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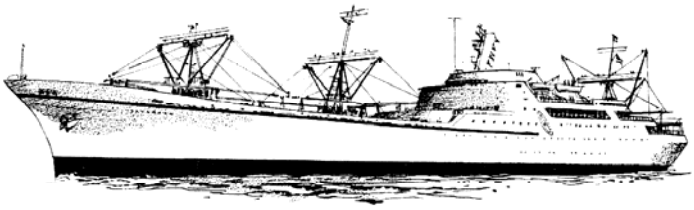

January 31, 2006

Erhard Koehler
Senior Technical Advisor, NS SAVANNAH
NS SAVANNAH Project
US Maritime Administration
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Washington, DC 20590

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Subject: NS SAVANNAH Characterization Project
MARAD Contract No. DTMA1C05013

Dear Mr. Koehler,

This transmittal provides MARAD the following document for their review and acceptance.

1. Nuclear Ship Savannah Reactor Pressure Vessel Drilling, Sampling and Radiochemical Analysis Project Report, Revision 1, dated January 30, 2006.

The revisions to this report in regards to the original report submitted on December 7, 2005 under Revision 0 are as follows:

- Page 17, Section 3.1, paragraph 2 – the issue of CRUD activity levels and where additional characterization of this type is documented in previous reports are addressed.
- Page 13, Section 2.6, paragraph 1 – The Origen cross sectional library and location for information retrieval has been added.
- Page 24, Appendix D – The assumptions used for the input power operating levels as derived from the actual power history graphs has been added.
- Appendix C – Copies of all the actual power history graphs have been added.

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These revisions have been incorporated as a result of comments received from the review of the above referenced report by Professor Ronald Ballinger of Massachusetts Institute of Technology. Mr. Ballinger's comments were annotated in a letter to Mr. Christopher D. Zevitas of the Volpe National Transportation Systems Center on January 2, 2006. They were also discussed and the corrective actions annotated above were developed as a result of the teleconference between MIT, MARAD and WPI on January 6, 2006.

If you have any questions do not hesitate to contact me at (804) 783-0185.

Sincerely,

John Millacci
Director of Energy Projects

Cc:
G. Solovey w/attachment
R. Stouky w/attachment
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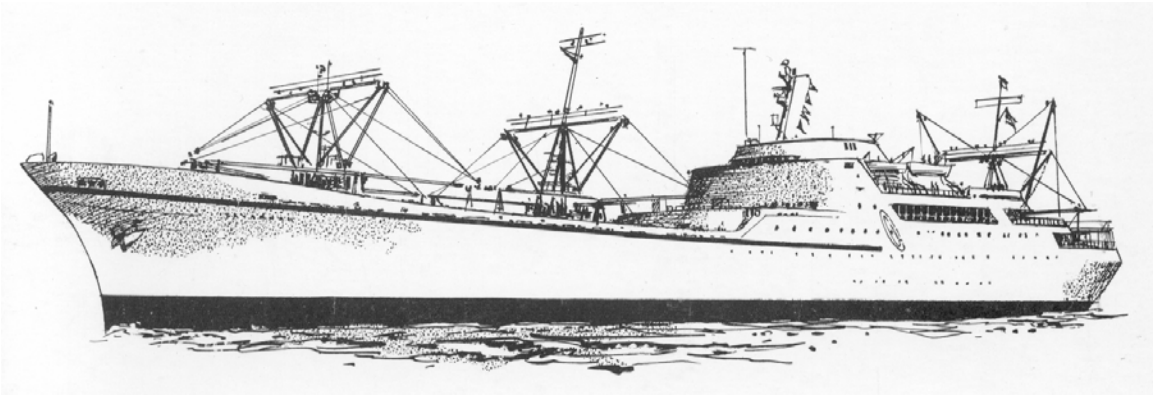
U.S. Department of Transportation
Maritime Administration
Office of Ship Operations



NUCLEAR SHIP (NS) SAVANNAH

REACTOR PRESSURE VESSEL DRILLING, SAMPLING AND RADIOCHEMICAL ANALYSIS PROJECT REPORT

Contract No. DTMA1C05013

Prepared by:

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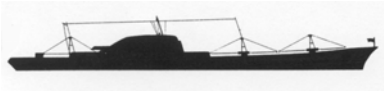
January 31, 2006
Revision 1



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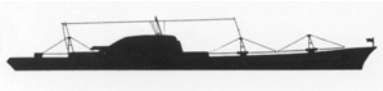

APPENDICES

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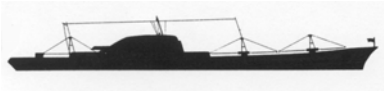


1.0 EXECUTIVE SUMMARY

1.1 PRINCIPAL FINDING

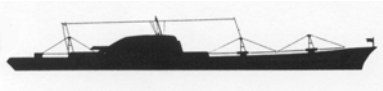
The principle finding of the project is that the reactor pressure vessel and related components on the NS SAVANNAH are class A radioactive waste material for land disposal purposes.

1.2 OBJECTIVE

The objective of this project, conducted on the NS SAVANNAH between August 25, 2005 and September 1, 2005, was to refine the 2004 analysis performed by WPI and obtain a more accurate set of nuclide activation measurements. These measurements are based on current RPV and internals conditions as observed from actual metal sampling in the reactor internals. All earlier analyses dating back to the late 1950's were based on theoretical design values which were very conservative. The 2005 analysis provides a highly reliable baseline in the decision-making process associated with various disposal options for the NS SAVANNAH Reactor Pressure Vessel (RPV) and internals.

The specific objective was to determine the curie content, waste classification and radioisotopic inventory of the NS SAVANNAH RPV, Internals and Neutron Shield Tank (NST) by extracting metal samples at selected locations, and subsequently performing radiochemical analysis of the samples. Refined calculations were performed based on the integrated actual reactor power history, actual radiochemical data from reactor components and realistic neutron flux approximations.

It is important to note that MARAD intends to remove, package, ship and dispose of the RPV and internals package without opening the RPV or further sampling of the RPV/internals. Further sampling would entail more radiation exposure and expense with marginal value of the additional data. Opening the RPV (the ambient dose rate by measurement in the internals is approximately 16 R/Hr) would require the expense of specialized equipment and systems far exceeding the value of any additional data, and would not be consistent with ALARA principles. If necessary, the RPV could be filled with cement or grout prior to shipment.



1.3 RESULTS

Table 1A and 1B below presents the results of total RPV nuclide activation levels based on actual radiochemistry data from the samples, and analysis using the ORIGEN code for the part 10 CFR part 61 analyses. Table 1A and 1B correspond to the applicable nuclide locations in Tables 1 and 2 of 10 CFR part 61.55. The concentration of each radionuclide was averaged over the entire volume of metal in the RPV and internals. As shown, all nuclides are within the Waste Classification Class A limit both individually per isotope and when combined using the sum of the fractions for Class A Waste, which is 0.89. These results satisfy the branch technical position WAC criteria and averaging methodology for burial at Chem-Nuclear Systems and Envirocare of Utah (EOU). The result of the analysis, using a current computer code and radiochemical analysis of metal samples is that the NS SAVANNAH's RPV and internals package meets the radiological requirements of the US NRC and the states of Utah and South Carolina for a Class A waste package.

TABLE 1A

SUMMARY OF RADIOACTIVITY PRESENT

Nuclide	**Metal Sample Analysis**		**ORIGEN**		**WAC Class A Limit / Ratio***
	Curies	Curies/m^3	Curies	Curies/m^3	Curies/m^3
Ni-59***	4.1	0.3	3.9	0.3	22 / 0.014
Nb-94***	< MDA**	--	<0.0001	--	--
C-14***	<0.01	--	<0.0001	--	--

*****Ratio of Curie concentration from metal sample analysis to Class A limit
****** Minimum Detectable Activity Level
*** in activated metal

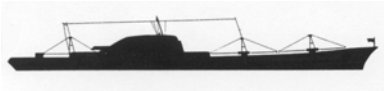


TABLE 1B

SUMMARY OF RADIOACTIVITY PRESENT

Nuclide	**Metal Sample Analysis**		**ORIGEN**		**WAC Class A Limit / Ratio***
	Curies	Curies/m^3	Curies	Curies/m^3	Curies/m^3
Ni-63***	385	30.1	356	27.9	35 / 0.86
Co-60	62	4.9	80	6.3	700 / 0.007
Fe-55	1.1	0.09	0.9	0.07	700 / 1.3E-4

*****Ratio of Curie concentration from metal sample analysis to Class A limit
****** Minimum Detectable Activity Level
*** in activated metal

2.0 PROJECT REPORT

2.1 BACKGROUND

Between August 25, 2005 and September 1, 2005, a project was conducted on the NS SAVANNAH to determine the Curie content and radioisotopic inventory of the NS SAVANNAH Reactor Pressure Vessel (RPV), Internals and Neutron Shield Tank (NST) by extracting metal samples at selected locations in the RPV and internals, and subsequent radiochemical analysis. The purpose of the project is to develop more representative baseline information to use in the decision-making process associated with various disposal options for the RPV and internals. MARAD intends to remove, package, ship and dispose of the RPV/Internals package without opening the RPV or conducting further sampling of the RPV/Internals.

2.2 APPROACH

Using a heavy metal boring system, a 4" access hole was drilled through the external lead shield and the outer and inner annuli of the neutron shield tank, and the thermal insulation layer adjacent to the RPV wall. The 4" bore was sleeved with PVC pipe, and a 1.0625" hole was bored in the center through the carbon steel RPV wall and ID SS clad layer, and through the outer thermal shield. A 0.5" hole was drilled through the middle thermal shield.

All metal samples were taken in the form of chips by extending a drill bit with an extension shaft, operating inside of a sleeve, through the metal to be sampled. The sleeve forced the chips up the drill bit flute from which samples were obtained. A new drill bit and sleeve was used for each sample to eliminate cross-sample contamination. Each sample was packaged separately and marked to preserve a chain of custody.

This physical drilling process was mocked-up and demonstrated at the contractor's (Wachs Technical Services) facilities in Charlotte, NC by the personnel who actually performed the shipboard drilling operation.

The methodology for drilling holes for sampling and other purposes in reactor and other pressure vessels is not new. As an example, the Shoreham reactor vessel, which was the same wall thickness and experienced dose rates similar to that of the NS SAVANNAH, was drilled in a similar manner to render the vessel forever inoperable. The drilling or boring of heavy wall vessels and castings is a common field machining practice.

A total of eight metal samples, one insulation sample, and two liquid samples from the secondary steam generator loops were collected, bagged, packaged for transportation and shipped to General Engineering Laboratory (GEL), a QA certified laboratory in Charleston, SC. A 10 CFR part 61 analysis of seven metal samples was performed. The lead shield and thermal insulation were analyzed by gamma scan only.

The sample locations included:

1. NST-Lead (Neutron Shield Tank)
2. NST- Outer Diameter (OD) Inner Wall (Neutron Shield Tank) (Steel)
3. NST – Inner Diameter (ID) (Neutron Shield Tank) (Steel)
4. RPV Non-Asbestos Insulation (Reactor Pressure Vessel)
5. RPV OD (Reactor Pressure Vessel) (Steel)
6. RPV ID (Reactor Pressure Vessel) (Steel)

7. OTS ID/OD (Outer Thermal Shield) (Stainless Steel)
8. MTS OD (Middle Thermal Shield) (Stainless Steel)
9. MTS ID (Middle Thermal Shield) (Stainless Steel)
10. Starboard Steam Generator secondary side (water)
11. Port Steam Generator secondary side (water)

2.3 ANALYTICAL METHODOLOGIES

2.3.1 Radiochemical Data

Sample data was reviewed and discussed with GEL personnel responsible for the NS SAVANNAH radiochemical analysis. Data anomalies were satisfactorily resolved. Activation levels at statistically significant levels above MDA (Minimum Detectable Activity) were reported in uCi/gm, which were converted to uCi/cm³ for direct comparison with South Carolina DHEC (Department of Health and Environmental Control) Waste Acceptance Criteria. All GEL data was decay-adjusted to October 2008, the date considered to be the earliest feasible date for RPV disposal.

For each of the isotopes of interest, activity concentration levels were scaled to the core centerline in conformance to reactor flux profiles developed as part of the initial reactor physics calculations. Though the 1956 design basis peak flux for the NS SAVANNAH core has been shown to be an over-estimate, the general shape of the thermal flux curve is considered to be an adequate representation of NS SAVANNAH reactor's neutron distribution. Using the middle thermal shield data as a benchmark, ID and OD activation levels were extrapolated to components in higher flux regions of the core including the core basket – an internal component with the highest expected Curie concentration in the vessel. This flux ratio approach enabled the use of relative flux differences without arbitrarily selecting a baseline peak flux value.

All RPV/internal samples were extracted at an access hole with an elevation equal to mid-height of the core, where peak axial flux would be expected to occur. Based on flux profiles used in design of the NSS reactor (*Nuclear Merchant Ship Reactor*, April 1958, W.R.Smith & M.A.Turner), a peak to average axial flux ratio of 1.48 was calculated, a typical ratio for pressurized water reactors. The 1.48 ratio corresponds to a 68% reduction in Curie concentrations derived from metal sample data obtained at the core mid-height.

The presence of Nickel-63 and Cobalt-60 in the internals along with trace amounts of Nickel-59 and Iron-55 were positively identified by GEL in their radiochemical analysis.

Niobium (Nb-94), a 10CFR part 61-reportable isotope with low concentration limits for all waste classification categories, was not found in any samples at levels above the minimum detectable activity (MDA). To approximate Nb-94 Curie concentrations, the MDA level for Nb-94 was assumed to be the actual concentration and was extrapolated to the peak flux region of the core. This overly conservative approach still yielded activation levels three orders of magnitude below the State of South Carolina and Envirocare of Utah (EOU) Waste Acceptance Class A limit of 0.02 Ci/m^3 for Nb-94.

Carbon (C-14), another reportable isotope in 10CFR part 61, was detected at concentrations above MDA. However, peak concentration levels were calculated to be more than two orders of magnitude below Waste Acceptance Class A limits of 8 Ci/m^3.

2.3.2 Water Sample Analysis

Water samples (previously obtained from the port and starboard secondary steam generator loop) had no detectable levels of activity based on the gamma scan results. Water sample results are consistent with the operating history of the steam generators, which experienced no significant leakage into the secondary system.

2.3.3 Gamma Scans

The lead shield external to the NST outer diameter had no activation above MDA. Trace amounts of Eu-152, Eu-154 and Co-60 were detected in the insulation between the inner diameter of the NST and outer diameter of the RPV. The Eu isotopes (Eu-152 and Eu-154) were most likely impurities inherent in the insulation. Europium isotopes are not reportable nuclides in 10CFR part 61 analyses. Detectable trace amounts of Co-60 in the insulation are not readily explainable from the composition of typical insulation materials. However, the presence of C0-60 likely resulted from slight cross contamination of the samples during the drilling process, or left from the original construction. These concentrations have negligible effect on the total Co-60 content of the RPV.

2.3.4 Detection Methods

A gamma scan analysis was considered adequate for the NST-Lead, RPV-Insulation and both liquid samples due to the expected low activation levels. The remaining samples were subjected to a complete 10 CFR Part 50/61 radionuclide identification and quantitative analysis.

GEL employed the following radionuclide detection processes in their analysis:

- Gamma spectroscopy – suitable for most gamma emitters.
- Liquid scintillation counting – used for measuring low energy beta particles.
- Gas flow proportional counter – able to discriminate among nuclides in a combined alpha-beta sample.
- Alpha spectroscopy – suitable for most alpha emitters.

Most radionuclides analyzed were not detected at or above the Minimum Detectable Activity (MDA) levels. The MDA levels for each radionuclide analyzed are specified in GEL Report, Sample Data Summary, pages 28-51. The presence of a specific radionuclide was considered statistically positive at the 99.9% confidence level, i.e., activation is greater than three times the one sigma uncertainty. (one sigma = 68.3%; two sigma = 96.0%; three sigma = 99.7%).

2.3.5 Data Anomalies

Several of the findings were inconsistent with expected results and were reviewed with GEL personnel. These anomalies and their likely explanations include:

1. <u>Trace amounts of Co-60 in NST outer diameter</u>.
   The NST is a carbon steel structure that is not expected to contain natural cobalt (Co-59), which would transmute to Co-60 when irradiated with neutrons. A plausible explanation is the presence of natural cobalt as an impurity in the carbon steel composition of the NST. However, the small amount of Co-60 has a negligible effect on the total Co-60 Curie content of the RPV and internals.

2. <u>Eu-152 and Eu-154 in RPV Insulation</u>.
   Trace quantities of Eu-152 and Eu-154 were identified in the RPV insulation. GEL personnel reviewed their analysis and confirmed the original findings. Europium, which is not a reportable nuclide in 10 CFR Part 50/61, was likely a trace impurity in the insulation.

3. Presence of Co-58 in RPV Insulation.
   Co-58 with a 71 day half-life was detected in the RPV insulation at a concentration slightly above MDA. The gamma spectroscopy signature of Co-58 is very similar to that of Eu-154, about 810 Kev. It is difficult to distinguish similar energy peaks in a gamma spectrum created by trace quantities of individual isotopes. It was concluded that detection of the Co-58 finding was a false positive.

