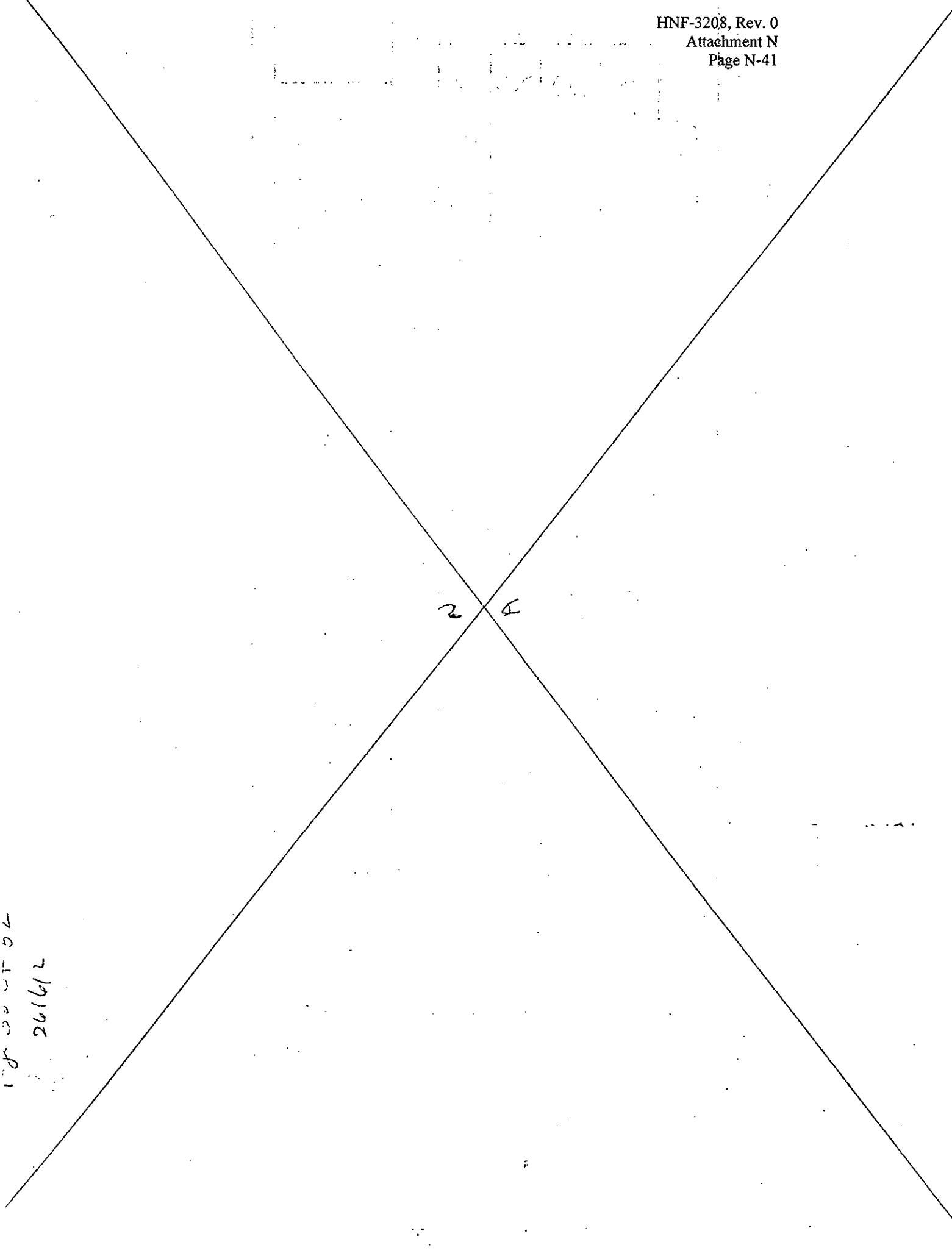
261612


HOT PIPE TRENCH
(56) 250K
A
B
HOT PIPE TRENCH
(60) 150K * 146 C=170/20 F=45/15
A
B
(55) 400K
144 * C=7340/80 F=190/25
1
(54) 350
2
3
143 * C=480/60 F=370/30
(53) 550K
4
CELL 15
(59) 300K
1
2
(58) 300K PR 6-26-98
3
4
145 *
(57) 100K
C=14,000/500 F=680/35
CELL 16
lifting bails & stand