4. Presence of Co-60 in RPV Insulation.
   A trace amount of Co-60, slightly above MDA, was detected in the insulation. This was likely due to cross-contamination of the insulation by metal from the adjoining inner diameter of the NST addressed in Item #1 above.

GEL's certified concurrence with explanations of these data anomalies is shown in Appendix B.

2.4 DOSIMETRY MEASUREMENTS

An independent confirmation of credibility of the radiochemistry data is supported through actual dose measurements taken aboard ship. Dosimetry readings were taken at two locations - one external to the NST Inner Diameter (7 mR/hr at contact, taken April 2005); the other in the annular space between the outer and middle thermal shields (16 R/hr, taken September 2005). The reading at the thermal shield was taken with a small diameter Teletector extension instrument on a shaft that was inserted through the vessel drill hole. The face of the detector was extended 50 inches (127 cm) from the outer diameter of the lead shield surrounding the NST to the annular space between the outer and middle thermal shields as shown in Figure ES-1. The detector was used with a closed plastic shield to block beta radiation and low energy gammas; therefore, the readings are attributable primarily to the energetic gamma radiation from Cobalt (Co-60).

Using conventional gamma dosimetry calculations, the laboratory-derived activity concentrations for Co-60 at the two locations were compared to the dosimetry readings. This activation scaling approach yielded agreement within a factor of 6 over a dose range of almost four orders of magnitude. This was well within acceptable correlation limits. Results of activation levels based on metal sample analysis are shown in Table 2.

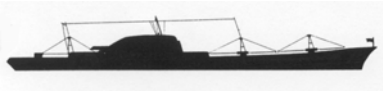


Table 2. Sample Derived Activity Levels

Reactor Components	Volume (m^3)	Activity in Curies						Totals (WAC Class/Ratio)
		Fe-55	Co-60	Ni-59	Ni-63	Nb-94	C-14	
Core Basket	0.186	0.6	28.8	2.4	187	*	**	218.8 (C/0.14)
Upper Transition Nozzles	0.094	0.4	14.6	1.2	94.3	*	**	110.5 (C/0.14)
Lower Transition Nozzles	0.094	0.4	14.6	1.2	94.3	*	**	110.5 (C/0.14)
Control Rods	0.008	*	0.42	*	3.1	*	**	3.4 (B/0.55)
Inner Thermal Shield	0.336	0.2	15.5	1.1	101	*	**	117.8 (B/0.43)
Middle Thermal Shield	0.924	0.1	13.0	0.1	84.2	<MDA	*	97.4 (B/0.13)
Outer Thermal Shield	0.439	*	4.7	0.1	8.2	<MDA	*	13.0 (A/0.54)
Lower Grid Plate & Flow Baffle Plate	0.189	*	0.3	*	1.9	<MDA	*	2.2 (A/0.29)
Upper Grid Plate	0.073	*	0.1		0.7	<MDA	*	0.8 (A/0.27)
Upper Grid Plate Shrouds	0.175	*	0.5		3.5	<MDA	*	4.0 (A/0.57)
Lower Flow Baffle Shrouds	0.149	*	*		*	<MDA	*	
Upper Flow Baffle Shrouds	0.245	*	*		*	<MDA	*	
Pressure-Vessel (Midsect.)	3.349	*	*		*	<MDA	*	
Neutron Shield Tank (ID)	0.286	*	*		*	<MDA	*	
Totals		1.7	93	6.1	578			678.3
Axial Flux Adjusted Totals		1.1	63	4.1	391			459.2

* Less than 0.001Curies

** Less than 0.01 Curies

NOTE: The MDA levels for Niobium-94 and all other radionuclides analyzed are specified in GEL Report, Sample Data Summary, pages 28-51.

2.5 EXTRA CONTROL BLADE

During de-fueling there was an extra used (irradiated) NS SAVANNAH cruciform control blade to be disposed of in 1971. This control blade was either damaged during the fuel shuffle or was destructively tested at the shipyard. The control blade was placed vertically and rotated 45 degrees in an empty fuel element l space in the core region before insertion of the upper internals package. It is now not practical from a cost, safety, or ALARA standpoint to take this control blade out of the RPV. If that was done it would be buried with the RPV in its own cask or container.

The effects of the (22nd) control blade are minimal. In the analysis the blade was assumed to be among the most highly irradiated blades and the curie content assigned to it was 150% of the average control blade activity from the most current ORIGEN-ARP analysis.

2.6 ORIGEN-ARP 2.0 COMPUTER CODE

ORIGEN-ARP performs isotopic activation and depletion/decay calculations for pressurized and boiling water reactors. Oak Ridge National Laboratory developed ORIGEN-ARP (and its predecessors) for the Nuclear Regulatory Commission and the Department of Energy to satisfy the need for a standardized method of isotope depletion/decay analysis of spent fuel, fissile material and radioactive material. It can be used for spent fuel characterization, isotopic inventory, radiation source terms and decay heat. The neutron cross sections used in the analysis are based on cross section libraries in Origen ARP 2.0, SCALE 5, developed by Oak Ridge National Laboratories and available at http://www.ornl.gov/sci/origen-arp/index.htm.

The NSS reactor operated from 1962 to 1970 at an average plant capacity factor of 30% resulting in 2.423 years of effective full power operation. A realistic fuel irradiation profile was input to the ORIGEN code, consistent with the complete operational history of NSS' reactor. A total of 2.423 effective full power years of operation was utilized, but was apportioned in accordance with NSS' actual operating history as shown in Appendix B. A more realistic RPV/Internals irradiation profile based on GEL results was inputted to the ORIGEN code.

The eight-year operating period with extended interim shutdown resulted in significant decay of Cobalt (Co-60) and Iron (Fe-55) and minor decay of Nickel

(Ni-63). Because NSS seldom operated at full power for extended periods, peak neutron flux was rarely experienced. October 2008 is considered the earliest realistic date for reactor burial. The resulting 38-year decay mode results in only trace quantities of Fe-55 currently in the RPV (decay factor = 2.1×10^{-6}), considerable reduction in Co-60 (decay factor = 6.8×10^{-3}) and modest reduction in Ni-63 (decay factor = 0.77). Ni-59, with a 7.5×10^{4} year half-life, has a unity decay factor.

As with the radiochemical analysis, an axial neutron flux factor of 1.48 corresponding to a 68% reduction in axial neutron flux was assumed in realistically describing average activation levels across the reactor internals and pressure vessel.

Results of the ORIGEN-ARP analysis by reactor component are shown in Table 3.

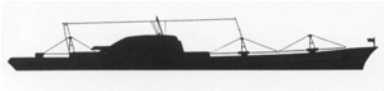


Table 3 ORIGEN –ARP Activity Levels

Reactor Components	Volume (m^3)	Activity in Curies						Totals WAC (Class/ Ratio)
		Fe-55	Co-60	Ni-59	Ni-63	Nb-94	C-14	
Core Basket	0.186	0.5	48.5	2.4	216	**	**	267 (C/0.17)
Upper Transition Nozzles	0.094	0.3	24.5	1.2	110	**	**	136 (C/0.17)
Lower Transition Nozzles	0.094	0.3	24.5	1.2	110	**	**	136 (C/0.17)
Control Rods	0.008	*	0.8	*	3.2	**	**	4.0 (B/0.53)
Inner Thermal Shield	0.336	0.2	17.6	0.9	78.3	**	**	97.0 (B/0.33)
Middle Thermal Shield	0.924	*	2.8	0.1	10.9	**	*	13.8 (A/0.34)
Outer Thermal Shield	0.439	*	0.6	*	2.6	**	*	3.2 (A/0.17)
Lower Grid Plate & Flow Baffle Plate	0.189	*	0.5	*	2.2	**	*	2.7 (A/0.30)
Upper Grid Plate	0.073		0.2	*	0.9	**	*	1.1 (A/0.35)
Upper Grid Plate Shrouds	0.175	*	0.9	*	4.1	**	*	5.0 (A/0.82)
Lower Flow Baffle Shrouds	0.149	*	*	*	*	**	*	
Upper Flow Baffle Shrouds	0.245						*	
Pressure Vessel (Mid-Section)	3.349	*	*	*	*	**	*	
Neutron Shield Tank (ID)	0.286	*	*	*	*	**	*	
Totals		1.3	121	5.7	538			666.0
Axial Flux Adjusted Totals		0.9	82	3.9	364			451.0

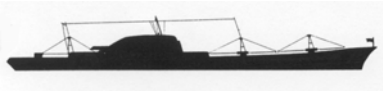
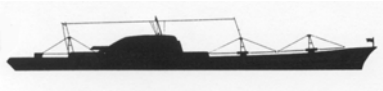


Table 4
Comparison of 2004 and 2005 ORIGEN Analysis

Nuclide	**ORIGEN** (April 2004)	**WAC Class/ Ratio***	**ORIGEN** (October2005)	**WAC Class/ Ratio***
Ni-63	2902	B/0.324	364	A/0.81
Co-60	1108	A/0.124	82	A/0.009
Ni-59	30.6	A/0.109	3.9	A/0.014
Fe-55	17.8	A/0.002	0.9	A/1.3E-4
Nb-94	0.100	A/0.391	<0.0001	---
C-14	7.32	A/0.072	<0.0001	---
Total	4066		451	



3.0 FINDINGS

3.1 DISCUSSION OF RESULTS

Table 5A and 5B below presents the results of total RPV nuclide activation levels based on actual radiochemistry data from the samples and analysis using the ORIGEN code for the part 61 analyses, respectively. The concentration of each radionuclide was averaged over the entire volume of metal in the RPV and internals. As shown, all nuclides are within the Waste Classification Class A limit both individually per isotope and when combined using the sum of the fractions for Class A Waste, which is 0.89. These results satisfy the WAC criteria and averaging methodology for burial at Chem-Nuclear Systems and Envirocare of Utah (EOU).

An analysis of the surface coating (CRUD) levels were performed as part of the NSS Characterization Study and are documented in Appendix B of the NS Savannah Characterization Survey Report, Revision 0, September 22, 2005. The principal isotope in the crud was confirmed to be C0-60 through the use of gamma spectroscopy. A surface coating analysis is also documented in the Reactor Vessel, Internals and Neutron Shield Tank Characterization and Classification Assessment dated April 3, 2004.

TABLE 5A

SUMMARY OF RADIOACTIVITY PRESENT

Nuclide	**Metal Sample Analysis**		**ORIGEN**		**WAC Class A Limit / Ratio***
	Curies	Curies/m^3	Curies	Curies/m^3	Curies/m^3
Ni-59***	4.1	0.3	3.9	0.3	22 / 0.014
Nb-94***	< MDA**	--	<0.0001	--	--
C-14***	<0.01	--	<0.0001	--	--

*****Ratio of Curie concentration from metal sample analysis to Class A limit
****** Minimum detectable Activity Level
*** in activated metal

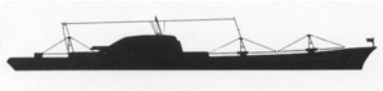


TABLE 5B

SUMMARY OF RADIOACTIVITY PRESENT

Nuclide	**Metal Sample Analysis**		**ORIGEN**		**WAC Class A Limit / Ratio***
	Curies	Curies/m^3	Curies	Curies/m^3	Curies/m^3
Ni-63***	385	30.1	356	27.9	35 / 0.86
Co-60	62	4.9	80	6.3	700 / 0.007
Fe-55	1.1	0.09	0.9	0.07	700 / 1.3E-4

*****Ratio of Curie concentration from metal sample analysis to Class A limit
****** Minimum detectable Activity Level
*** in activated metal

3.2 REGULATORY CONDITIONS

The regulatory conditions, limitations and allowances are such that the NS SAVANNAH RPV and Internals package is a class A package per 10 CFR Part 61. And they are a class A package at both Envirocare of Utah and Chem-Nuclear in Barnwell, SC.

4.0 CONCLUSIONS

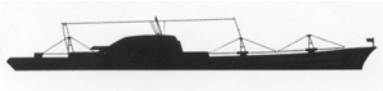
The following conclusions are drawn from this project:

- These results are consistent with previous analyses and are based upon a conservative methodology and assumptions.
- This project approach has been proven and accepted for similar projects, such as one completed at Shoreham Nuclear Power Station.
- The analytical data and results also correlate with actual field dosimetry measurements taken during the project.

- The computer code used for this analysis (ORIGEN-ARP Version 2.0) is the state-of-the-art code used by the nuclear industry and government for analyses of this type.
- The radionuclide concentration for the NS SAVANNAH RPV and internals package is clearly shown to be within Class A disposal limits. The specific waste classification criteria and allowable limits comply with the written requirements set forth by the federal government, state governments, and waste management facilities.
- Further intrusive sampling or opening of the RPV and/or internals will be expensive, will require additional personnel radiation exposure, and will not yield data that will change this waste classification conclusion.

5.0 REFERENCES

1. NS SAVANNAH Reactor Construction and Design Calculations; The Babcock & Wilcox Company, Barberton, OH; March 10, 1958
2. NS SAVANNAH Primary Piping Design Calculations; The Babcock & Wilcox Company, Barberton, OH; March 13, 1959
3. Steam Generator Instruction Book, NS SAVANNAH Nuclear Power Plant; The Babcock & Wilcox Company, New York, NY; February, 1959
4. South Carolina Department of Health and Environmental Control, Radioactive Material License no.097, July 31, 2000.
5. ENVROCARE of UTAH, Bulk Waste Disposal and Treatment Facilities Waste Acceptance Criteria, Revision 5, April 2005.
6. *N. S. SAVANNAH Radiological Survey*, Todd Shipyard Corporation, August 1976.
7. *Nuclear Merchant Ship Reactor*, W.R.Smith & M.A.Turner, April 1958.
8. *N. S. SAVANNAH SAFETY ASSESSMENT*, Vol. I, Engineering and Construction, Edited by Zelvin Levine, June 1959.
9. *N. S. SAVANNAH SAFETY ASSESSMENT,* Vol. III, Radiological Health, Prepared by States Marines Lines, August 1961.
10. *N. S. SAVANNAH SAFETY ASSESSMENT,* Revision III, Prepared by First Atomic Ship Transport Inc., October 1968.
11. DOE/LLW-238, *Selected Radionuclides Important to Low-Level Radioactive Waste Management,* Idaho National Engineering Laboratory, November 1996.
12. BAW-1164, *NUCLEAR MERCHANT SHIP REACTOR, FINAL SAFEGUARDS REPORT*, VOLUME I, The Babcock & Wilcox Company, June 1960.



APPENDIX A

GEL Data

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Chain of Custody and Supporting Documentation

RADIOACTIVE MATERIALS (EXEMPT QUANTITIES OR LOWER) SAMPLE CHAIN OF CUSTODY DOCUMENTATION

WPI
2020 KRAFT DRIVE, SUITE 2200
BLACKSBURG, VIRGINIA 24060
(336) 316-0707
(336) 210-0662 (CELL)

SHIPPER: R. Jon Stouky, Project Manager
WPI
2020 Kraft Drive, Suite 2200
Blacksburg, Virginia 24060

September 2, 2005

144814%

DRIVER: Thomas Craddick, WPI employee
sole use private vehicle - exempt quantities RM

Thomas Craddick 09/02
Thomas Craddick Date

PACKAGE/CONTENTS DESCRIPTION:

Item 1, DOT Cert. ammo box with wired closed lid containing 7 each 14.2 to 28.2 gram each CS, SS, and lead metal shaving, and one thermal insulation samples (see attached list) in individual poly baggies which are in 3/4" capped pipe nipples, and wrapped in 1/4" lead. All containers have been surveyed and have no residual contamination. Total measured activity is 3.2 Ci CO-60 and 10.0 Ci NI-63.

Highest dose rate is samples 7 through 9, and is approximately 40 mrem/hr. Major isotopes are CO-60 and NI-63. Samples contain no measurable fissionable materials.

All samples are from NS SAVANNAH reactor vessel and internals and samples 1, 3, 5, 6, 7, 8, and 9 are to be subjected to a full Part 61 analysis. Sample 4 is to be gamma scanned only for induced activity and residual contamination.

Item 2, 2 each non approved containers of NS SAVANNAH secondary system water, counted previously on board the SAVANNAH and found to contain no radioactive materials in excess of background.

These two liquid samples are to be subjected to a gamma scan only to confirm the above results.

All samples are exempt quantities or lower in classification and the liquid samples are not shipped as any class of RM.

RECEIPT SIGNATURE:

I certify that General Engineering Laboratories (GEL), of Charleston, South Carolina received the above packages/samples (contaienrs not on September 27, 2005.

Received by; Date;

T. Blum 9-6-05

Subject: Samples from NS SAVANNAH
Date: Wed, 7 Sep 2005 09:26:20 -0400
From: "Fitzgerald, Frank" <frank_fitzgerald@wpi.biz>
To: "Cheryl Jones" <cj@mail.gel.com>
CC: "Solovey, Garrick" <Garrick_Solovey@wpi.biz>, <gjsolovey@aol.com>, "Howell, Wayne" <Wayne_Howell@wpi.biz>, "Stouky, Jon @ AOL" <jstouky@aol.com>, "Bowen, John" <john_bowen@wpi.biz>

Cheryl:

This email is to confirm our discussion this morning, concerning the samples received by GEL from the NS SAVANNAH.

- There are 11 total samples.
- Seven of the samples will undergo Part 61 Analysis
  - Two of the seven samples will be accelerated. The two samples to be accelerated are:
    - MTS-ID-1
    - OTS-ID/OD
- Please perform a Gamma Scan only on the following two samples:
  - Sample 1 NST-Lead
  - Sample 4 RPV-INSUL-1
  - The price for the Gamma scan on these samples (as we discussed) is $234/each. $156 each x 1.5X for RAD II = $234.
  - Total price for the gamma scan on the 2 samples is $468 ($234 x 2).
- Please perform a Gamma Scan only on the two water samples:
  - The price for the gamma scan on the 2 water samples is $156/each or $312 total.

Please confirm you have these samples. Also, I will issue a change order to the P.O. WPI-06-0025 to authorize the Gamma scans.

If you have questions or need additional information, please let me know. We appreciate your help with these.

Sincerely,

Frank Fitzgerald
Contracts Manager, CFCM
WPI, Inc.
Frank_Fitzgerald@wpi.biz
Phone: 540-557-6034
Fax: 540-557-6043

NOTICE:
This message is for the designated recipient only and may contain privileged or confidential information. If you have received it in error, please notify the sender immediately and delete the original. Any other use of this e-mail by you is prohibited.

SAMPLES		Approx. sample wt. (gm)
✓ 1	NST – Lead	(26.1)
✓ 2	NST – OD – Inner wall	(14.6)
✓ 3	NST – ID – 1	(19.8)
✓ 4	RPV Insulation – 1	(28.8)
✓ 5	RPV – OD – 1	(19.3)
✓ 6	RPV – ID – 1	(17.0)
✓ 7	OTS ID/OD	(16.3)
✓ 8	MTS OD – 1	(14.6)
✓ 9	MTS ID – 1	(14.4)

9.6.05 14:00

SHIPPING DECLARATION
~~REQUISITION FOR MATERIAL~~

NOTE: Only applicable information need be entered on the first five lines of this form. Be sure to describe fully the items in the Description of Material column.

Requisition Number 2005-001

Date of request SEPT 01, 2005 Delivery requested _____ TIME M _____ DATE Page ____ of ____ pages

FROM: N.S. SAVANNAH DEPARTMENT JAMES RIVER RES FLEET; NEWPORT NEWS VA. LOCATION

Deliver _____ NAME OF VESSEL OR BUILDING LOCATION _____ DEPARTMENT _____ NAME

If vessel, give _____ PIER _____ PORT _____ VOYAGE NUMBER

DO NOT USE	NO. OF UNITS ON HAND	NO. OF UNITS NEEDED	UNIT	DESCRIPTION OF MATERIAL	DO NOT USE UNIT VALUE	DO NOT USE TOTAL VALUE
				RADIOACTIVE MATERIAL (SAMPLES)		
				EXEMPT QUANTITY		
				CLASS 7, UN3332 (CO-60)		
				3.2 µCi		
				SHIP TO: GENERAL ENGINEERING LABORATORIES		
				CHARLESTON, SC		
				AUTH BY: ERHARD W. KOEHLER		
				SR. TECH'L ADVISOR, N.S. SAVANNAH		
				U.S. MARITIME ADMIN.		
				WASHINGTON, DC 20590		
				PHONE: (202) 309-4610		
				DRIVER: THOMAS CRADDICK		
				WPI, INC.		
				RICHMOND, VA		
				PHONE: (336) 210-0662		
					TOTAL	

Submitted _____ SIGNATURE _____ TITLE

Approved _____ SIGNATURE 9/1/2005 TITLE

Material received _____ SIGNATURE _____ TITLE

FORM 1307A PRINTED IN U.S.A.

AMERICAN EXPORT ISBRANDTSEN LINES

SAMPLE RECEIPT & REVIEW FORM

GENERAL ENGINEERING LABORATORIES, LLC

PM use only

Client: WPI	SDG/ARCOC/Work Order: 144814
Date Received: 9.6.05	PM(A) Review (ensure non-conforming items are resolved prior to signing):
Received By: E. Martin	

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	X			Circle Applicable: seals broken damaged container leaking container other (describe)
2	Samples requiring cold preservation within (4 +/- 2 C)? Record preservation method.		X		Circle Coolant # ice bags blue ice dry ice none other describe)
3	Chain of custody documents included with shipment?	X			
4	Sample containers intact and sealed?	X			Circle Applicable: seals broken damaged container leaking container other (describe)
5	Samples requiring chemical preservation at proper pH?		X		Sample ID's, containers affected and observed pH:
6	VOA vials free of headspace (defined as < 6mm bubble)?		X		Sample ID's and containers affected:
7	Are Encore containers present? (If yes, immediately deliver to VOA laboratory)			X	
8	Samples received within holding time?	X			Id's and tests affected:
9	Sample ID's on COC match ID's on bottles?			X	Sample ID's and containers affected: 2 liquid samples not on COC
10	Date & time on COC match date & time on bottles?			X	Sample ID's affected: No dates + times
11	Number of containers received match number indicated on COC?			X	Sample ID's affected: 2 liquid sample not on COC
12	COC form is properly signed in relinquished/received sections?	X			
14	Air Bill ,Tracking #'s, & Additional Comments	Liquid client ID's- 1. Starboard secondary steam generator liquid sample 2. Port secondary steam generator liquid sample Samples delivered by courier			

	Suspected Hazard Information	Non-Regulated	Regulated	High Level	RSO RAD Receipt # _____ *If > x2 area background is observed on samples identified as "non-regulated/non-radioactive", contact the Radiation Safety group for further investigation.
A	Radiological Classification?		✓	X	Maximum Counts Observed*: 30K a/c
B	PCB Regulated?				Comments: Waters are RAD, Solids are RAD II
C	Shipped as DOT Hazardous Material? If yes, contact Waste Manager or ESH Manager.				Hazard Class Shipped: UN#:

PM (or PMA) review of Hazard classification: _____ Initials 9/6/05 Date:

RADIOLOGICAL ANALYSIS

Radiochemistry Case Narrative
WPI (WPIA)
Work Order 144814

Method/Analysis Information

Product:	**Alphaspec Am241, Cm, Solid High Rad**
Analytical Method:	DOE EML HASL-300, Am-05-RC Modified
Prep Method:	Ash Soil Prep
Dry Soil Prep GL-RAD-A-021 Method:	Dry Soil Prep
Analytical Batch Number:	461113
Prep Batch Number:	461043
Dry Soil Prep GL-RAD-A-021 Batch Number:	461025

Sample ID	Client ID
144814002	NST - OD Inner Wall
144814003	NST - ID-1
144814005	RPV OD-1
144814006	RPV ID-1
144814007	OTS ID/OD
144814008	MTS OD-1
144814009	MTS ID-1
1200932035	Method Blank (MB)
1200932036	144814005(RPV OD-1) Sample Duplicate (DUP)
1200932037	144814005(RPV OD-1) Matrix Spike (MS)
1200932038	Laboratory Control Sample (LCS)

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-011 REV# 14.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume in this batch.

Designated QC
The following sample was used for QC: 144814005 (RPV OD-1).

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Preparation Information
All preparation criteria have been met for these analyses.

Sample Re-prep/Re-analysis
None of the samples in this sample set required reprep or reanalysis.

Miscellaneous Information:

NCR Documentation
Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. An NCR was not generated for this SDG.

Manual Integration
No manual integrations were performed on data in this batch.

Qualifier information
Manual qualifiers were not required.

Method/Analysis Information

Product:	**Liquid Scint Pu241, Solid High Rad**
Analytical Method:	DOE EML HASL-300, Pu-11-RC Modified
Prep Method:	Ash Soil Prep
Dry Soil Prep GL-RAD-A-021 Method:	Dry Soil Prep
Analytical Batch Number:	461078
Prep Batch Number:	461043
Dry Soil Prep GL-RAD-A-021 Batch Number:	461025

Sample ID	Client ID
144814002	NST - OD Inner Wall
144814003	NST - ID-1
144814005	RPV OD-1
144814006	RPV ID-1
144814007	OTS ID/OD
144814008	MTS OD-1
144814009	MTS ID-1
1200931922	Method Blank (MB)
1200931923	144814005(RPV OD-1) Sample Duplicate (DUP)
1200931924	144814005(RPV OD-1) Matrix Spike (MS)
1200931925	Laboratory Control Sample (LCS)

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering

Laboratories, LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-035 REV# 7.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume in this batch.

Designated QC
The following sample was used for QC: 144814005 (RPV OD-1).

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Preparation Information
All preparation criteria have been met for these analyses.

Sample Re-prep/Re-analysis
None of the samples in this sample set required reprep or reanalysis.

Miscellaneous Information:

NCR Documentation
Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. An NCR was not generated for this SDG.

Manual Integration
No manual integrations were performed on data in this batch.

Qualifier information
Manual qualifiers were not required.

Method/Analysis Information

Product:	**Alphaspec Pu, Solid High Rad**
Analytical Method:	DOE EML HASL-300, Pu-11-RC Modified
Prep Method:	Ash Soil Prep
Dry Soil Prep GL-RAD-A-021 Method:	Dry Soil Prep

Analytical Batch Number: 461109
Prep Batch Number: 461043
Dry Soil Prep GL-RAD-A-021 Batch Number: 461025

Sample ID	Client ID
144814002	NST - OD Inner Wall
144814003	NST - ID-1
144814005	RPV OD-1
144814006	RPV ID-1
144814007	OTS ID/OD
144814008	MTS OD-1
144814009	MTS ID-1
1200932031	Method Blank (MB)
1200932032	144814005(RPV OD-1) Sample Duplicate (DUP)
1200932033	144814005(RPV OD-1) Matrix Spike (MS)
1200932034	Laboratory Control Sample (LCS)

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-011 REV# 14.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume in this batch.

Designated QC
The following sample was used for QC: 144814005 (RPV OD-1).

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Preparation Information
All preparation criteria have been met for these analyses.

Sample Re-prep/Re-analysis
None of the samples in this sample set required reprep or reanalysis.

Miscellaneous Information:

NCR Documentation
Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. An NCR was not generated for this SDG.

Manual Integration
No manual integrations were performed on data in this batch.

Qualifier information
Manual qualifiers were not required.

Method/Analysis Information

Product: **Liquid Scint Tc99, Solid High Rad**
Analytical Method: DOE EML HASL-300, Tc-02-RC Modified
Analytical Batch Number: 461039

Sample ID	Client ID
144814002	NST - OD Inner Wall
144814003	NST - ID-1
144814005	RPV OD-1
144814006	RPV ID-1
144814007	OTS ID/OD
144814008	MTS OD-1
144814009	MTS ID-1
1200931827	Method Blank (MB)
1200931828	144814002(NST - OD Inner Wall) Sample Duplicate (DUP)
1200931829	144814002(NST - OD Inner Wall) Matrix Spike (MS)
1200931830	Laboratory Control Sample (LCS)

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-005 REV# 12.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume in this batch.

Designated QC
The following sample was used for QC: 144814002 (NST - OD Inner Wall).

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Preparation Information
All preparation criteria have been met for these analyses.

Sample Re-prep/Re-analysis
None of the samples in this sample set required reprep or reanalysis.

Miscellaneous Information:

NCR Documentation
Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. An NCR was not generated for this SDG.

Manual Integration
No manual integrations were performed on data in this batch.

Qualifier information
Manual qualifiers were not required.

Method/Analysis Information

Product:	**Liquid Scint Fe55, Solid High Rad**
Analytical Method:	DOE RESL Fe-1, Modified
Prep Method:	Ash Soil Prep
Dry Soil Prep GL-RAD-A-021 Method:	Dry Soil Prep
Analytical Batch Number:	461073
Prep Batch Number:	461043
Dry Soil Prep GL-RAD-A-021 Batch Number:	461025

Sample ID	Client ID
144814002	NST - OD Inner Wall
144814003	NST - ID-1
144814005	RPV OD-1
144814006	RPV ID-1
144814007	OTS ID/OD
144814008	MTS OD-1
144814009	MTS ID-1
1200931907	Method Blank (MB)

1200931908 144814003(NST - ID-1) Sample Duplicate (DUP)
1200931909 144814003(NST - ID-1) Matrix Spike (MS)
1200931910 Laboratory Control Sample (LCS)

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-040 REV# 3.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume in this batch.

Designated QC
The following sample was used for QC: 144814003 (NST - ID-1).

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Preparation Information
All preparation criteria have been met for these analyses.

Sample Re-prep/Re-analysis
None of the samples in this sample set required reprep or reanalysis.

Miscellaneous Information:

NCR Documentation
Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. An NCR was not generated for this SDG.

Manual Integration
No manual integrations were performed on data in this batch.

Qualifier information
Manual qualifiers were not required.

Method/Analysis Information

Product:	**Gamma Ni59, Solid High Rad**
Analytical Method:	DOE RESL Ni-1
Prep Method:	Ash Soil Prep
Dry Soil Prep GL-RAD-A-021 Method:	Dry Soil Prep
Analytical Batch Number:	461105
Prep Batch Number:	461043
Dry Soil Prep GL-RAD-A-021 Batch Number:	461025

Sample ID	Client ID
144814002	NST - OD Inner Wall
144814003	NST - ID-1
144814005	RPV OD-1
144814006	RPV ID-1
144814007	OTS ID/OD
144814008	MTS OD-1
144814009	MTS ID-1
1200932016	Method Blank (MB)
1200932017	144814003(NST - ID-1) Sample Duplicate (DUP)
1200932018	144814003(NST - ID-1) Matrix Spike (MS)
1200932019	Laboratory Control Sample (LCS)

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-022 REV# 7.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume in this batch.

Designated QC
The following sample was used for QC: 144814003 (NST - ID-1).

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Preparation Information
All preparation criteria have been met for these analyses.

Sample Re-prep/Re-analysis
Sample 1200932018 (NST - ID-1) was recounted due to low/high recovery.

Chemical Recoveries
All chemical recoveries meet the required acceptance limits for this sample set.

Miscellaneous Information:

NCR Documentation
Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. An NCR was not generated for this SDG.

Manual Integration
No manual integrations were performed on data in this batch.

Qualifier information

Qualifier	Reason	Analyte	Sample
UI	Data rejected due to low abundance.	Nickel-59	144814003
			144814005

Method/Analysis Information

Product:	**Liquid Scint Ni63, Solid High Rad**
Analytical Method:	DOE RESL Ni-1, Modified
Prep Method:	Ash Soil Prep
Dry Soil Prep GL-RAD-A-021 Method:	Dry Soil Prep
Analytical Batch Number:	467200
Prep Batch Number:	461043
Dry Soil Prep GL-RAD-A-021 Batch Number:	461025

Sample ID	Client ID
144814002	NST - OD Inner Wall
144814003	NST - ID-1
144814005	RPV OD-1
144814006	RPV ID-1
144814007	OTS ID/OD
144814008	MTS OD-1
144814009	MTS ID-1
1200946695	Method Blank (MB)
1200946696	144814002(NST - OD Inner Wall) Sample Duplicate (DUP)
1200946697	144814002(NST - OD Inner Wall) Matrix Spike (MS)

1200946698 Laboratory Control Sample (LCS)

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-022 REV# 7.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume in this batch.

Designated QC
The following sample was used for QC: 144814002 (NST - OD Inner Wall).

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Preparation Information
All preparation criteria have been met for these analyses.

Sample Re-prep/Re-analysis
Samples were reprepped due to high relative percent difference/relative error ratio.
Samples were reprepped due to low/high recovery.

Miscellaneous Information:

NCR Documentation
Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. An NCR was not generated for this SDG.

Manual Integration
No manual integrations were performed on data in this batch.

Qualifier information
Manual qualifiers were not required.

Method/Analysis Information

Product: **Gamma I129, Solid High Rad**
Analytical Method: EML HASL 300, 4.5.2.3
Analytical Batch Number: 461082

Sample ID	Client ID
144814002	NST - OD Inner Wall
144814003	NST - ID-1
144814005	RPV OD-1
144814006	RPV ID-1
144814007	OTS ID/OD
144814008	MTS OD-1
144814009	MTS ID-1
1200931936	Method Blank (MB)
1200931937	144814002(NST - OD Inner Wall) Sample Duplicate (DUP)
1200931938	Laboratory Control Sample (LCS)

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-013 REV# 10.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume in this batch.

Designated QC
The following sample was used for QC: 144814002 (NST - OD Inner Wall).

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Preparation Information
All preparation criteria have been met for these analyses.

Sample Re-prep/Re-analysis

Sample 1200931938 (LCS) was recounted due to low/high recovery.

Miscellaneous Information:

NCR Documentation
Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. An NCR was not generated for this SDG.

Manual Integration
No manual integrations were performed on data in this batch.

Additional Comments
The standard detection limits were not met, however, the 10CFR Part 61 detection limits were met. 1200931937 (NST - OD Inner Wall), 144814002 (NST - OD Inner Wall), 144814003 (NST - ID-1), 144814006 (RPV ID-1), 144814007 (OTS ID/OD), 144814008 (MTS OD-1) and 144814009 (MTS ID-1).