2
A

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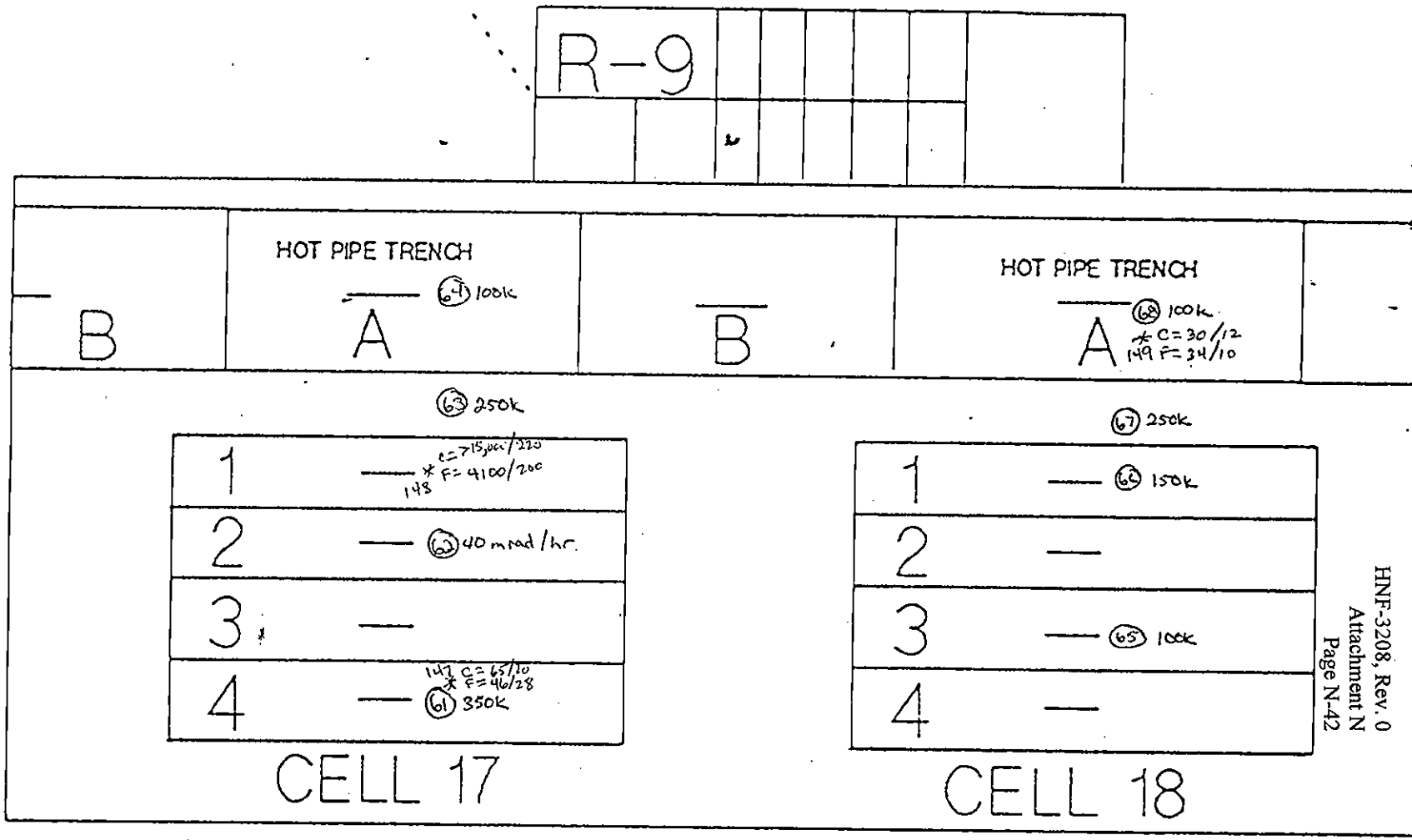
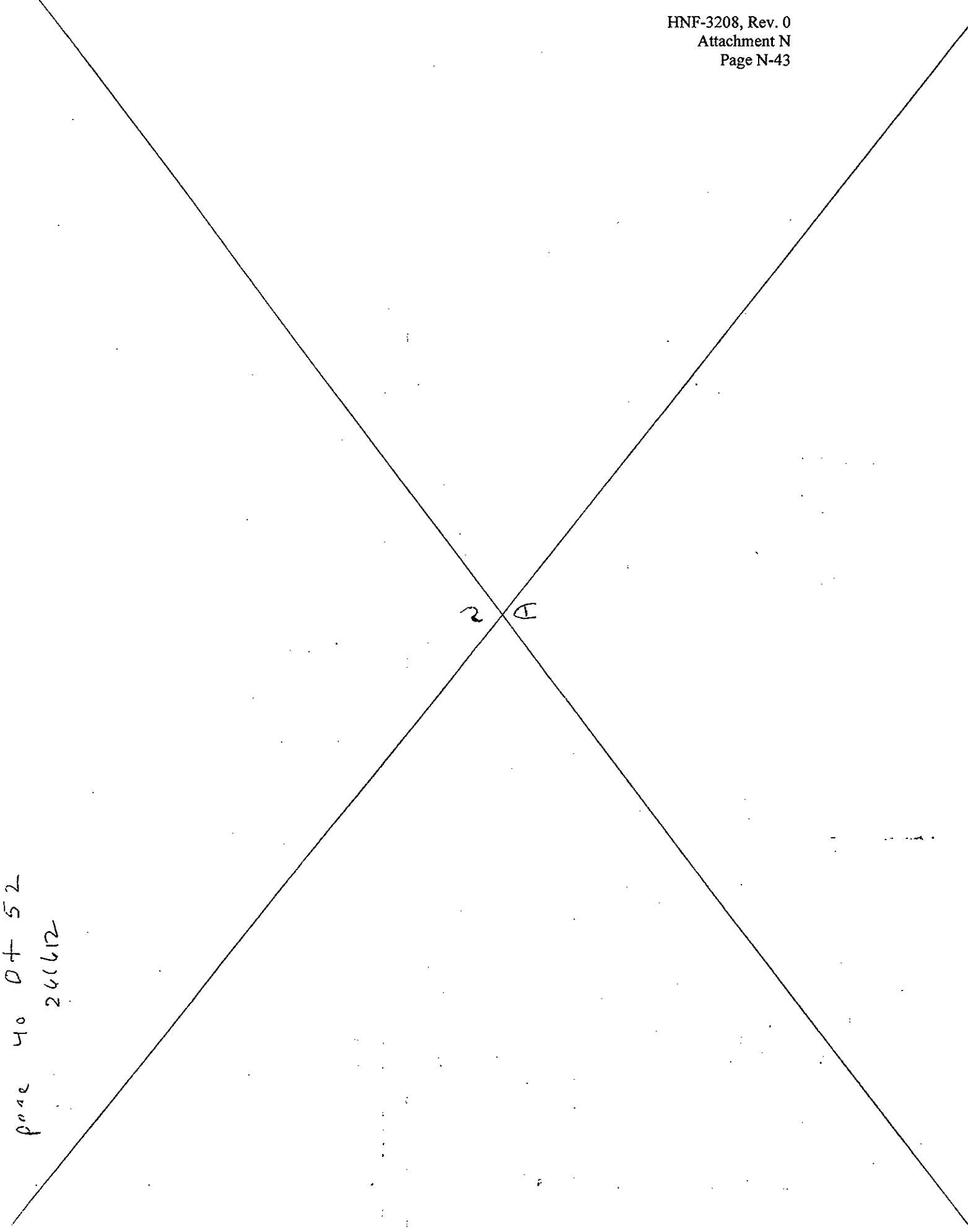
CANYON C





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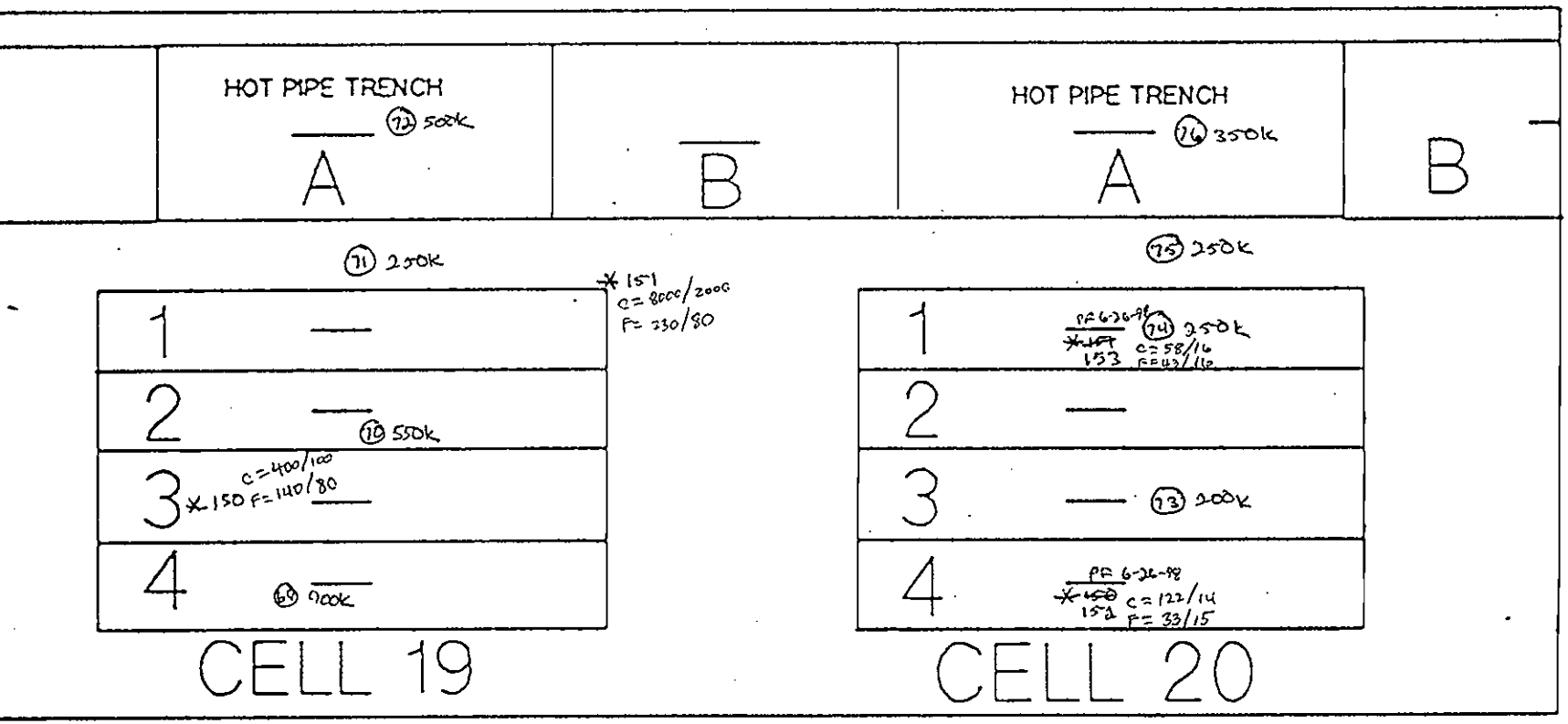
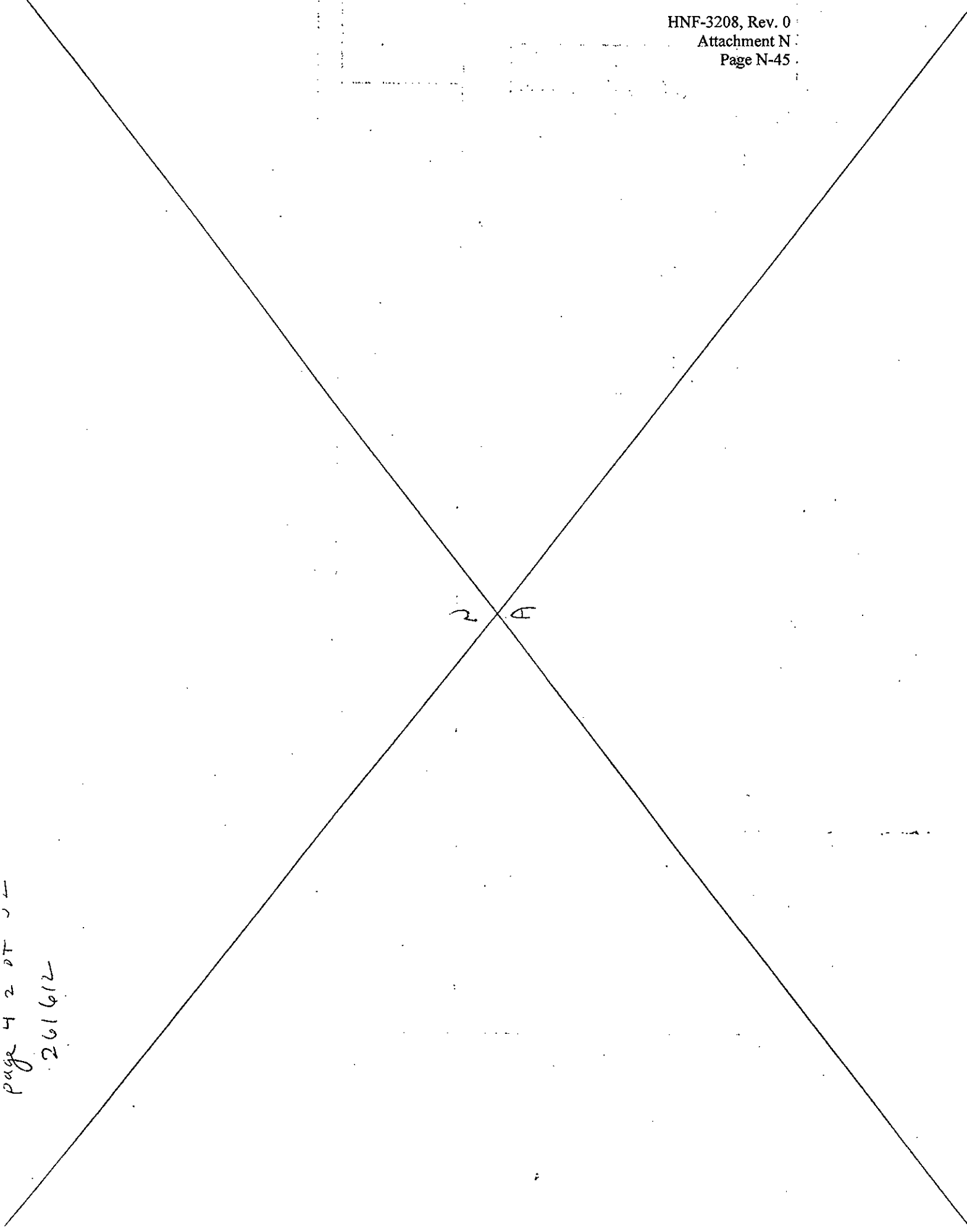
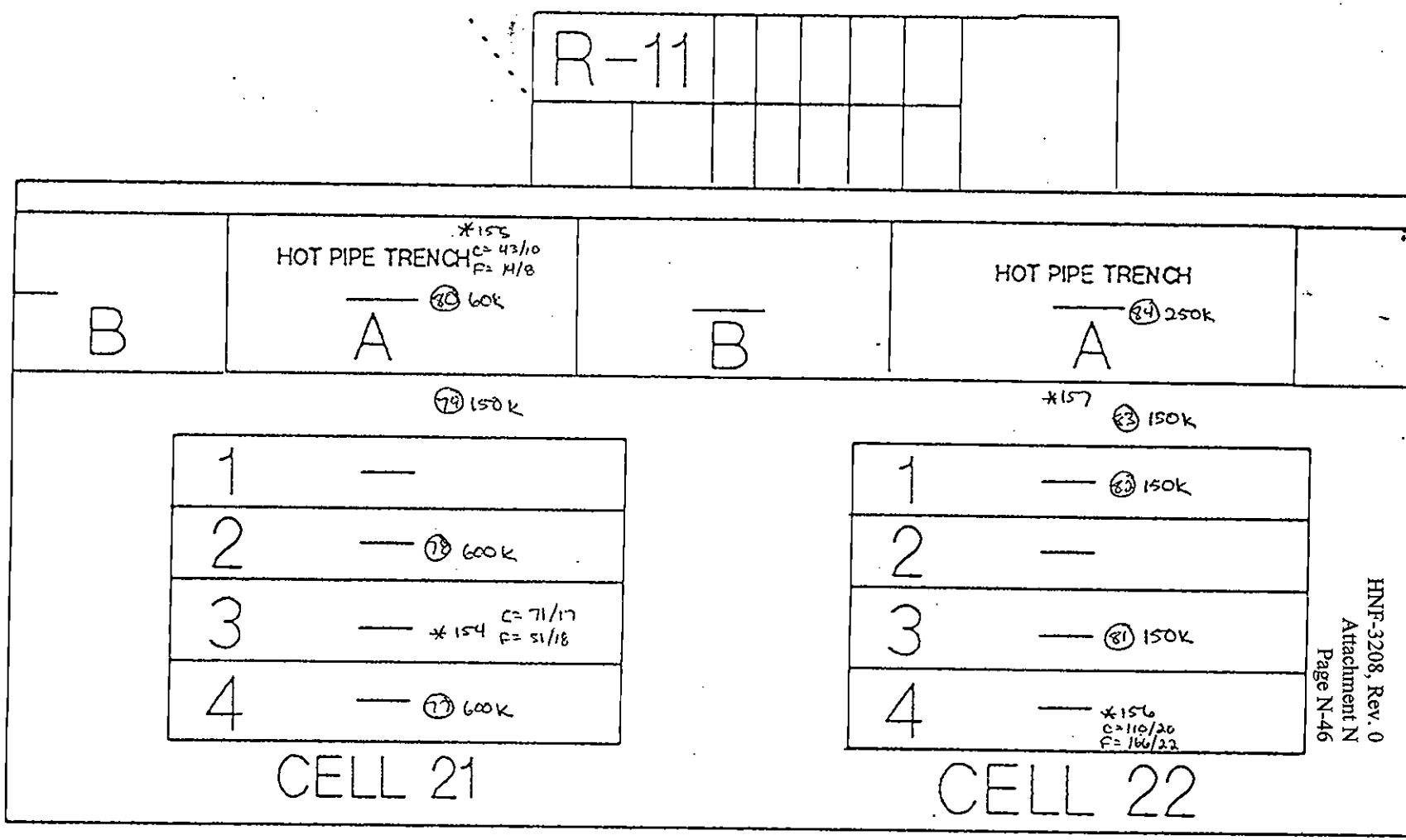
24412