Qualifier information
Manual qualifiers were not required.

Method/Analysis Information

Product:	**Gammaspec, Gamma, solid High Rad**
Analytical Method:	EML HASL 300, 4.5.2.3
Prep Method:	Dry Soil Prep
Analytical Batch Number:	461085
Prep Batch Number:	461025

Sample ID	Client ID
144814001	NST - Lead
144814002	NST - OD Inner Wall
144814003	NST - ID-1
144814004	RPV Insulation-1
144814005	RPV OD-1
144814006	RPV ID-1
144814007	OTS ID/OD
144814008	MTS OD-1
144814009	MTS ID-1
1200931947	Method Blank (MB)
1200931948	144814001(NST - Lead) Sample Duplicate (DUP)
1200931949	Laboratory Control Sample (LCS)

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-013 REV# 10.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume in this batch.

Designated QC
The following sample was used for QC: 144814001 (NST - Lead).

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Preparation Information
All preparation criteria have been met for these analyses.

Sample Re-prep/Re-analysis
Sample 1200931949 (LCS) was recounted due to low/high recovery.

Miscellaneous Information:

NCR Documentation
Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. An NCR was not generated for this SDG.

Manual Integration
No manual integrations were performed on data in this batch.

Additional Comments
The standard detection limits were not met, however, the 10CFR Part 61 detection limits were met. 144814007 (OTS ID/OD), 144814008 (MTS OD-1) and 144814009 (MTS ID-1).

Qualifier information

Qualifier	Reason	Analyte	Sample
U	Result not detected above the detection limit	Thorium-234	144814004
UI	Data rejected due to interference.	Cobalt-57	144814004
UI	Data rejected due to low abundance.	Barium-133	144814004
		Cesium-137	144814007
			144814009
		Lead-210	1200931948
		Lead-212	144814003
		Sodium-22	144814004
		Thorium-234	1200931947

		Uranium-238	1200931947
		Zinc-65	144814004
			144814007
			144814008
		Zirconium-95	144814004
UI	Data rejected due to no valid peak.	Cerium-139	144814004
		Cobalt-60	144814001
		Niobium-95	144814004
		Potassium-40	1200931948
			144814001
			144814004
		Thorium-234	144814004
		Uranium-235	1200931948
		Uranium-238	1200931948
			144814004
		Zinc-65	144814009

Method/Analysis Information

Product:	**GFPC, Sr90, solid High Rad**
Analytical Method:	EPA 905.0 Modified
Prep Method:	Ash Soil Prep
Dry Soil Prep GL-RAD-A-021 Method:	Dry Soil Prep
Analytical Batch Number:	461107
Prep Batch Number:	461043
Dry Soil Prep GL-RAD-A-021 Batch Number:	461025

Sample ID	Client ID
144814002	NST - OD Inner Wall
144814003	NST - ID-1
144814005	RPV OD-1
144814006	RPV ID-1
144814007	OTS ID/OD
144814008	MTS OD-1
144814009	MTS ID-1
1200932020	Method Blank (MB)
1200932021	144814003(NST - ID-1) Sample Duplicate (DUP)
1200932022	144814003(NST - ID-1) Matrix Spike (MS)
1200932023	Laboratory Control Sample (LCS)

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-004 REV# 9.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume in this batch.

Designated QC
The following sample was used for QC: 144814003 (NST - ID-1).

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Preparation Information
All preparation criteria have been met for these analyses.

Sample Re-prep/Re-analysis
Samples were recounted at least five days after the separation date to verify sample results. Second counts being reported.

Chemical Recoveries
All chemical recoveries meet the required acceptance limits for this sample set.

Miscellaneous Information:

NCR Documentation
Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. An NCR was not generated for this SDG.

Manual Integration
No manual integrations were performed on data in this batch.

Qualifier information
Manual qualifiers were not required.

Method/Analysis Information

Product:	**LSC, Tritium Dist, Solid High Rad**
Analytical Method:	EPA 906.0 Modified
Analytical Batch Number:	465649

Sample ID	Client ID
144814002	NST - OD Inner Wall
144814003	NST - ID-1
144814005	RPV OD-1
144814006	RPV ID-1
144814007	OTS ID/OD
144814008	MTS OD-1
144814009	MTS ID-1
1200943141	Method Blank (MB)
1200943142	144814002(NST - OD Inner Wall) Sample Duplicate (DUP)
1200943143	144814002(NST - OD Inner Wall) Matrix Spike (MS)
1200943144	Laboratory Control Sample (LCS)

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-002 REV# 10.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume in this batch.

Designated QC
The following sample was used for QC: 144814002 (NST - OD Inner Wall).

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Preparation Information
All preparation criteria have been met for these analyses.

Sample Re-prep/Re-analysis
Samples were reprepped due to low/high recovery.

Miscellaneous Information:

NCR Documentation
Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. An NCR was not generated for this SDG.

Manual Integration
No manual integrations were performed on data in this batch.

Qualifier information
Manual qualifiers were not required.

Method/Analysis Information

Product: **Liquid Scint C14, Solid**
Analytical Method: EPA EERF C-01 Modified
Analytical Batch Number: 461028

Sample ID	Client ID
144814002	NST - OD Inner Wall
144814003	NST - ID-1
144814005	RPV OD-1
144814006	RPV ID-1
144814007	OTS ID/OD
144814008	MTS OD-1
144814009	MTS ID-1
1200931790	Method Blank (MB)
1200931791	144814002(NST - OD Inner Wall) Sample Duplicate (DUP)
1200931792	144814002(NST - OD Inner Wall) Matrix Spike (MS)
1200931793	Laboratory Control Sample (LCS)

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-003 REV# 8.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume in this batch.

Designated QC

The following sample was used for QC: 144814002 (NST - OD Inner Wall).

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Preparation Information
All preparation criteria have been met for these analyses.

Sample Re-prep/Re-analysis
None of the samples in this sample set required reprep or reanalysis.

Miscellaneous Information:

NCR Documentation
Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. An NCR was not generated for this SDG.

Manual Integration
No manual integrations were performed on data in this batch.

Qualifier information
Manual qualifiers were not required.

Method/Analysis Information

Product: **Gammaspec, Gamma, Liquid (Long List)**
Analytical Method: EPA 901.1
Analytical Batch Number: 463088

Sample ID	Client ID
144814010	Starboard Secondary Steam Gene
144814011	Port Secondary Steam Generator
1200936878	Method Blank (MB)
1200936879	145401002(SMH South End) Sample Duplicate (DUP)
1200936880	145401002(SMH South End) Matrix Spike (MS)
1200936881	Laboratory Control Sample (LCS)

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-013 REV# 10.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met.

Standards Information

Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume in this batch.

Designated QC
The following sample was used for QC: 145401002 (SMH South End).

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Preparation Information
All preparation criteria have been met for these analyses.

Sample Re-prep/Re-analysis
None of the samples in this sample set required reprep or reanalysis.

Miscellaneous Information:

NCR Documentation
Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. An NCR was not generated for this SDG.

Qualifier information

Qualifier	Reason	Analyte	Sample
UI	Data rejected due to low abundance.	Lead-210	144814011
		Thorium-234	1200936879
			144814011
		Uranium-238	1200936879
			144814011
UI	Data rejected due to no valid peak.	Bismuth-214	1200936879
		Thorium-230	1200936879
			144814011

Certification Statement
Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Review Validation:
GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

The following data validator verified the information presented in this case narrative:

Reviewer: L Lynch 10/4/06

SAMPLE DATA SUMMARY

GENERAL ENGINEERING LABORATORIES, LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis Report for
for
WPIA002 WPI

Client SDG: 144814 GEL Work Order: 144814

Sample(s) Contained within this report:

Lab Sample ID	Client Sample ID	Sample Description	Collected
144814001	NST - Lead	N/A	09/01/2005 12:00
144814002	NST - OD Inner Wall	N/A	09/01/2005 12:00
144814003	NST - ID-1	N/A	09/01/2005 12:00
144814004	RPV Insulation-1	N/A	09/01/2005 12:00
144814005	RPV OD-1	N/A	09/01/2005 12:00
144814006	RPV ID-1	N/A	09/01/2005 12:00
144814007	OTS ID/OD	N/A	09/01/2005 12:00
144814008	MTS OD-1	N/A	09/01/2005 12:00
144814009	MTS ID-1	N/A	09/01/2005 12:00
144814010	Starboard Secondary Steam Gene	N/A	09/01/2005 12:00
144814011	Port Secondary Steam Generator	N/A	09/01/2005 12:00

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, LLC standard operating procedures. Please direct any questions to your Project Manager, Cheryl Jones.

Reviewed by

GENERAL ENGINEERING LABORATORIES, LLC

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10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814001**	**Client:**	**WPI**
Client Sample ID:	**NST - Lead**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Solid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (g)	Run Date	Activity[2]	Uncertainty	MDA[1]	RL	Units	Qualifier
Gamma Spec								
Be-7	2.52E+00	10/01/05	9.54E-07	5.29E-06	9.09E-06		uCi/g	U
Na-22	2.52E+00	10/01/05	-7.74E-08	6.59E-07	1.18E-06		uCi/g	U
K-40	2.52E+00	10/01/05	0.00E+00	1.02E-05	7.79E-06		uCi/g	UUI
Cr-51	2.52E+00	10/01/05	3.15E-06	7.01E-06	1.14E-05		uCi/g	U
Mn-54	2.52E+00	10/01/05	2.44E-09	4.27E-07	7.58E-07		uCi/g	U
Fe-59	2.52E+00	10/01/05	4.89E-07	1.59E-06	3.06E-06		uCi/g	U
Co-56	2.52E+00	10/01/05	-3.80E-07	7.09E-07	1.10E-06		uCi/g	U
Co-57	2.52E+00	10/01/05	-6.68E-08	2.68E-07	4.00E-07		uCi/g	U
Co-58	2.52E+00	10/01/05	-1.09E-07	6.51E-07	1.09E-06		uCi/g	U
Co-60	2.52E+00	10/01/05	0.00E+00	1.00E-06	8.90E-07	7.00E-01	uCi/g	UUI
Zn-65	2.52E+00	10/01/05	-3.17E-07	1.13E-06	1.99E-06		uCi/g	U
Y-88	2.52E+00	10/01/05	4.02E-07	7.33E-07	1.64E-06		uCi/g	U
Zr-95	2.52E+00	10/01/05	3.28E-07	1.19E-06	1.92E-06		uCi/g	U
Nb-94	2.52E+00	10/01/05	-3.37E-08	4.75E-07	7.99E-07	2.00E-04	uCi/g	U
Nb-95	2.52E+00	10/01/05	5.01E-07	7.07E-07	1.78E-06		uCi/g	U
Ru-106	2.52E+00	10/01/05	2.69E-07	3.94E-06	6.89E-06		uCi/g	U
Ag-110m	2.52E+00	10/01/05	-3.52E-07	4.95E-07	7.52E-07		uCi/g	U
Sn-113	2.52E+00	10/01/05	3.15E-08	5.63E-07	9.57E-07		uCi/g	U
Sb-124	2.52E+00	10/01/05	1.18E-06	1.78E-06	3.76E-06		uCi/g	U
Sb-125	2.52E+00	10/01/05	4.85E-07	1.20E-06	1.93E-06		uCi/g	U
Cs-134	2.52E+00	10/01/05	1.40E-07	4.82E-07	8.95E-07		uCi/g	U
Cs-136	2.52E+00	10/01/05	-1.67E-06	3.09E-06	5.15E-06		uCi/g	U
Cs-137	2.52E+00	10/01/05	7.26E-08	5.24E-07	9.09E-07	1.00E-03	uCi/g	U
Ba-133	2.52E+00	10/01/05	9.31E-08	5.88E-07	9.27E-07		uCi/g	U
Ba-140	2.52E+00	10/01/05	6.97E-06	7.76E-06	1.46E-05		uCi/g	U
Ce-139	2.52E+00	10/01/05	-4.68E-08	3.90E-07	5.25E-07		uCi/g	U
Ce-141	2.52E+00	10/01/05	4.53E-07	8.84E-07	1.40E-06		uCi/g	U
Ce-144	2.52E+00	10/01/05	-4.96E-08	2.15E-06	3.26E-06		uCi/g	U
Nd-147	2.52E+00	10/01/05	4.29E-06	1.71E-05	3.05E-05		uCi/g	U
Pm-144	2.52E+00	10/01/05	2.06E-07	5.25E-07	9.33E-07		uCi/g	U
Pm-146	2.52E+00	10/01/05	3.65E-07	5.04E-07	9.36E-07		uCi/g	U
Eu-152	2.52E+00	10/01/05	1.82E-07	1.20E-06	1.90E-06		uCi/g	U
Eu-154	2.52E+00	10/01/05	-4.17E-07	1.86E-06	3.26E-06		uCi/g	U
Eu-155	2.52E+00	10/01/05	2.26E-07	1.02E-06	1.57E-06		uCi/g	U
Ir-192	2.52E+00	10/01/05	-3.21E-07	5.81E-07	8.41E-07		uCi/g	U
Hg-203	2.52E+00	10/01/05	3.27E-07	6.97E-07	1.11E-06		uCi/g	U
Tl-208	2.52E+00	10/01/05	1.91E-07	8.94E-07	1.11E-06		uCi/g	U

Note(s):1. Calculated MDAs are a-posteriori values.

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

GENERAL ENGINEERING LABORATORIES, LLC

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10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814001**	**Client:**	**WPI**
Client Sample ID:	**NST - Lead**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Solid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (g)	Run Date	Activity	Uncertainty	MDA	RL	Units	Qualifier
Pb-210	2.52E+00	10/01/05	6.99E-05	5.18E-05	7.37E-05		uCi/g	U
Pb-212	2.52E+00	10/01/05	6.20E-07	1.18E-06	1.24E-06		uCi/g	U
Pb-214	2.52E+00	10/01/05	6.86E-07	1.48E-06	1.77E-06		uCi/g	U
Bi-212	2.52E+00	10/01/05	4.15E-06	3.49E-06	7.21E-06		uCi/g	U
Bi-214	2.52E+00	10/01/05	1.11E-06	1.28E-06	2.06E-06		uCi/g	U
Ra-228	2.52E+00	10/01/05	1.88E-06	3.79E-06	4.79E-06		uCi/g	U
Ac-228	2.52E+00	10/01/05	1.88E-06	3.79E-06	4.79E-06		uCi/g	U
Th-230	2.52E+00	10/01/05	1.11E-06	1.28E-06	1.84E-06		uCi/g	U
Th-234	2.52E+00	10/01/05	5.39E-06	1.48E-05	1.92E-05		uCi/g	U
U-235	2.52E+00	10/01/05	2.08E-06	2.12E-06	3.47E-06		uCi/g	U
U-238	2.52E+00	10/01/05	5.39E-06	1.48E-05	1.92E-05		uCi/g	U
Np-239	2.52E+00	10/01/05	-7.88E-07	1.85E-06	2.71E-06		uCi/g	U
Am-241	2.52E+00	10/01/05	7.17E-07	1.83E-06	2.39E-06		uCi/g	U

Note(s): **1. Calculated MDAs are a-posteriori values.**

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

GENERAL ENGINEERING LABORATORIES, LLC

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10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814002**	**Client:**	**WPI**
Client Sample ID:	**NST - OD Inner Wall**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Solid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (g)	Run Date	Activity[2]	Uncertainty	MDA[1]	RL	Units	Qualifier
H-3	3.55E-02	09/26/05	-5.79E-05	4.22E-04	7.55E-04	4.00E-02	uCi/g	U
C-14	3.07E-02	09/22/05	-6.28E-06	5.45E-05	9.63E-05	8.00E-03	uCi/g	U
Fe-55	1.37E-03	09/23/05	1.38E-03	1.06E-02	1.46E-02	7.00E-01	uCi/g	U
Ni-63	1.37E-03	09/30/05	-2.54E-04	1.21E-03	2.11E-03	3.50E-03	uCi/g	U
Sr-90	2.10E-02	10/01/05	1.98E-05	1.59E-05	2.66E-05	4.00E-05	uCi/g	U
Tc-99	4.18E-02	09/25/05	-5.60E-05	4.91E-05	8.88E-05	3.00E-03	uCi/g	U
Pu-241	1.37E-02	09/26/05	6.83E-05	3.61E-04	6.26E-04	3.50E-03	uCi/g	U
Alpha Spec								
Pu-238	1.37E-02	10/01/05	7.27E-08	2.28E-06	6.60E-06	1.00E-04	uCi/g	U
Pu-239/240	1.37E-02	10/01/05	6.30E-07	1.77E-06	4.58E-06	1.00E-04	uCi/g	U
Am-241	1.37E-02	10/01/05	6.08E-07	1.79E-06	4.45E-06	1.00E-04	uCi/g	U
Cm-242	1.37E-02	10/01/05	-8.06E-07	5.97E-07	4.33E-06	2.00E-02	uCi/g	U
Cm-243/244	1.37E-02	10/01/05	1.81E-12	2.26E-06	6.08E-06	2.00E-02	uCi/g	U
Gamma Spec								
Be-7	2.73E-01	09/22/05	1.28E-04	1.22E-04	2.28E-04		uCi/g	U
Na-22	2.73E-01	09/22/05	6.12E-06	1.29E-05	2.63E-05		uCi/g	U
K-40	2.73E-01	09/22/05	1.76E-04	1.73E-04	3.58E-04		uCi/g	U
Cr-51	2.73E-01	09/22/05	-8.09E-05	1.36E-04	1.97E-04		uCi/g	U
Mn-54	2.73E-01	09/22/05	-1.62E-06	1.00E-05	1.72E-05		uCi/g	U
Fe-59	2.73E-01	09/22/05	3.34E-05	4.67E-05	6.82E-05		uCi/g	U
Co-56	2.73E-01	09/22/05	-7.98E-06	1.28E-05	1.96E-05		uCi/g	U
Co-57	2.73E-01	09/22/05	1.53E-06	7.98E-06	1.24E-05		uCi/g	U
Co-58	2.73E-01	09/22/05	-1.18E-05	1.23E-05	1.72E-05		uCi/g	U
Co-60	2.73E-01	09/22/05	3.24E-06	1.05E-05	2.03E-05	7.00E-01	uCi/g	U
Ni-59	6.83E-03	09/22/05	1.29E-04	3.79E-04	3.75E-04	2.20E-01	uCi/g	U
Zn-65	2.73E-01	09/22/05	-3.84E-07	2.41E-05	4.49E-05		uCi/g	U
Y-88	2.73E-01	09/22/05	-6.99E-07	8.77E-06	1.72E-05		uCi/g	U
Zr-95	2.73E-01	09/22/05	-1.56E-05	2.36E-05	3.61E-05		uCi/g	U
Nb-94	2.73E-01	09/22/05	6.13E-07	1.14E-05	1.96E-05	2.00E-04	uCi/g	U
Nb-95	2.73E-01	09/22/05	1.12E-06	1.85E-05	3.19E-05		uCi/g	U
Ru-106	2.73E-01	09/22/05	6.61E-05	1.06E-04	1.97E-04		uCi/g	U
Ag-110m	2.73E-01	09/22/05	-4.03E-08	9.79E-06	1.72E-05		uCi/g	U
Sn-113	2.73E-01	09/22/05	1.07E-05	2.61E-05	2.24E-05		uCi/g	U
Sb-124	2.73E-01	09/22/05	1.76E-05	2.23E-05	5.86E-05		uCi/g	U
Sb-125	2.73E-01	09/22/05	-3.05E-06	2.87E-05	4.83E-05		uCi/g	U
I-129	4.10E-02	09/22/05	-1.32E-06	6.02E-05	8.56E-05	8.00E-05	uCi/g	U
Cs-134	2.73E-01	09/22/05	6.93E-06	1.26E-05	2.39E-05		uCi/g	U

Note(s):1. Calculated MDAs are a-posteriori values.

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

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10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814002**	**Client:**	**WPI**
Client Sample ID:	**NST - OD Inner Wall**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Solid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (g)	Run Date	Activity	Uncertainty	MDA	RL	Units	Qualifier
Cs-136	2.73E-01	09/22/05	-1.97E-05	3.38E-05	5.66E-05		uCi/g	U
Cs-137	2.73E-01	09/22/05	-3.97E-06	1.11E-05	1.82E-05	1.00E-03	uCi/g	U
Ba-133	2.73E-01	09/22/05	8.86E-07	1.49E-05	2.35E-05		uCi/g	U
Ba-140	2.73E-01	09/22/05	-4.86E-06	1.07E-04	1.84E-04		uCi/g	U
Ce-139	2.73E-01	09/22/05	-5.44E-06	1.05E-05	1.36E-05		uCi/g	U
Ce-141	2.73E-01	09/22/05	5.09E-06	2.39E-05	3.70E-05		uCi/g	U
Ce-144	2.73E-01	09/22/05	-4.91E-05	6.44E-05	9.16E-05		uCi/g	U
Nd-147	2.73E-01	09/22/05	8.43E-05	2.48E-04	4.48E-04		uCi/g	U
Pm-144	2.73E-01	09/22/05	1.26E-05	1.19E-05	2.31E-05		uCi/g	U
Pm-146	2.73E-01	09/22/05	5.46E-06	1.43E-05	2.54E-05		uCi/g	U
Eu-152	2.73E-01	09/22/05	2.44E-05	3.14E-05	5.40E-05		uCi/g	U
Eu-154	2.73E-01	09/22/05	1.70E-05	3.60E-05	7.33E-05		uCi/g	U
Eu-155	2.73E-01	09/22/05	1.36E-05	3.60E-05	5.62E-05		uCi/g	U
Ir-192	2.73E-01	09/22/05	4.37E-06	1.30E-05	2.10E-05		uCi/g	U
Hg-203	2.73E-01	09/22/05	-2.33E-07	1.36E-05	2.13E-05		uCi/g	U
Tl-208	2.73E-01	09/22/05	4.30E-06	1.98E-05	2.54E-05		uCi/g	U
Pb-210	2.73E-01	09/22/05	1.68E-03	3.12E-03	4.15E-03		uCi/g	U
Pb-212	2.73E-01	09/22/05	2.09E-05	3.15E-05	3.70E-05		uCi/g	U
Pb-214	2.73E-01	09/22/05	1.72E-05	2.47E-05	4.16E-05		uCi/g	U
Bi-212	2.73E-01	09/22/05	1.37E-05	8.33E-05	1.50E-04		uCi/g	U
Bi-214	2.73E-01	09/22/05	1.39E-05	3.87E-05	4.72E-05		uCi/g	U
Ra-228	2.73E-01	09/22/05	1.17E-06	3.78E-05	6.73E-05		uCi/g	U
Ac-228	2.73E-01	09/22/05	1.17E-06	3.78E-05	6.73E-05		uCi/g	U
Th-230	2.73E-01	09/22/05	1.39E-05	3.87E-05	4.72E-05		uCi/g	U
Th-234	2.73E-01	09/22/05	2.59E-04	7.54E-04	9.57E-04		uCi/g	U
U-235	2.73E-01	09/22/05	3.26E-05	7.04E-05	1.10E-04		uCi/g	U
U-238	2.73E-01	09/22/05	2.59E-04	7.54E-04	7.43E-04		uCi/g	U
Np-239	2.73E-01	09/22/05	2.99E-06	6.20E-05	9.48E-05		uCi/g	U
Am-241	2.73E-01	09/22/05	-5.69E-06	7.59E-05	9.48E-05		uCi/g	U

Note(s):1. Calculated MDAs are a-posteriori values.

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

GENERAL ENGINEERING LABORATORIES, LLC

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10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814003**	**Client:**	**WPI**
Client Sample ID:	**NST - ID-1**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Solid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (g)	Run Date	Activity[2]	Uncertainty	MDA[1]	RL	Units	Qualifier
H-3	3.51E-02	09/26/05	1.48E-04	4.80E-04	8.34E-04	4.00E-02	uCi/g	U
C-14	3.86E-02	09/22/05	2.32E-05	4.47E-05	7.62E-05	8.00E-03	uCi/g	U
Fe-55	1.87E-03	09/23/05	2.24E-03	7.35E-03	1.01E-02	7.00E-01	uCi/g	U
Ni-63	1.87E-03	09/30/05	9.13E-04	9.12E-04	1.52E-03	3.50E-03	uCi/g	U
Sr-90	2.80E-02	10/01/05	1.14E-05	9.05E-06	1.56E-05	4.00E-05	uCi/g	U
Tc-99	7.06E-02	09/25/05	-5.91E-06	3.72E-05	6.48E-05	3.00E-03	uCi/g	U
Pu-241	1.87E-02	09/26/05	-7.85E-05	2.84E-04	5.05E-04	3.50E-03	uCi/g	U
Alpha Spec								
Pu-238	1.87E-02	10/01/05	-6.11E-07	1.55E-06	5.07E-06	1.00E-04	uCi/g	U
Pu-239/240	1.87E-02	10/01/05	6.27E-07	1.64E-06	4.00E-06	1.00E-04	uCi/g	U
Am-241	1.87E-02	10/01/05	-4.36E-07	4.95E-07	2.98E-06	1.00E-04	uCi/g	U
Cm-242	1.87E-02	10/01/05	0.00E+00	7.74E-07	1.19E-06	2.00E-02	uCi/g	U
Cm-243/244	1.87E-02	10/01/05	-2.51E-07	2.84E-07	2.42E-06	2.00E-02	uCi/g	U
Gamma Spec								
Be-7	3.74E-01	09/22/05	1.78E-04	1.78E-04	2.98E-04		uCi/g	U
Na-22	3.74E-01	09/22/05	8.59E-06	1.47E-05	2.79E-05		uCi/g	U
K-40	3.74E-01	09/22/05	9.30E-06	1.16E-04	2.14E-04		uCi/g	U
Cr-51	3.74E-01	09/22/05	1.52E-04	1.87E-04	3.06E-04		uCi/g	U
Mn-54	3.74E-01	09/22/05	-1.31E-05	2.28E-05	3.62E-05		uCi/g	U
Fe-59	3.74E-01	09/22/05	1.31E-05	7.07E-05	1.18E-04		uCi/g	U
Co-56	3.74E-01	09/22/05	3.09E-05	2.75E-05	4.83E-05		uCi/g	U
Co-57	3.74E-01	09/22/05	-4.73E-06	9.91E-06	1.38E-05		uCi/g	U
Co-58	3.74E-01	09/22/05	9.67E-06	2.54E-05	4.31E-05		uCi/g	U
Co-60	3.74E-01	09/22/05	1.84E-03	1.51E-04	3.42E-05	7.00E-01	uCi/g	3
Ni-59	9.35E-03	09/22/05	4.34E-04	3.14E-04	3.32E-04	2.20E-01	uCi/g	UI
Zn-65	3.74E-01	09/22/05	1.72E-05	5.72E-05	9.65E-05		uCi/g	U
Y-88	3.74E-01	09/22/05	-3.72E-06	1.34E-05	2.46E-05		uCi/g	U
Zr-95	3.74E-01	09/22/05	-2.43E-05	4.44E-05	7.07E-05		uCi/g	U
Nb-94	3.74E-01	09/22/05	1.55E-05	1.94E-05	3.22E-05	2.00E-04	uCi/g	U
Nb-95	3.74E-01	09/22/05	-1.97E-05	2.88E-05	4.54E-05		uCi/g	U
Ru-106	3.74E-01	09/22/05	9.92E-07	1.74E-04	2.75E-04		uCi/g	U
Ag-110m	3.74E-01	09/22/05	-1.99E-06	2.21E-05	2.99E-05		uCi/g	U
Sn-113	3.74E-01	09/22/05	1.19E-05	2.15E-05	3.49E-05		uCi/g	U
Sb-124	3.74E-01	09/22/05	8.54E-06	3.33E-05	5.98E-05		uCi/g	U
Sb-125	3.74E-01	09/22/05	-1.06E-05	4.13E-05	6.40E-05		uCi/g	U
I-129	5.57E-02	09/27/05	1.17E-05	7.00E-05	8.74E-05	8.00E-05	uCi/g	U
Cs-134	3.74E-01	09/22/05	3.80E-06	2.38E-05	3.98E-05		uCi/g	U

Note(s):1. Calculated MDAs are a-posteriori values.

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

GENERAL ENGINEERING LABORATORIES, LLC

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10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814003**	**Client:**	**WPI**
Client Sample ID:	**NST - ID-1**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Solid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (g)	Run Date	Activity	Uncertainty	MDA	RL	Units	Qualifier
Cs-136	3.74E-01	09/22/05	-1.13E-05	9.28E-05	1.53E-04		uCi/g	U
Cs-137	3.74E-01	09/22/05	6.51E-06	1.95E-05	3.17E-05	1.00E-03	uCi/g	U
Ba-133	3.74E-01	09/22/05	-3.55E-06	1.97E-05	3.05E-05		uCi/g	U
Ba-140	3.74E-01	09/22/05	4.43E-05	1.82E-04	2.93E-04		uCi/g	U
Ce-139	3.74E-01	09/22/05	1.89E-06	1.18E-05	1.72E-05		uCi/g	U
Ce-141	3.74E-01	09/22/05	-1.91E-05	2.66E-05	3.66E-05		uCi/g	U
Ce-144	3.74E-01	09/22/05	-3.47E-05	7.91E-05	1.10E-04		uCi/g	U
Nd-147	3.74E-01	09/22/05	1.61E-04	4.82E-04	6.81E-04		uCi/g	U
Pm-144	3.74E-01	09/22/05	1.15E-05	2.18E-05	3.14E-05		uCi/g	U
Pm-146	3.74E-01	09/22/05	-7.08E-06	2.23E-05	3.43E-05		uCi/g	U
Eu-152	3.74E-01	09/22/05	-2.21E-06	4.31E-05	6.72E-05		uCi/g	U
Eu-154	3.74E-01	09/22/05	2.35E-05	4.08E-05	7.75E-05		uCi/g	U
Eu-155	3.74E-01	09/22/05	2.27E-05	4.00E-05	5.69E-05		uCi/g	U
Ir-192	3.74E-01	09/22/05	-1.19E-05	1.66E-05	2.47E-05		uCi/g	U
Hg-203	3.74E-01	09/22/05	2.56E-05	1.85E-05	3.07E-05		uCi/g	U
Tl-208	3.74E-01	09/22/05	1.14E-05	1.89E-05	3.12E-05		uCi/g	U
Pb-210	3.74E-01	09/22/05	5.65E-04	1.93E-03	2.38E-03		uCi/g	U
Pb-212	3.74E-01	09/22/05	0.00E+00	2.58E-05	4.11E-05		uCi/g	UUI
Pb-214	3.74E-01	09/22/05	3.50E-05	3.15E-05	5.23E-05		uCi/g	U
Bi-212	3.74E-01	09/22/05	1.08E-05	1.60E-04	2.54E-04		uCi/g	U
Bi-214	3.74E-01	09/22/05	-1.80E-05	3.62E-05	5.51E-05		uCi/g	U
Ra-228	3.74E-01	09/22/05	-2.00E-06	1.12E-04	1.58E-04		uCi/g	U
Ac-228	3.74E-01	09/22/05	-2.00E-06	1.12E-04	1.58E-04		uCi/g	U
Th-230	3.74E-01	09/22/05	-1.80E-05	3.62E-05	5.51E-05		uCi/g	U
Th-234	3.74E-01	09/22/05	9.08E-05	5.38E-04	6.64E-04		uCi/g	U
U-235	3.74E-01	09/22/05	4.30E-05	7.54E-05	1.11E-04		uCi/g	U
U-238	3.74E-01	09/22/05	9.08E-05	5.38E-04	6.64E-04		uCi/g	U
Np-239	3.74E-01	09/22/05	-4.16E-05	7.00E-05	9.64E-05		uCi/g	U
Am-241	3.74E-01	09/22/05	5.17E-05	1.19E-04	8.83E-05		uCi/g	U

Note(s):1. Calculated MDAs are a-posteriori values.