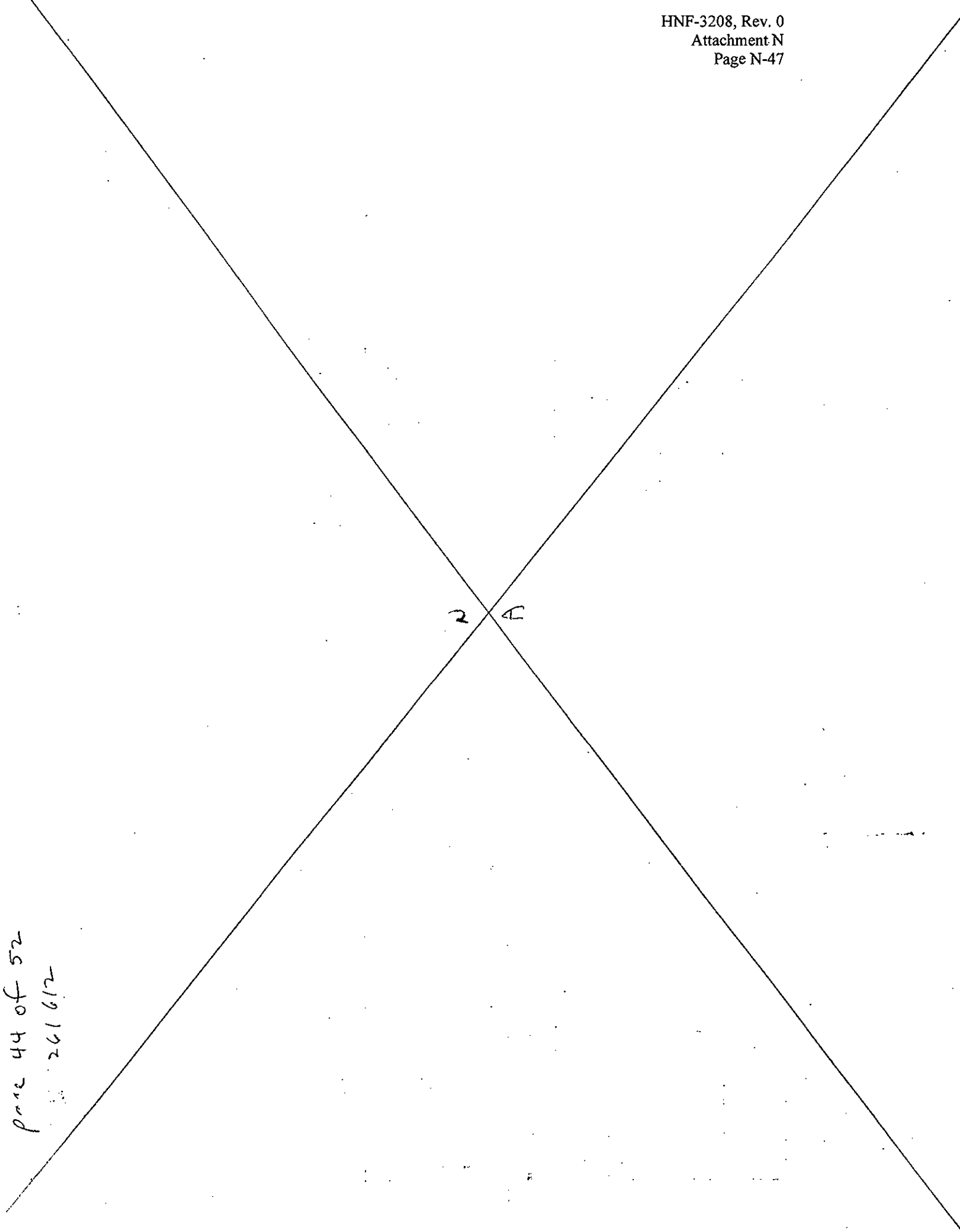

HOT PIPE TRENCH
72 500k
A
B
HOT PIPE TRENCH
76 350k
A
B
71 250k
1
2
10 550k
3
* 150 C=400/100 F=140/80
4
69 700k
CELL 19
* 151 C=8000/2000 F=230/80
75 250k
1
74 350k
153 C=58/16 F=43/16
2
3
73 200k
4
* 150 152 C=122/14 F=33/15
CELL 20



2 A

page 4 2 of 2
261612


CELL 17
CELL 18
R-11
B
HOT PIPE TRENCH
*155
C= 43/10
F= H/8
80 60K
A
B
HOT PIPE TRENCH
84 250K
A
79 150K
*157
83 150K
1
2
79 600K
3
* 154
C= 71/17
F= 51/18
4
77 600K
CELL 21
1
82 150K
2
3
81 150K
4
*156
C=110/20
F=166/22
CELL 22



2 A

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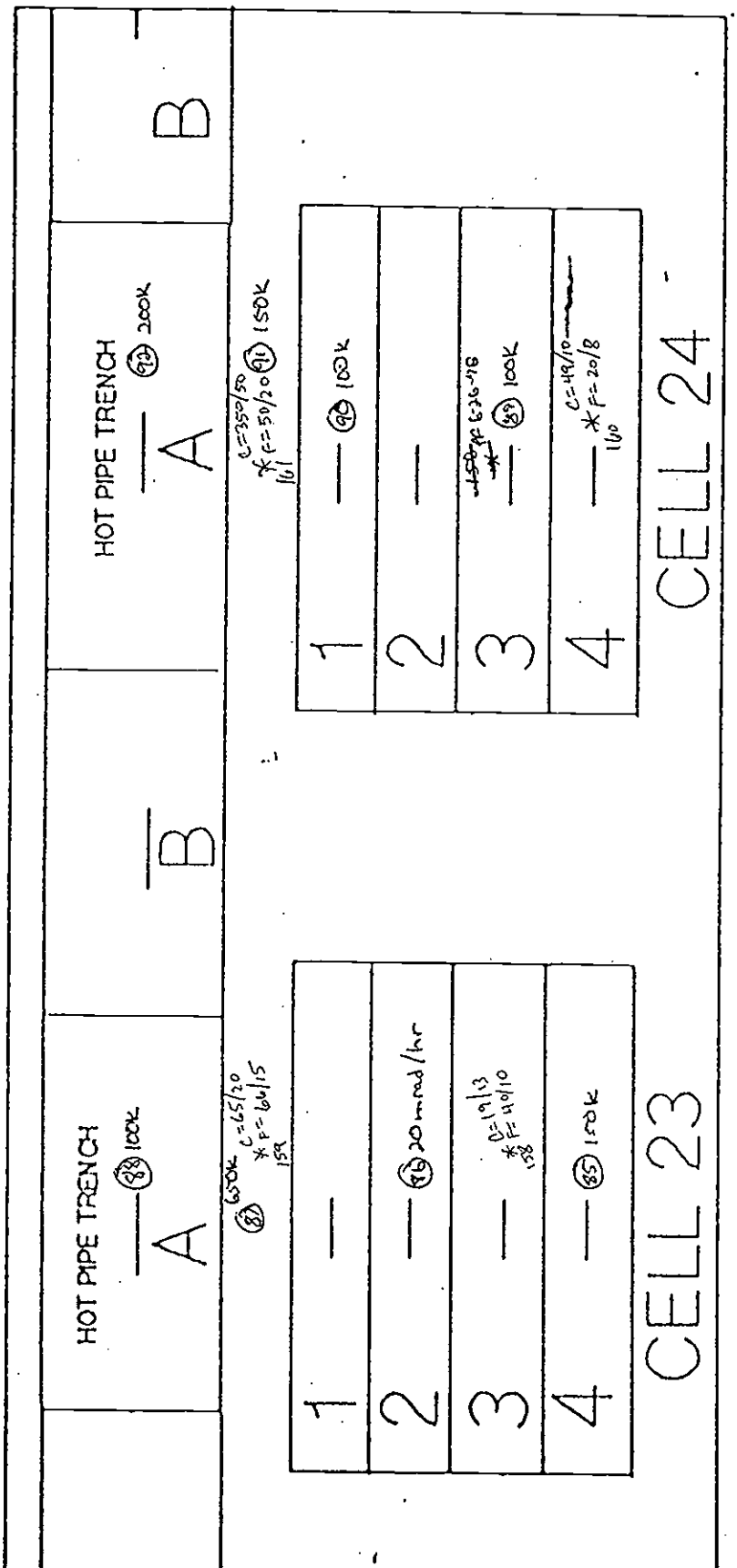
261612