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

GENERAL ENGINEERING LABORATORIES, LLC

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10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814004**	**Client:**	**WPI**
Client Sample ID:	**RPV Insulation-1**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Solid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (g)	Run Date	Activity[2]	Uncertainty	MDA[1]	RL	Units	Qualifier
Gamma Spec								
Be-7	2.87E+00	10/01/05	-4.30E-06	1.16E-05	1.82E-05		uCi/g	U
Na-22	2.87E+00	10/01/05	0.00E+00	3.17E-06	4.98E-06		uCi/g	UUI
K-40	2.87E+00	10/01/05	0.00E+00	1.42E-05	1.44E-05		uCi/g	UUI
Cr-51	2.87E+00	10/01/05	-3.78E-07	1.32E-05	1.96E-05		uCi/g	U
Mn-54	2.87E+00	10/01/05	1.46E-06	1.68E-06	2.69E-06		uCi/g	U
Fe-59	2.87E+00	10/01/05	6.24E-07	3.85E-06	6.43E-06		uCi/g	U
Co-56	2.87E+00	10/01/05	-4.05E-07	2.07E-06	3.18E-06		uCi/g	U
Co-57	2.87E+00	10/01/05	0.00E+00	4.54E-06	7.44E-07		uCi/g	UUI
Co-58	2.87E+00	10/01/05	4.26E-06	2.62E-06	3.02E-06		uCi/g	3
Co-60	2.87E+00	10/01/05	2.94E-05	3.56E-06	1.55E-06	7.00E-01	uCi/g	3
Zn-65	2.87E+00	10/01/05	0.00E+00	3.91E-06	6.18E-06		uCi/g	UUI
Y-88	2.87E+00	10/01/05	1.80E-07	5.70E-07	1.23E-06		uCi/g	U
Zr-95	2.87E+00	10/01/05	0.00E+00	6.93E-06	6.38E-06		uCi/g	UUI
Nb-94	2.87E+00	10/01/05	1.27E-06	1.31E-06	2.12E-06	2.00E-04	uCi/g	U
Nb-95	2.87E+00	10/01/05	0.00E+00	5.06E-06	3.95E-06		uCi/g	UUI
Ru-106	2.87E+00	10/01/05	5.94E-06	1.17E-05	1.87E-05		uCi/g	U
Ag-110m	2.87E+00	10/01/05	1.80E-06	1.60E-06	2.32E-06		uCi/g	U
Sn-113	2.87E+00	10/01/05	5.12E-07	1.38E-06	2.08E-06		uCi/g	U
Sb-124	2.87E+00	10/01/05	8.91E-07	1.95E-06	3.92E-06		uCi/g	U
Sb-125	2.87E+00	10/01/05	3.79E-07	2.60E-06	4.15E-06		uCi/g	U
Cs-134	2.87E+00	10/01/05	-2.68E-07	2.01E-06	2.70E-06		uCi/g	U
Cs-136	2.87E+00	10/01/05	1.09E-05	9.30E-06	1.61E-05		uCi/g	U
Cs-137	2.87E+00	10/01/05	1.09E-06	1.79E-06	2.08E-06	1.00E-03	uCi/g	U
Ba-133	2.87E+00	10/01/05	0.00E+00	2.65E-06	2.08E-06		uCi/g	UUI
Ba-140	2.87E+00	10/01/05	5.08E-06	2.22E-05	3.11E-05		uCi/g	U
Ce-139	2.87E+00	10/01/05	0.00E+00	2.04E-06	1.04E-06		uCi/g	UUI
Ce-141	2.87E+00	10/01/05	-4.76E-07	1.65E-06	2.44E-06		uCi/g	U
Ce-144	2.87E+00	10/01/05	5.56E-07	3.76E-06	5.63E-06		uCi/g	U
Nd-147	2.87E+00	10/01/05	-2.64E-05	4.89E-05	7.51E-05		uCi/g	U
Pm-144	2.87E+00	10/01/05	3.14E-07	1.38E-06	2.17E-06		uCi/g	U
Pm-146	2.87E+00	10/01/05	-4.58E-07	1.23E-06	1.93E-06		uCi/g	U
Eu-152	2.87E+00	10/01/05	4.84E-04	4.88E-05	3.75E-06		uCi/g	3
Eu-154	2.87E+00	10/01/05	5.50E-05	9.66E-06	6.96E-06		uCi/g	3
Eu-155	2.87E+00	10/01/05	-1.07E-06	1.90E-06	2.49E-06		uCi/g	U
Ir-192	2.87E+00	10/01/05	-6.25E-07	9.70E-07	1.40E-06		uCi/g	U
Hg-203	2.87E+00	10/01/05	-4.24E-07	1.24E-06	1.81E-06		uCi/g	U
Tl-208	2.87E+00	10/01/05	-1.33E-06	1.63E-06	2.13E-06		uCi/g	U

Note(s):1. Calculated MDAs are a-posteriori values.

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

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10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814004**	**Client:**	**WPI**
Client Sample ID:	**RPV Insulation-1**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Solid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (g)	Run Date	Activity	Uncertainty	MDA	RL	Units	Qualifier
Pb-210	2.87E+00	10/01/05	-4.82E-04	4.93E-05	2.99E-05		uCi/g	U
Pb-212	2.87E+00	10/01/05	2.71E-07	1.55E-06	1.88E-06		uCi/g	U
Pb-214	2.87E+00	10/01/05	1.94E-06	2.05E-06	2.84E-06		uCi/g	U
Bi-212	2.87E+00	10/01/05	2.44E-05	1.61E-05	1.84E-05		uCi/g	
Bi-214	2.87E+00	10/01/05	-1.15E-06	2.35E-06	3.61E-06		uCi/g	U
Ra-228	2.87E+00	10/01/05	-2.55E-06	6.58E-06	9.14E-06		uCi/g	U
Ac-228	2.87E+00	10/01/05	-2.55E-06	6.58E-06	9.14E-06		uCi/g	U
Th-230	2.87E+00	10/01/05	-1.15E-06	2.35E-06	3.61E-06		uCi/g	U
Th-234	2.87E+00	10/01/05	0.00E+00	1.38E-05	1.03E-05		uCi/g	UUI
U-235	2.87E+00	10/01/05	1.12E-06	3.92E-06	5.89E-06		uCi/g	U
U-238	2.87E+00	10/01/05	0.00E+00	1.38E-05	1.03E-05		uCi/g	UUI
Np-239	2.87E+00	10/01/05	3.14E-07	3.90E-06	5.25E-06		uCi/g	U
Am-241	2.87E+00	10/01/05	-1.16E-07	8.29E-07	1.03E-06		uCi/g	U

Note(s): **1. Calculated MDAs are a-posteriori values.**

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

GENERAL ENGINEERING LABORATORIES, LLC

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10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814005**	**Client:**	**WPI**
Client Sample ID:	**RPV OD-1**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Solid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (g)	Run Date	Activity[2]	Uncertainty	MDA[1]	RL	Units	Qualifier
H-3	7.86E-02	09/26/05	-7.64E-05	1.95E-04	3.55E-04	4.00E-02	uCi/g	U
C-14	7.84E-02	09/22/05	3.06E-05	2.33E-05	3.80E-05	8.00E-03	uCi/g	U
Fe-55	1.80E-03	09/23/05	-3.67E-03	7.04E-03	9.86E-03	7.00E-01	uCi/g	U
Ni-63	1.80E-03	09/30/05	2.61E-03	1.05E-03	1.65E-03	3.50E-03	uCi/g	3
Sr-90	2.70E-02	10/01/05	2.96E-06	7.26E-06	1.80E-05	4.00E-05	uCi/g	U
Tc-99	4.96E-02	09/25/05	-5.67E-05	7.70E-05	1.37E-04	3.00E-03	uCi/g	U
Pu-241	1.80E-02	09/26/05	9.13E-06	3.21E-04	5.62E-04	3.50E-03	uCi/g	U
Alpha Spec								
Pu-238	1.80E-02	10/01/05	7.27E-07	1.43E-06	3.27E-06	1.00E-04	uCi/g	U
Pu-239/240	1.80E-02	10/01/05	-4.84E-07	4.24E-07	3.26E-06	1.00E-04	uCi/g	U
Am-241	1.80E-02	10/01/05	9.18E-07	1.12E-06	1.70E-06	1.00E-04	uCi/g	U
Cm-242	1.80E-02	10/01/05	-1.76E-07	7.60E-07	2.28E-06	2.00E-02	uCi/g	U
Cm-243/244	1.80E-02	10/01/05	3.36E-07	9.46E-07	2.44E-06	2.00E-02	uCi/g	U
Gamma Spec								
Be-7	3.59E-01	10/01/05	-4.94E-05	1.51E-04	2.30E-04		uCi/g	U
Na-22	3.59E-01	10/01/05	-7.50E-06	1.15E-05	1.82E-05		uCi/g	U
K-40	3.59E-01	10/01/05	1.71E-04	2.05E-04	1.79E-04		uCi/g	U
Cr-51	3.59E-01	10/01/05	-7.54E-05	2.17E-04	3.25E-04		uCi/g	U
Mn-54	3.59E-01	10/01/05	-2.48E-06	1.67E-05	2.78E-05		uCi/g	U
Fe-59	3.59E-01	10/01/05	2.57E-05	6.09E-05	1.07E-04		uCi/g	U
Co-56	3.59E-01	10/01/05	3.66E-06	2.42E-05	4.11E-05		uCi/g	U
Co-57	3.59E-01	10/01/05	-4.08E-06	1.00E-05	1.44E-05		uCi/g	U
Co-58	3.59E-01	10/01/05	-8.77E-06	2.20E-05	3.56E-05		uCi/g	U
Co-60	3.59E-01	10/01/05	8.48E-04	8.99E-05	2.64E-05	7.00E-01	uCi/g	3
Ni-59	8.98E-03	09/22/05	3.43E-04	2.71E-04	2.88E-04	2.20E-01	uCi/g	UI
Zn-65	3.59E-01	10/01/05	-5.69E-08	4.04E-05	6.90E-05		uCi/g	U
Y-88	3.59E-01	10/01/05	-2.96E-06	1.13E-05	2.20E-05		uCi/g	U
Zr-95	3.59E-01	10/01/05	-1.41E-05	4.25E-05	5.93E-05		uCi/g	U
Nb-94	3.59E-01	10/01/05	-2.16E-07	1.36E-05	2.30E-05	2.00E-04	uCi/g	U
Nb-95	3.59E-01	10/01/05	3.04E-06	2.57E-05	4.42E-05		uCi/g	U
Ru-106	3.59E-01	10/01/05	-1.02E-04	1.35E-04	2.08E-04		uCi/g	U
Ag-110m	3.59E-01	10/01/05	5.02E-06	1.45E-05	2.53E-05		uCi/g	U
Sn-113	3.59E-01	10/01/05	-1.49E-05	1.93E-05	2.79E-05		uCi/g	U
Sb-124	3.59E-01	10/01/05	1.08E-05	3.56E-05	6.77E-05		uCi/g	U
Sb-125	3.59E-01	10/01/05	6.40E-07	3.84E-05	6.03E-05		uCi/g	U
I-129	6.78E-02	09/27/05	3.03E-05	4.58E-05	6.34E-05	8.00E-05	uCi/g	U
Cs-134	3.59E-01	10/01/05	2.86E-06	1.78E-05	3.06E-05		uCi/g	U

Note(s):1. Calculated MDAs are a-posteriori values.

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

GENERAL ENGINEERING LABORATORIES, LLC

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10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814005**	**Client:**	**WPI**
Client Sample ID:	**RPV OD-1**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Solid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (g)	Run Date	Activity	Uncertainty	MDA	RL	Units	Qualifier
Cs-136	3.59E-01	10/01/05	-3.79E-05	1.42E-04	1.99E-04		uCi/g	U
Cs-137	3.59E-01	10/01/05	1.01E-05	9.61E-06	2.60E-05	1.00E-03	uCi/g	U
Ba-133	3.59E-01	10/01/05	-5.52E-06	1.82E-05	2.75E-05		uCi/g	U
Ba-140	3.59E-01	10/01/05	-7.77E-05	2.68E-04	4.07E-04		uCi/g	U
Ce-139	3.59E-01	10/01/05	-6.77E-06	1.23E-05	1.77E-05		uCi/g	U
Ce-141	3.59E-01	10/01/05	-3.86E-06	3.43E-05	5.04E-05		uCi/g	U
Ce-144	3.59E-01	10/01/05	7.07E-05	8.33E-05	1.28E-04		uCi/g	U
Nd-147	3.59E-01	10/01/05	-8.47E-05	6.32E-04	9.84E-04		uCi/g	U
Pm-144	3.59E-01	10/01/05	6.55E-06	1.47E-05	2.57E-05		uCi/g	U
Pm-146	3.59E-01	10/01/05	-5.64E-06	2.04E-05	3.10E-05		uCi/g	U
Eu-152	3.59E-01	10/01/05	2.20E-05	4.33E-05	6.93E-05		uCi/g	U
Eu-154	3.59E-01	10/01/05	-2.08E-05	3.20E-05	5.03E-05		uCi/g	U
Eu-155	3.59E-01	10/01/05	-5.36E-06	4.14E-05	6.00E-05		uCi/g	U
Ir-192	3.59E-01	10/01/05	-3.29E-06	1.66E-05	2.52E-05		uCi/g	U
Hg-203	3.59E-01	10/01/05	8.65E-06	2.09E-05	3.28E-05		uCi/g	U
Tl-208	3.59E-01	10/01/05	5.92E-06	1.97E-05	2.61E-05		uCi/g	U
Pb-210	3.59E-01	10/01/05	1.32E-04	3.81E-03	4.75E-03		uCi/g	U
Pb-212	3.59E-01	10/01/05	1.60E-05	4.48E-05	4.17E-05		uCi/g	U
Pb-214	3.59E-01	10/01/05	1.34E-05	2.83E-05	4.56E-05		uCi/g	U
Bi-212	3.59E-01	10/01/05	-4.82E-05	1.25E-04	2.03E-04		uCi/g	U
Bi-214	3.59E-01	10/01/05	3.48E-05	3.13E-05	5.63E-05		uCi/g	U
Ra-228	3.59E-01	10/01/05	4.32E-06	6.96E-05	1.17E-04		uCi/g	U
Ac-228	3.59E-01	10/01/05	4.32E-06	6.96E-05	1.17E-04		uCi/g	U
Th-230	3.59E-01	10/01/05	3.48E-05	3.13E-05	5.63E-05		uCi/g	U
Th-234	3.59E-01	10/01/05	-6.85E-05	7.32E-04	9.13E-04		uCi/g	U
U-235	3.59E-01	10/01/05	-3.82E-05	8.19E-05	1.17E-04		uCi/g	U
U-238	3.59E-01	10/01/05	-6.85E-05	7.32E-04	9.13E-04		uCi/g	U
Np-239	3.59E-01	10/01/05	5.42E-05	7.67E-05	1.17E-04		uCi/g	U
Am-241	3.59E-01	10/01/05	-4.40E-05	1.02E-04	1.24E-04		uCi/g	U

Note(s):1. Calculated MDAs are a-posteriori values.

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

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10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814006**	**Client:**	**WPI**
Client Sample ID:	**RPV ID-1**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Solid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (g)	Run Date	Activity[2]	Uncertainty	MDA[1]	RL	Units	Qualifier
H-3	5.76E-02	09/26/05	-8.56E-05	2.67E-04	4.83E-04	4.00E-02	uCi/g	U
C-14	3.73E-02	09/22/05	1.17E-04	5.16E-05	8.01E-05	8.00E-03	uCi/g	3
Fe-55	1.67E-03	09/23/05	7.47E-04	7.55E-03	1.04E-02	7.00E-01	uCi/g	U
Ni-63	1.67E-03	09/30/05	6.77E-02	2.40E-03	1.67E-03	3.50E-03	uCi/g	3
Sr-90	2.50E-02	10/01/05	1.09E-05	1.07E-05	2.07E-05	4.00E-05	uCi/g	U
Tc-99	4.70E-02	09/24/05	-6.64E-05	6.44E-05	1.16E-04	3.00E-03	uCi/g	U
Pu-241	1.67E-02	09/26/05	9.87E-05	2.84E-04	4.89E-04	3.50E-03	uCi/g	U
Alpha Spec								
Pu-238	1.67E-02	10/01/05	-1.16E-06	1.04E-06	4.67E-06	1.00E-04	uCi/g	U
Pu-239/240	1.67E-02	10/01/05	1.05E-07	7.99E-07	2.61E-06	1.00E-04	uCi/g	U
Am-241	1.67E-02	10/01/05	1.05E-06	1.38E-06	2.42E-06	1.00E-04	uCi/g	U
Cm-242	1.67E-02	10/01/05	4.42E-07	8.67E-07	1.33E-06	2.00E-02	uCi/g	U
Cm-243/244	1.67E-02	10/01/05	-1.87E-07	8.06E-07	2.42E-06	2.00E-02	uCi/g	U
Gamma Spec								
Be-7	3.34E-01	10/01/05	1.81E-04	4.70E-04	7.09E-04		uCi/g	U
Na-22	3.34E-01	10/01/05	-8.30E-06	3.46E-05	5.64E-05		uCi/g	U
K-40	3.34E-01	10/01/05	1.67E-04	2.37E-04	4.27E-04		uCi/g	U
Cr-51	3.34E-01	10/01/05	-2.06E-04	5.70E-04	8.43E-04		uCi/g	U
Mn-54	3.34E-01	10/01/05	-5.83E-05	6.59E-05	9.94E-05		uCi/g	U
Fe-59	3.34E-01	10/01/05	9.24E-05	2.22E-04	3.60E-04		uCi/g	U
Co-56	3.34E-01	10/01/05	5.19E-05	8.31E-05	1.31E-04		uCi/g	U
Co-57	3.34E-01	10/01/05	4.10E-06	2.10E-05	2.93E-05		uCi/g	U
Co-58	3.34E-01	10/01/05	1.81E-05	9.01E-05	1.22E-04		uCi/g	U
Co-60	3.34E-01	10/01/05	1.70E-02	1.01E-03	5.70E-05	7.00E-01	uCi/g	3
Ni-59	8.35E-03	09/22/05	1.36E-04	2.48E-04	2.96E-04	2.20E-01	uCi/g	U
Zn-65	3.34E-01	10/01/05	-3.27E-05	1.58E-04	2.52E-04		uCi/g	U
Y-88	3.34E-01	10/01/05	2.16E-05	2.93E-05	5.59E-05		uCi/g	U
Zr-95	3.34E-01	10/01/05	1.10E-04	1.23E-04	2.01E-04		uCi/g	U
Nb-94	3.34E-01	10/01/05	-1.98E-05	4.74E-05	7.31E-05	2.00E-04	uCi/g	U
Nb-95	3.34E-01	10/01/05	6.31E-05	9.64E-05	1.53E-04		uCi/g	U
Ru-106	3.34E-01	10/01/05	-4.78E-04	4.44E-04	6.68E-04		uCi/g	U
Ag-110m	3.34E-01	10/01/05	2.80E-05	4.84E-05	7.70E-05		uCi/g	U
Sn-113	3.34E-01	10/01/05	-3.31E-05	5.31E-05	7.76E-05		uCi/g	U
Sb-124	3.34E-01	10/01/05	8.13E-06	6.15E-05	1.11E-04		uCi/g	U
Sb-125	3.34E-01	10/01/05	-2.40E-05	1.06E-04	1.57E-04		uCi/g	U
I-129	4.92E-02	09/27/05	3.25E-05	8.72E-05	1.10E-04	8.00E-05	uCi/g	U
Cs-134	3.34E-01	10/01/05	-1.05E-05	6.87E-05	1.06E-04		uCi/g	U

Note(s):1. Calculated MDAs are a-posteriori values.