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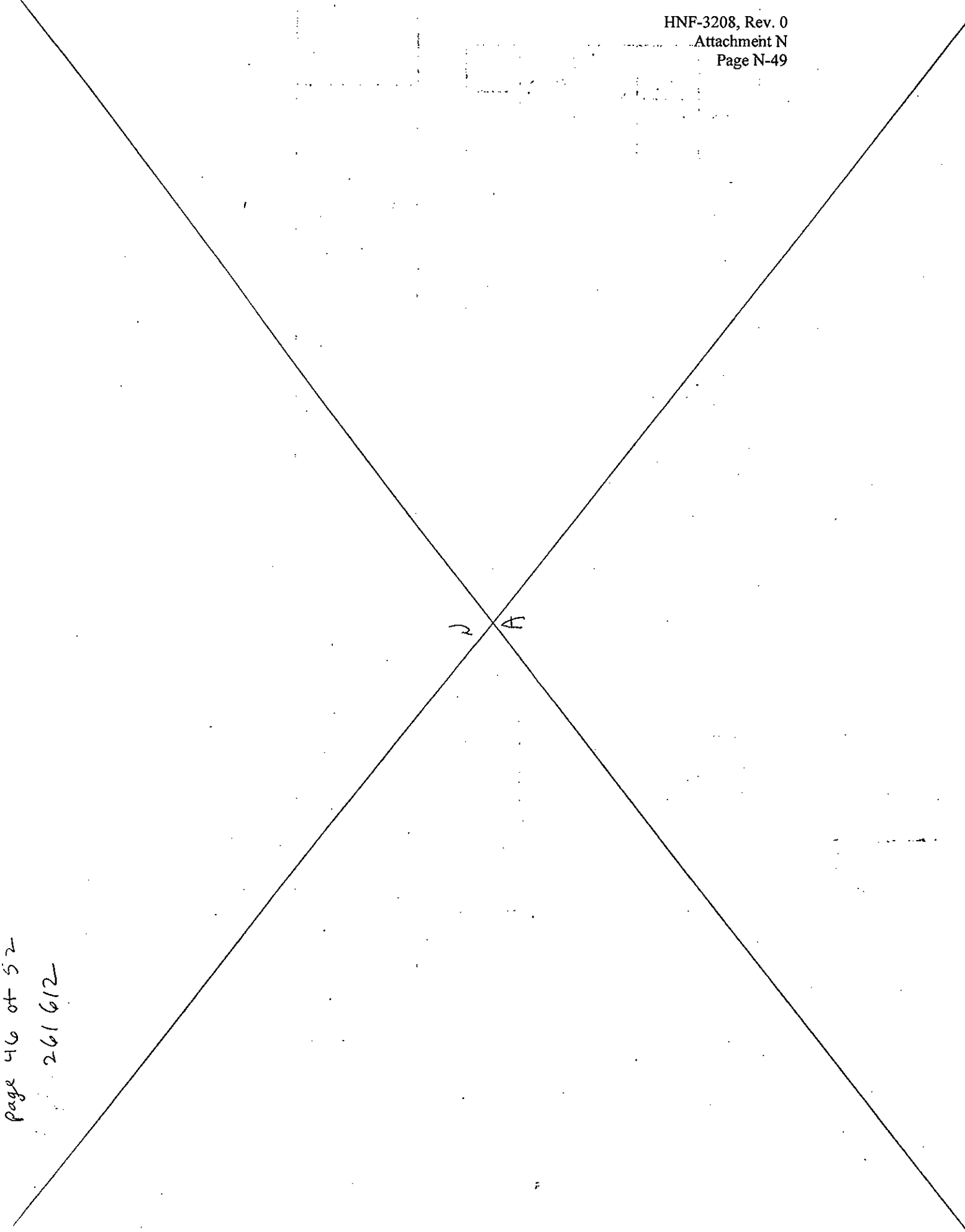
2/16/12



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HNF-3208, Rev. 0
Attachment N
Page N-50

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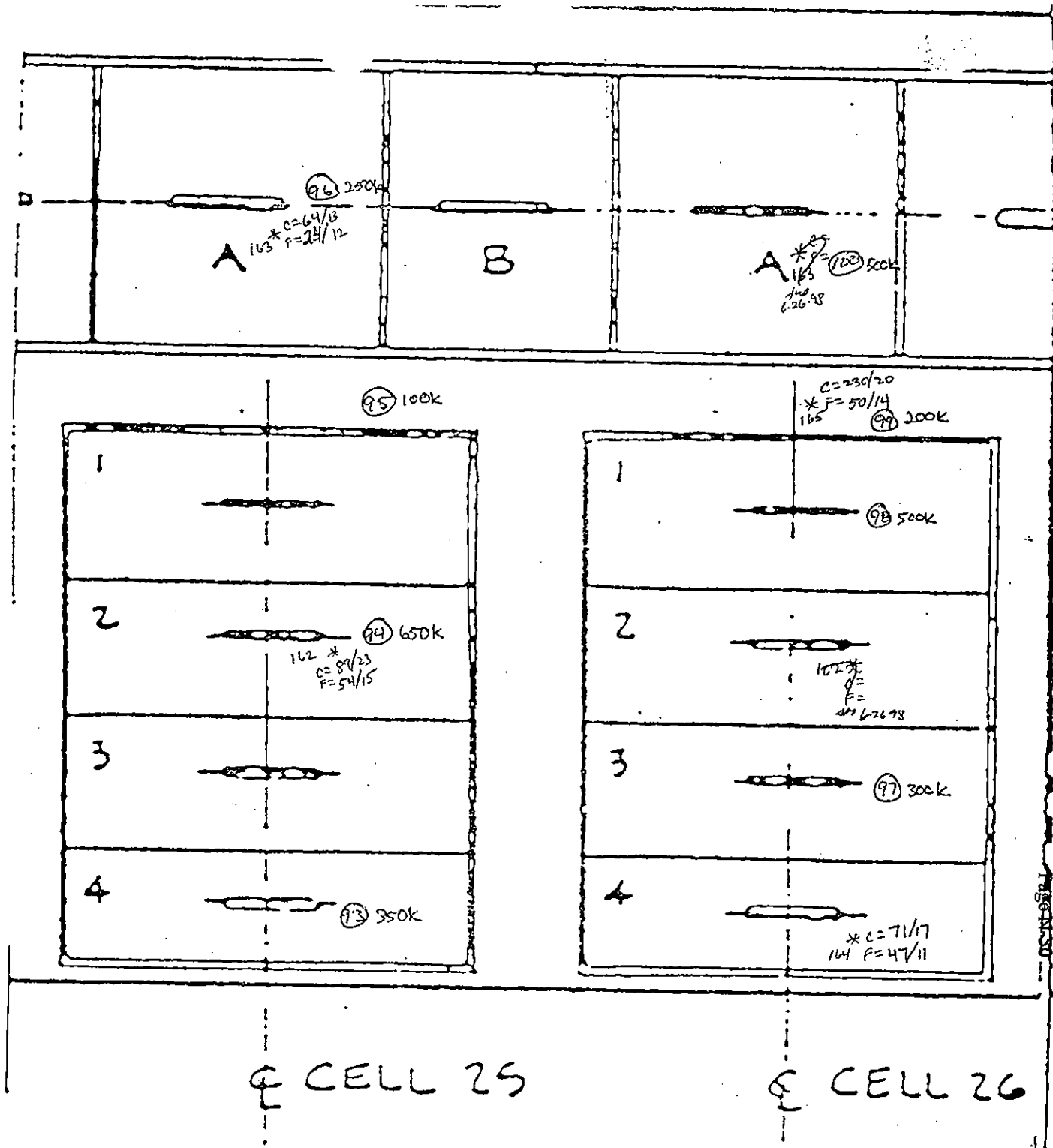