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

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10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814006**	**Client:**	**WPI**
Client Sample ID:	**RPV ID-1**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Solid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (g)	Run Date	Activity	Uncertainty	MDA	RL	Units	Qualifier
Cs-136	3.34E-01	10/01/05	3.14E-06	4.33E-04	6.98E-04		uCi/g	U
Cs-137	3.34E-01	10/01/05	-4.99E-05	5.11E-05	7.74E-05	1.00E-03	uCi/g	U
Ba-133	3.34E-01	10/01/05	-5.62E-06	4.51E-05	6.72E-05		uCi/g	U
Ba-140	3.34E-01	10/01/05	-5.21E-04	7.30E-04	1.09E-03		uCi/g	U
Ce-139	3.34E-01	10/01/05	2.25E-05	2.97E-05	3.77E-05		uCi/g	U
Ce-141	3.34E-01	10/01/05	1.16E-05	7.24E-05	1.01E-04		uCi/g	U
Ce-144	3.34E-01	10/01/05	-8.98E-05	1.74E-04	2.36E-04		uCi/g	U
Nd-147	3.34E-01	10/01/05	-9.20E-04	1.78E-03	2.74E-03		uCi/g	U
Pm-144	3.34E-01	10/01/05	4.67E-06	4.88E-05	7.65E-05		uCi/g	U
Pm-146	3.34E-01	10/01/05	3.31E-05	5.25E-05	7.97E-05		uCi/g	U
Eu-152	3.34E-01	10/01/05	-3.26E-05	1.00E-04	1.48E-04		uCi/g	U
Eu-154	3.34E-01	10/01/05	-2.30E-05	9.60E-05	1.56E-04		uCi/g	U
Eu-155	3.34E-01	10/01/05	1.57E-05	8.36E-05	1.16E-04		uCi/g	U
Ir-192	3.34E-01	10/01/05	3.86E-07	4.17E-05	6.23E-05		uCi/g	U
Hg-203	3.34E-01	10/01/05	3.88E-06	5.09E-05	7.62E-05		uCi/g	U
Tl-208	3.34E-01	10/01/05	-3.33E-05	4.67E-05	7.17E-05		uCi/g	U
Pb-210	3.34E-01	10/01/05	3.05E-03	4.14E-03	3.81E-03		uCi/g	U
Pb-212	3.34E-01	10/01/05	-4.17E-05	5.36E-05	7.82E-05		uCi/g	U
Pb-214	3.34E-01	10/01/05	4.22E-05	7.34E-05	1.11E-04		uCi/g	U
Bi-212	3.34E-01	10/01/05	-1.82E-06	4.25E-04	6.62E-04		uCi/g	U
Bi-214	3.34E-01	10/01/05	1.92E-05	8.75E-05	1.38E-04		uCi/g	U
Ra-228	3.34E-01	10/01/05	1.03E-04	2.72E-04	4.24E-04		uCi/g	U
Ac-228	3.34E-01	10/01/05	1.03E-04	2.72E-04	4.24E-04		uCi/g	U
Th-230	3.34E-01	10/01/05	1.92E-05	8.75E-05	1.38E-04		uCi/g	U
Th-234	3.34E-01	10/01/05	9.62E-05	1.10E-03	1.18E-03		uCi/g	U
U-235	3.34E-01	10/01/05	1.08E-04	1.74E-04	2.44E-04		uCi/g	U
U-238	3.34E-01	10/01/05	9.62E-05	1.10E-03	1.18E-03		uCi/g	U
Np-239	3.34E-01	10/01/05	7.59E-05	1.61E-04	2.13E-04		uCi/g	U
Am-241	3.34E-01	10/01/05	1.36E-05	1.08E-04	1.48E-04		uCi/g	U

Note(s):1. Calculated MDAs are a-posteriori values.

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

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10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814007**	**Client:**	**WPI**
Client Sample ID:	**OTS ID/OD**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Solid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (g)	Run Date	Activity[2]	Uncertainty	MDA[1]	RL	Units	Qualifier
H-3	6.12E-02	09/26/05	0.00E+00	2.55E-04	4.53E-04	4.00E-02	uCi/g	U
C-14	4.25E-02	09/22/05	1.24E-05	4.07E-05	7.02E-05	8.00E-03	uCi/g	U
Fe-55	1.62E-03	09/23/05	1.51E-02	8.65E-03	1.14E-02	7.00E-01	uCi/g	3
Ni-63	1.62E-03	09/30/05	2.42E+00	4.75E-02	6.62E-03	3.50E-03	uCi/g	3
Sr-90	2.40E-02	10/01/05	9.06E-06	1.03E-05	2.11E-05	4.00E-05	uCi/g	U
Tc-99	4.32E-02	09/24/05	-3.95E-05	6.72E-05	1.19E-04	3.00E-03	uCi/g	U
Pu-241	1.62E-02	09/26/05	1.99E-04	3.29E-04	5.59E-04	3.50E-03	uCi/g	U
Alpha Spec								
Pu-238	1.62E-02	10/01/05	-4.05E-07	1.74E-06	5.23E-06	1.00E-04	uCi/g	U
Pu-239/240	1.62E-02	10/01/05	4.05E-07	1.14E-06	2.94E-06	1.00E-04	uCi/g	U
Am-241	1.62E-02	10/01/05	-4.19E-07	7.68E-07	2.01E-06	1.00E-04	uCi/g	U
Cm-242	1.62E-02	10/01/05	-1.04E-07	8.75E-07	2.29E-06	2.00E-02	uCi/g	U
Cm-243/244	1.62E-02	10/01/05	-9.17E-08	7.70E-07	2.02E-06	2.00E-02	uCi/g	U
Gamma Spec								
Be-7	3.23E-01	10/01/05	1.53E-03	3.84E-03	5.81E-03		uCi/g	U
Na-22	3.23E-01	10/01/05	6.14E-05	3.18E-04	5.04E-04		uCi/g	U
K-40	3.23E-01	10/01/05	6.95E-04	2.75E-03	3.44E-03		uCi/g	U
Cr-51	3.23E-01	10/01/05	-1.35E-03	4.98E-03	6.98E-03		uCi/g	U
Mn-54	3.23E-01	10/01/05	-8.41E-05	5.55E-04	8.34E-04		uCi/g	U
Fe-59	3.23E-01	10/01/05	3.63E-04	1.82E-03	2.88E-03		uCi/g	U
Co-56	3.23E-01	10/01/05	-2.88E-04	6.95E-04	1.04E-03		uCi/g	U
Co-57	3.23E-01	10/01/05	-8.63E-05	1.83E-04	2.53E-04		uCi/g	U
Co-58	3.23E-01	10/01/05	-2.60E-04	6.63E-04	9.95E-04		uCi/g	U
Co-60	3.23E-01	10/01/05	1.44E+00	8.60E-02	4.96E-04	7.00E-01	uCi/g	3
Ni-59	8.08E-03	09/22/05	2.19E-02	1.81E-03	3.75E-04	2.20E-01	uCi/g	3
Zn-65	3.23E-01	10/01/05	0.00E+00	1.36E-03	2.14E-03		uCi/g	UUI
Y-88	3.23E-01	10/01/05	-6.84E-05	2.55E-04	4.18E-04		uCi/g	U
Zr-95	3.23E-01	10/01/05	-1.86E-04	1.10E-03	1.65E-03		uCi/g	U
Nb-94	3.23E-01	10/01/05	8.52E-05	3.96E-04	5.97E-04	2.00E-04	uCi/g	U
Nb-95	3.23E-01	10/01/05	2.91E-04	8.13E-04	1.22E-03		uCi/g	U
Ru-106	3.23E-01	10/01/05	1.66E-03	3.71E-03	5.60E-03		uCi/g	U
Ag-110m	3.23E-01	10/01/05	-3.52E-04	4.22E-04	6.33E-04		uCi/g	U
Sn-113	3.23E-01	10/01/05	9.22E-05	4.37E-04	6.62E-04		uCi/g	U
Sb-124	3.23E-01	10/01/05	5.90E-05	6.39E-04	1.01E-03		uCi/g	U
Sb-125	3.23E-01	10/01/05	-2.17E-04	8.68E-04	1.31E-03		uCi/g	U
I-129	5.20E-02	10/01/05	-2.52E-04	6.96E-04	7.71E-04	8.00E-05	uCi/g	U
Cs-134	3.23E-01	10/01/05	1.12E-04	5.72E-04	8.60E-04		uCi/g	U

Note(s):1. Calculated MDAs are a-posteriori values.

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

GENERAL ENGINEERING LABORATORIES, LLC

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10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814007**	**Client:**	**WPI**
Client Sample ID:	**OTS ID/OD**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Solid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (g)	Run Date	Activity	Uncertainty	MDA	RL	Units	Qualifier
Cs-136	3.23E-01	10/01/05	7.10E-04	3.69E-03	5.84E-03		uCi/g	U
Cs-137	3.23E-01	10/01/05	0.00E+00	4.36E-04	6.58E-04	1.00E-03	uCi/g	UUI
Ba-133	3.23E-01	10/01/05	-4.09E-04	3.79E-04	5.66E-04		uCi/g	U
Ba-140	3.23E-01	10/01/05	7.52E-03	6.59E-03	9.29E-03		uCi/g	U
Ce-139	3.23E-01	10/01/05	2.50E-04	2.24E-04	3.13E-04		uCi/g	U
Ce-141	3.23E-01	10/01/05	-2.22E-04	5.86E-04	8.15E-04		uCi/g	U
Ce-144	3.23E-01	10/01/05	-6.91E-05	1.47E-03	2.04E-03		uCi/g	U
Nd-147	3.23E-01	10/01/05	5.17E-03	1.52E-02	2.29E-02		uCi/g	U
Pm-144	3.23E-01	10/01/05	-2.61E-04	4.17E-04	6.26E-04		uCi/g	U
Pm-146	3.23E-01	10/01/05	2.92E-04	4.21E-04	6.38E-04		uCi/g	U
Eu-152	3.23E-01	10/01/05	-5.96E-04	8.41E-04	1.27E-03		uCi/g	U
Eu-154	3.23E-01	10/01/05	1.61E-04	8.81E-04	1.40E-03		uCi/g	U
Eu-155	3.23E-01	10/01/05	5.62E-04	7.23E-04	1.00E-03		uCi/g	U
Ir-192	3.23E-01	10/01/05	-1.05E-04	3.66E-04	5.14E-04		uCi/g	U
Hg-203	3.23E-01	10/01/05	-3.08E-04	4.41E-04	6.17E-04		uCi/g	U
Tl-208	3.23E-01	10/01/05	-8.17E-05	3.93E-04	5.93E-04		uCi/g	U
Pb-210	3.23E-01	10/01/05	-1.24E-02	5.71E-02	6.88E-02		uCi/g	U
Pb-212	3.23E-01	10/01/05	-2.21E-04	4.82E-04	6.75E-04		uCi/g	U
Pb-214	3.23E-01	10/01/05	7.37E-04	6.03E-04	9.10E-04		uCi/g	U
Bi-212	3.23E-01	10/01/05	-4.67E-03	3.62E-03	5.40E-03		uCi/g	U
Bi-214	3.23E-01	10/01/05	-5.03E-04	7.25E-04	1.09E-03		uCi/g	U
Ra-228	3.23E-01	10/01/05	9.60E-04	2.30E-03	3.45E-03		uCi/g	U
Ac-228	3.23E-01	10/01/05	9.60E-04	2.30E-03	3.45E-03		uCi/g	U
Th-230	3.23E-01	10/01/05	-5.03E-04	7.25E-04	1.09E-03		uCi/g	U
Th-234	3.23E-01	10/01/05	4.21E-03	1.13E-02	1.38E-02		uCi/g	U
U-235	3.23E-01	10/01/05	6.40E-04	1.42E-03	1.98E-03		uCi/g	U
U-238	3.23E-01	10/01/05	4.21E-03	1.13E-02	1.38E-02		uCi/g	U
Np-239	3.23E-01	10/01/05	-6.06E-04	1.29E-03	1.78E-03		uCi/g	U
Am-241	3.23E-01	10/01/05	-2.29E-04	1.53E-03	1.86E-03		uCi/g	U

Note(s):1. Calculated MDAs are a-posteriori values.

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

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10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814008**	**Client:**	**WPI**
Client Sample ID:	**MTS OD-1**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Solid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (g)	Run Date	Activity[2]	Uncertainty	MDA[1]	RL	Units	Qualifier
H-3	3.21E-02	09/26/05	-1.42E-04	5.02E-04	9.07E-04	4.00E-02	uCi/g	U
C-14	4.55E-02	09/22/05	7.17E-04	6.57E-05	6.57E-05	8.00E-03	uCi/g	3
Fe-55	1.63E-03	09/23/05	6.49E-02	1.00E-02	1.16E-02	7.00E-01	uCi/g	3
Ni-63	1.63E-03	09/30/05	9.92E+00	1.89E-01	1.46E-02	3.50E-03	uCi/g	3
Sr-90	2.50E-02	10/01/05	2.62E-05	1.49E-05	2.22E-05	4.00E-05	uCi/g	3
Tc-99	6.55E-02	09/24/05	-1.87E-05	3.86E-05	6.80E-05	3.00E-03	uCi/g	U
Pu-241	1.63E-02	09/26/05	9.11E-05	3.11E-04	5.37E-04	3.50E-03	uCi/g	U
Alpha Spec								
Pu-238	1.63E-02	10/01/05	-8.60E-07	1.40E-06	5.13E-06	1.00E-04	uCi/g	U
Pu-239/240	1.63E-02	10/01/05	4.46E-07	1.51E-06	3.90E-06	1.00E-04	uCi/g	U
Am-241	1.63E-02	10/01/05	-4.04E-07	5.26E-07	3.19E-06	1.00E-04	uCi/g	U
Cm-242	1.63E-02	10/01/05	0.00E+00	8.80E-07	1.35E-06	2.00E-02	uCi/g	U
Cm-243/244	1.63E-02	10/01/05	-1.90E-07	8.18E-07	2.46E-06	2.00E-02	uCi/g	U
Gamma Spec								
Be-7	3.27E-01	10/01/05	-1.05E-03	5.72E-03	8.40E-03		uCi/g	U
Na-22	3.27E-01	10/01/05	-2.88E-04	5.43E-04	7.40E-04		uCi/g	U
K-40	3.27E-01	10/01/05	-9.01E-04	3.32E-03	5.25E-03		uCi/g	U
Cr-51	3.27E-01	10/01/05	-1.08E-04	6.53E-03	9.63E-03		uCi/g	U
Mn-54	3.27E-01	10/01/05	1.10E-04	8.33E-04	1.28E-03		uCi/g	U
Fe-59	3.27E-01	10/01/05	-7.02E-04	2.84E-03	4.32E-03		uCi/g	U
Co-56	3.27E-01	10/01/05	3.12E-04	1.05E-03	1.61E-03		uCi/g	U
Co-57	3.27E-01	10/01/05	-5.74E-05	2.27E-04	3.09E-04		uCi/g	U
Co-58	3.27E-01	10/01/05	-9.81E-05	9.99E-04	1.53E-03		uCi/g	U
Co-60	3.27E-01	10/01/05	2.27E+00	1.21E-01	1.26E-03	7.00E-01	uCi/g	3
Ni-59	8.17E-03	09/22/05	1.02E-01	6.68E-03	5.07E-04	2.20E-01	uCi/g	3
Zn-65	3.27E-01	10/01/05	0.00E+00	2.12E-03	3.22E-03		uCi/g	UUI
Y-88	3.27E-01	10/01/05	-4.57E-05	4.19E-04	6.59E-04		uCi/g	U
Zr-95	3.27E-01	10/01/05	-1.47E-03	1.65E-03	2.52E-03		uCi/g	U
Nb-94	3.27E-01	10/01/05	2.98E-04	5.88E-04	9.06E-04	2.00E-04	uCi/g	U
Nb-95	3.27E-01	10/01/05	-1.46E-04	1.22E-03	1.87E-03		uCi/g	U
Ru-106	3.27E-01	10/01/05	-8.52E-04	5.42E-03	8.37E-03		uCi/g	U
Ag-110m	3.27E-01	10/01/05	-8.11E-04	6.26E-04	9.54E-04		uCi/g	U
Sn-113	3.27E-01	10/01/05	1.33E-04	7.22E-04	9.32E-04		uCi/g	U
Sb-124	3.27E-01	10/01/05	-4.57E-04	9.87E-04	1.55E-03		uCi/g	U
Sb-125	3.27E-01	10/01/05	4.26E-05	1.28E-03	1.88E-03		uCi/g	U
I-129	4.95E-02	10/02/05	-5.34E-04	9.93E-04	1.25E-03	8.00E-05	uCi/g	U
Cs-134	3.27E-01	10/01/05	-6.32E-04	8.60E-04	1.32E-03		uCi/g	U

Note(s):1. Calculated MDAs are a-posteriori values.