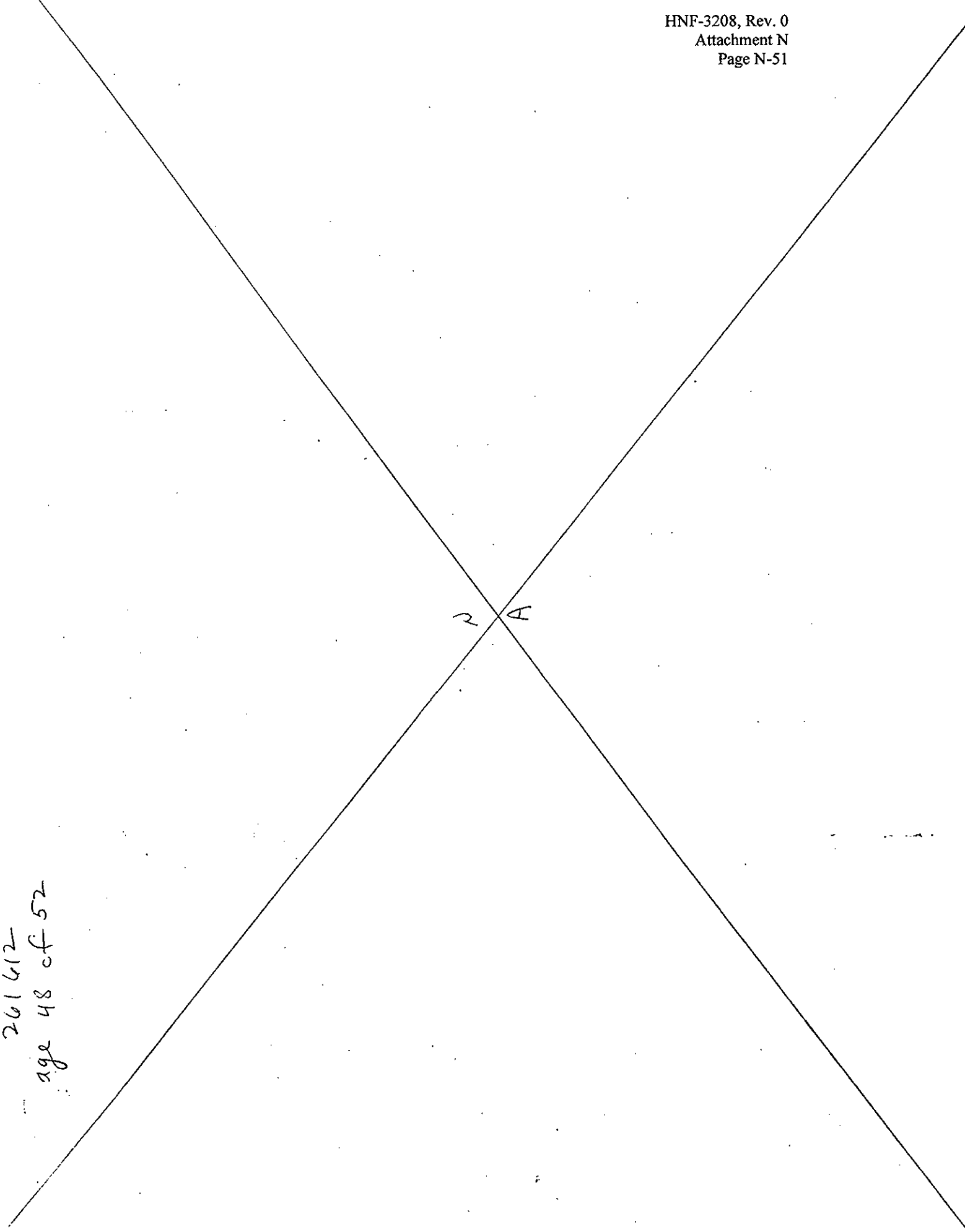

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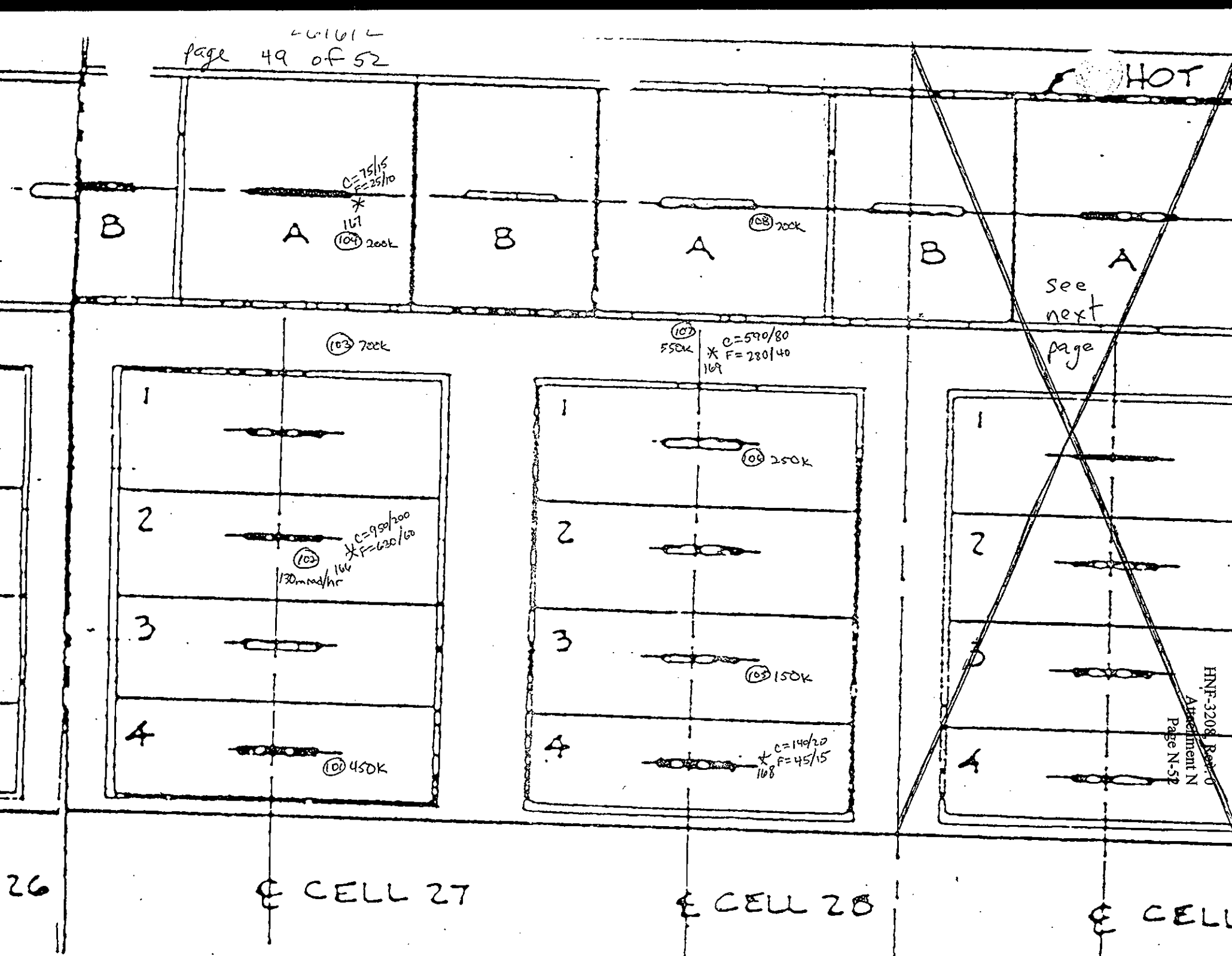
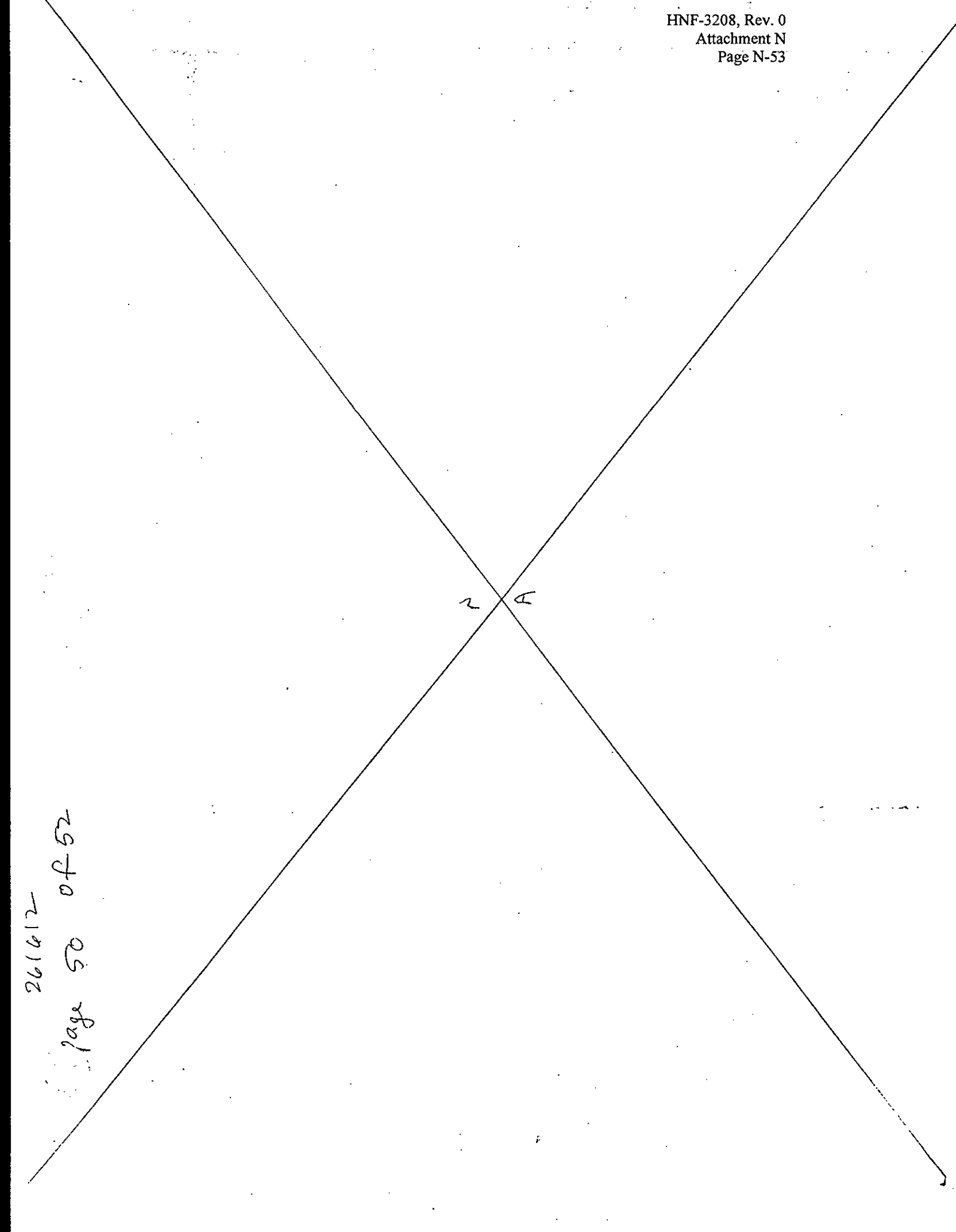

HOT
B
A
C=75/15
F=25/10
167
104 200K
B
A
108 200K
B
A
See next page
103 700K
1
2
C=950/200
F=620/160
102
130mrad/hr
166
3
4
101 450K
103
550K
C=590/80
F=280/40
169
1
106 250K
2
3
105 150K
4
C=140/20
F=45/15
168
1
2
3
4
26
CELL 27
CELL 28
CELL



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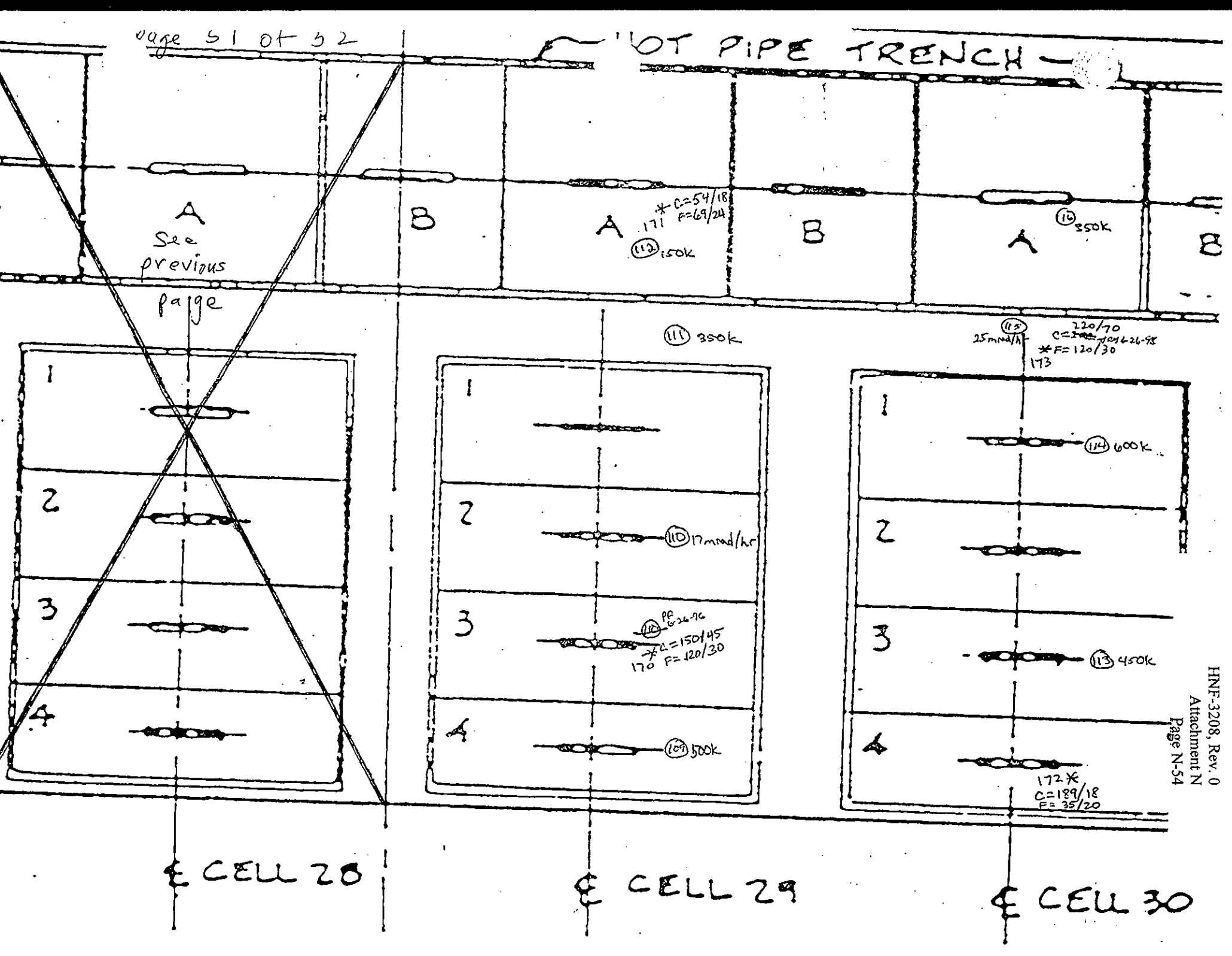
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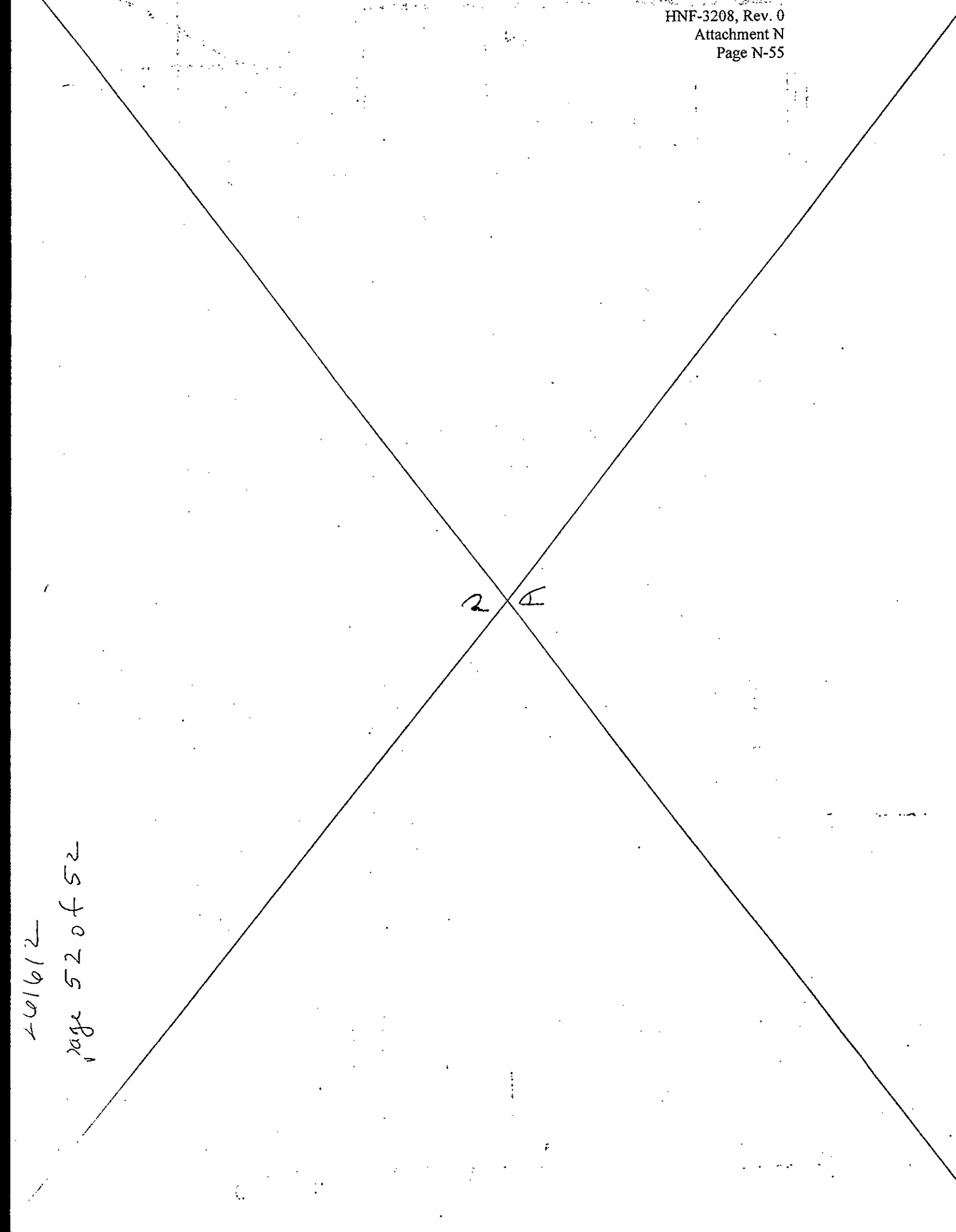
HOT PIPE TRENCH
A
See previous page
B
A
171 * C=54/18 F=69/24
112 150k
B
A
16 350k
B
111 350k
115 25 mrad/hr
C=220/70
*F=120/30
173
1
2
3
4
1
2
110 17 mrad/hr
3
110 PF 6-26-96
*C=150/45
170 F=120/30
4
109 500k
1
114 600k
2
3
113 450k
4
172 *
C=189/18
F=35/20
℄ CELL 28
℄ CELL 29
℄ CELL 30



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B & W Hanford Co.

a McDermott company

To	End Point Files	S4-49	
From	S. L. Friar, Crane Planner B Plant Surveillance and Canyon D&D	S6-60	File No. or Ref.: 16D00-98-SLF-051
Subj	LEAD IN B PLANT CANYON IN-CELL PROCESS EQUIPMENT		Date: July 30, 1998

It is estimated about 10 percent of all jumpers made for the B Plant canyon before 1985 have lead counterweights. Counterweights allowed for proper positioning in the canyon cells with the overhead crane. After 1985, steel shot was used instead of lead for counterweights. There are 33 cells that have jumpers. Cells 1, 2, 3, 4, 15, 16, and 40 do not have jumpers. Twelve cells (cells 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 17, and 18) have approximately 50 jumpers per cell. At the 10 percent value, this amounts to 60 jumpers with lead for these cells. There are 21 cells with approximately 60 jumpers each or at the 10 percent value, about 126 jumpers with lead. This gives 186 jumpers with lead in the B Plant canyon.

Counterweights were normally between 10 and 20 pounds each. Lead was welded inside Schedule 40 stainless steel pipe or placed in as lead shot and welded closed. The estimated quantity of lead in canyon jumpers is 1,860 to 3,720 pounds. In addition, a lead counterweight (about 5,200 pounds) used for equipment installation in the canyon was placed in Cell 30 on June 24, 1998. The total inventory of in-cell process equipment lead in the canyon is estimated between 7,060 to 8,920 pounds.

slf/sah

Distribution

D. W. Jeppson	S4-49
N. L. Sant	R3-56
SLF File/LB	

DISTRIBUTION SHEET

To	From	Page 1 of 1
DISTRIBUTION	F. M. SIMMONS	Date September 11, 1998
Project Title/Work Order		EDT No. 622570
DOCUMENTATION OF REMAINING HAZARDOUS SUBSTANCES/DANGEROUS WASTE IN B PLANT		ECN No. NA

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
CENTRAL FILES	A3-88				
B&W HANFORD COMPANY					
E. R. Hafla	S6-51				
S. E. Killoy	S6-60				
G. J. LeBaron	S4-57				
F. M. Simmons	S6-51				
D. K. Smith	S6-60				
BECHTEL HANFORD, INC.					
G. M. MacFarlan (3)	S3-21	X			
COGEMA ENGINEERING					
L. F. Janin	S4-49				
RUST FEDERAL SERVICES OF HANFORD, INC.					
D. S. Merry	H6-06				