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

GENERAL ENGINEERING LABORATORIES, LLC

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10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814008**	**Client:**	**WPI**
Client Sample ID:	**MTS OD-1**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Solid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (g)	Run Date	Activity	Uncertainty	MDA	RL	Units	Qualifier
Cs-136	3.27E-01	10/01/05	8.87E-04	5.87E-03	8.96E-03		uCi/g	U
Cs-137	3.27E-01	10/01/05	8.58E-04	6.46E-04	9.92E-04	1.00E-03	uCi/g	U
Ba-133	3.27E-01	10/01/05	2.30E-04	5.38E-04	7.93E-04		uCi/g	U
Ba-140	3.27E-01	10/01/05	-5.89E-03	9.47E-03	1.36E-02		uCi/g	U
Ce-139	3.27E-01	10/01/05	4.89E-06	3.02E-04	4.14E-04		uCi/g	U
Ce-141	3.27E-01	10/01/05	-1.33E-04	7.81E-04	1.07E-03		uCi/g	U
Ce-144	3.27E-01	10/01/05	5.26E-04	1.91E-03	2.60E-03		uCi/g	U
Nd-147	3.27E-01	10/01/05	-1.06E-02	2.30E-02	3.36E-02		uCi/g	U
Pm-144	3.27E-01	10/01/05	-6.29E-04	6.19E-04	9.48E-04		uCi/g	U
Pm-146	3.27E-01	10/01/05	-2.62E-04	6.22E-04	9.12E-04		uCi/g	U
Eu-152	3.27E-01	10/01/05	-2.17E-03	1.21E-03	1.75E-03		uCi/g	U
Eu-154	3.27E-01	10/01/05	-7.90E-04	1.51E-03	2.05E-03		uCi/g	U
Eu-155	3.27E-01	10/01/05	1.56E-04	8.16E-04	1.11E-03		uCi/g	U
Ir-192	3.27E-01	10/01/05	-4.27E-04	4.85E-04	7.10E-04		uCi/g	U
Hg-203	3.27E-01	10/01/05	4.02E-04	6.64E-04	8.52E-04		uCi/g	U
Tl-208	3.27E-01	10/01/05	-7.16E-04	5.75E-04	8.81E-04		uCi/g	U
Pb-210	3.27E-01	10/01/05	6.63E-04	3.98E-03	4.75E-03		uCi/g	U
Pb-212	3.27E-01	10/01/05	1.57E-04	6.38E-04	9.39E-04		uCi/g	U
Pb-214	3.27E-01	10/01/05	-5.63E-04	8.60E-04	1.26E-03		uCi/g	U
Bi-212	3.27E-01	10/01/05	5.88E-03	5.42E-03	8.32E-03		uCi/g	U
Bi-214	3.27E-01	10/01/05	8.76E-04	1.24E-03	1.64E-03		uCi/g	U
Ra-228	3.27E-01	10/01/05	-4.60E-04	3.46E-03	5.30E-03		uCi/g	U
Ac-228	3.27E-01	10/01/05	-4.60E-04	3.46E-03	5.30E-03		uCi/g	U
Th-230	3.27E-01	10/01/05	8.76E-04	1.24E-03	1.64E-03		uCi/g	U
Th-234	3.27E-01	10/01/05	-2.10E-03	3.86E-03	5.14E-03		uCi/g	U
U-235	3.27E-01	10/01/05	3.27E-04	1.88E-03	2.57E-03		uCi/g	U
U-238	3.27E-01	10/01/05	-2.10E-03	3.86E-03	5.14E-03		uCi/g	U
Np-239	3.27E-01	10/01/05	2.54E-04	1.57E-03	2.14E-03		uCi/g	U
Am-241	3.27E-01	10/01/05	1.29E-04	4.05E-04	5.43E-04		uCi/g	U

Note(s):1. Calculated MDAs are a-posteriori values.

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

GENERAL ENGINEERING LABORATORIES, LLC

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10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814009**	**Client:**	**WPI**
Client Sample ID:	**MTS ID-1**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Solid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (g)	Run Date	Activity[2]	Uncertainty	MDA[1]	RL	Units	Qualifier
H-3	3.37E-02	09/26/05	-6.36E-05	4.63E-04	8.28E-04	4.00E-02	uCi/g	U
C-14	4.17E-02	09/22/05	6.96E-05	4.47E-05	7.20E-05	8.00E-03	uCi/g	3,U
Fe-55	1.61E-03	09/23/05	1.21E-01	1.13E-02	1.17E-02	7.00E-01	uCi/g	3
Ni-63	1.61E-03	09/30/05	1.83E+01	3.59E-01	2.22E-02	3.50E-03	uCi/g	3
Sr-90	2.40E-02	10/01/05	1.99E-05	1.40E-05	2.41E-05	4.00E-05	uCi/g	U
Tc-99	3.81E-02	09/24/05	-5.23E-05	7.34E-05	1.31E-04	3.00E-03	uCi/g	U
Pu-241	1.61E-02	09/26/05	1.76E-04	3.17E-04	5.40E-04	3.50E-03	uCi/g	U
Alpha Spec								
Pu-238	1.61E-02	10/01/05	1.02E-07	7.70E-07	2.52E-06	1.00E-04	uCi/g	U
Pu-239/240	1.61E-02	10/01/05	-4.20E-07	8.75E-07	3.56E-06	1.00E-04	uCi/g	U
Am-241	1.61E-02	10/01/05	-5.95E-07	7.83E-07	2.56E-06	1.00E-04	uCi/g	U
Cm-242	1.61E-02	10/01/05	4.20E-07	8.23E-07	1.26E-06	2.00E-02	uCi/g	U
Cm-243/244	1.61E-02	10/01/05	1.14E-06	1.69E-06	3.49E-06	2.00E-02	uCi/g	U
Gamma Spec								
Be-7	3.22E-01	10/02/05	4.43E-03	7.27E-03	1.09E-02		uCi/g	U
Na-22	3.22E-01	10/02/05	2.09E-04	5.99E-04	9.48E-04		uCi/g	U
K-40	3.22E-01	10/02/05	2.53E-03	4.55E-03	7.22E-03		uCi/g	U
Cr-51	3.22E-01	10/02/05	-2.78E-03	8.86E-03	1.31E-02		uCi/g	U
Mn-54	3.22E-01	10/02/05	-1.67E-04	1.03E-03	1.54E-03		uCi/g	U
Fe-59	3.22E-01	10/02/05	-3.32E-04	3.90E-03	5.35E-03		uCi/g	U
Co-56	3.22E-01	10/02/05	1.68E-04	1.31E-03	1.96E-03		uCi/g	U
Co-57	3.22E-01	10/02/05	1.82E-04	4.41E-04	4.53E-04		uCi/g	U
Co-58	3.22E-01	10/02/05	-7.29E-04	1.25E-03	1.86E-03		uCi/g	U
Co-60	3.22E-01	10/02/05	4.05E+00	4.98E-03	9.86E-04	7.00E-01	uCi/g	3
Ni-59	8.05E-03	09/23/05	1.90E-01	1.20E-02	5.55E-04	2.20E-01	uCi/g	3
Zn-65	3.22E-01	10/02/05	0.00E+00	2.88E-03	3.73E-03		uCi/g	UUI
Y-88	3.22E-01	10/02/05	4.37E-04	5.44E-04	8.63E-04		uCi/g	U
Zr-95	3.22E-01	10/02/05	1.04E-03	2.07E-03	3.10E-03		uCi/g	U
Nb-94	3.22E-01	10/02/05	-1.28E-04	7.36E-04	1.10E-03	2.00E-04	uCi/g	U
Nb-95	3.22E-01	10/02/05	-9.83E-04	1.55E-03	2.32E-03		uCi/g	U
Ru-106	3.22E-01	10/02/05	-6.38E-03	7.94E-03	1.04E-02		uCi/g	U
Ag-110m	3.22E-01	10/02/05	-1.56E-03	9.01E-04	1.17E-03		uCi/g	U
Sn-113	3.22E-01	10/02/05	1.45E-04	8.20E-04	1.22E-03		uCi/g	U
Sb-124	3.22E-01	10/02/05	-1.55E-04	1.34E-03	2.12E-03		uCi/g	U
Sb-125	3.22E-01	10/02/05	-1.11E-03	1.62E-03	2.42E-03		uCi/g	U
I-129	4.77E-02	10/02/05	3.96E-04	1.40E-03	1.56E-03	8.00E-05	uCi/g	U
Cs-134	3.22E-01	10/02/05	-1.48E-04	1.22E-03	1.59E-03		uCi/g	U

Note(s):1. Calculated MDAs are a-posteriori values.

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

GENERAL ENGINEERING LABORATORIES, LLC

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10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814009**	**Client:**	**WPI**
Client Sample ID:	**MTS ID-1**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Solid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (g)	Run Date	Activity	Uncertainty	MDA	RL	Units	Qualifier
Cs-136	3.22E-01	10/02/05	-3.09E-03	7.28E-03	1.15E-02		uCi/g	U
Cs-137	3.22E-01	10/02/05	0.00E+00	9.25E-04	1.22E-03	1.00E-03	uCi/g	UUI
Ba-133	3.22E-01	10/02/05	6.85E-04	7.95E-04	1.04E-03		uCi/g	U
Ba-140	3.22E-01	10/02/05	-3.57E-03	1.22E-02	1.82E-02		uCi/g	U
Ce-139	3.22E-01	10/02/05	-8.45E-05	4.21E-04	5.71E-04		uCi/g	U
Ce-141	3.22E-01	10/02/05	7.85E-04	1.12E-03	1.52E-03		uCi/g	U
Ce-144	3.22E-01	10/02/05	-5.49E-04	2.71E-03	3.66E-03		uCi/g	U
Nd-147	3.22E-01	10/02/05	7.71E-04	3.03E-02	4.53E-02		uCi/g	U
Pm-144	3.22E-01	10/02/05	-5.04E-05	7.78E-04	1.16E-03		uCi/g	U
Pm-146	3.22E-01	10/02/05	-5.58E-05	7.82E-04	1.17E-03		uCi/g	U
Eu-152	3.22E-01	10/02/05	-2.17E-03	1.77E-03	2.31E-03		uCi/g	U
Eu-154	3.22E-01	10/02/05	5.77E-04	1.66E-03	2.63E-03		uCi/g	U
Eu-155	3.22E-01	10/02/05	1.71E-04	1.29E-03	1.73E-03		uCi/g	U
Ir-192	3.22E-01	10/02/05	3.62E-04	6.41E-04	9.52E-04		uCi/g	U
Hg-203	3.22E-01	10/02/05	1.08E-04	7.80E-04	1.16E-03		uCi/g	U
Tl-208	3.22E-01	10/02/05	7.56E-07	7.32E-04	1.09E-03		uCi/g	U
Pb-210	3.22E-01	10/02/05	4.17E-02	5.76E-02	6.65E-02		uCi/g	U
Pb-212	3.22E-01	10/02/05	7.85E-04	1.01E-03	1.23E-03		uCi/g	U
Pb-214	3.22E-01	10/02/05	-2.15E-03	1.27E-03	1.66E-03		uCi/g	U
Bi-212	3.22E-01	10/02/05	-3.38E-03	6.75E-03	1.01E-02		uCi/g	U
Bi-214	3.22E-01	10/02/05	-8.25E-04	1.35E-03	2.02E-03		uCi/g	U
Ra-228	3.22E-01	10/02/05	-3.06E-03	4.03E-03	6.36E-03		uCi/g	U
Ac-228	3.22E-01	10/02/05	-3.06E-03	4.03E-03	6.36E-03		uCi/g	U
Th-230	3.22E-01	10/02/05	-8.25E-04	1.35E-03	2.02E-03		uCi/g	U
Th-234	3.22E-01	10/02/05	4.69E-03	1.61E-02	1.88E-02		uCi/g	U
U-235	3.22E-01	10/02/05	1.10E-03	2.64E-03	3.57E-03		uCi/g	U
U-238	3.22E-01	10/02/05	4.69E-03	1.61E-02	1.88E-02		uCi/g	U
Np-239	3.22E-01	10/02/05	-1.94E-04	2.35E-03	3.15E-03		uCi/g	U
Am-241	3.22E-01	10/02/05	-1.47E-04	2.07E-03	2.41E-03		uCi/g	U

Note(s):1. Calculated MDAs are a-posteriori values.

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

GENERAL ENGINEERING LABORATORIES, LLC

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10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814010**	**Client:**	**WPI**
Client Sample ID:	**Starboard Secondary Steam Gen**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Liquid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (L)	Run Date	Activity[2]	Uncertainty	MDA[1]	RL	Units	Qualifier
Gamma Spec								
Be-7	3.85E-01	09/26/05	4.33E-05	2.04E-04	1.20E-04		uCi/L	U
Na-22	3.85E-01	09/26/05	7.77E-08	5.07E-06	1.09E-05		uCi/L	U
K-40	3.85E-01	09/26/05	5.50E-05	9.17E-05	1.93E-04		uCi/L	U
Cr-51	3.85E-01	09/26/05	-2.07E-05	8.43E-05	1.51E-04		uCi/L	U
Mn-54	3.85E-01	09/26/05	-2.98E-06	6.26E-06	1.06E-05		uCi/L	U
Fe-59	3.85E-01	09/26/05	-7.41E-06	1.25E-05	2.21E-05		uCi/L	U
Co-56	3.85E-01	09/26/05	9.82E-07	8.72E-06	1.63E-05		uCi/L	U
Co-57	3.85E-01	09/26/05	6.13E-06	5.77E-06	1.01E-05		uCi/L	U
Co-58	3.85E-01	09/26/05	4.27E-06	1.11E-05	1.33E-05		uCi/L	U
Co-60	3.85E-01	09/26/05	6.46E-06	7.17E-06	1.68E-05	7.00E+02	uCi/L	U
Zn-65	3.85E-01	09/26/05	4.75E-06	1.11E-05	2.36E-05		uCi/L	U
Y-88	3.85E-01	09/26/05	1.09E-06	7.55E-06	1.66E-05		uCi/L	U
Zr-95	3.85E-01	09/26/05	-2.59E-06	1.40E-05	2.52E-05		uCi/L	U
Nb-94	3.85E-01	09/26/05	-3.04E-06	7.20E-06	1.23E-05	2.00E-01	uCi/L	U
Nb-95	3.85E-01	09/26/05	-5.94E-06	1.17E-05	1.96E-05		uCi/L	U
Ru-106	3.85E-01	09/26/05	-2.04E-05	5.53E-05	9.69E-05		uCi/L	U
Ag-110m	3.85E-01	09/26/05	-3.80E-06	5.46E-06	8.90E-06		uCi/L	U
Sn-113	3.85E-01	09/26/05	2.30E-06	8.07E-06	1.55E-05		uCi/L	U
Sb-124	3.85E-01	09/26/05	2.24E-06	2.05E-05	4.27E-05		uCi/L	U
Sb-125	3.85E-01	09/26/05	7.55E-06	1.94E-05	3.35E-05		uCi/L	U
Cs-134	3.85E-01	09/26/05	-2.52E-06	7.50E-06	1.31E-05		uCi/L	U
Cs-136	3.85E-01	09/26/05	-1.16E-05	3.37E-05	6.20E-05		uCi/L	U
Cs-137	3.85E-01	09/26/05	8.06E-06	7.38E-06	1.55E-05	1.00E+00	uCi/L	U
Ba-133	3.85E-01	09/26/05	1.04E-06	8.36E-06	1.39E-05		uCi/L	U
Ba-140	3.85E-01	09/26/05	3.22E-05	7.38E-05	1.48E-04		uCi/L	U
Ce-139	3.85E-01	09/26/05	1.08E-06	6.00E-06	1.04E-05		uCi/L	U
Ce-141	3.85E-01	09/26/05	9.32E-07	1.50E-05	2.58E-05		uCi/L	U
Ce-144	3.85E-01	09/26/05	3.31E-05	3.95E-05	7.29E-05		uCi/L	U
Nd-147	3.85E-01	09/26/05	8.37E-06	2.01E-04	3.73E-04		uCi/L	U
Pm-144	3.85E-01	09/26/05	4.16E-06	5.93E-06	1.31E-05		uCi/L	U
Pm-146	3.85E-01	09/26/05	2.58E-06	8.00E-06	1.54E-05		uCi/L	U
Eu-152	3.85E-01	09/26/05	-6.51E-07	1.84E-05	3.36E-05		uCi/L	U
Eu-154	3.85E-01	09/26/05	2.16E-07	1.41E-05	3.02E-05		uCi/L	U
Eu-155	3.85E-01	09/26/05	-1.00E-05	2.28E-05	3.78E-05		uCi/L	U
Ir-192	3.85E-01	09/26/05	-1.35E-07	6.66E-06	1.22E-05		uCi/L	U
Hg-203	3.85E-01	09/26/05	3.72E-06	9.10E-06	1.71E-05		uCi/L	U
Tl-208	3.85E-01	09/26/05	4.81E-07	7.87E-06	1.47E-05		uCi/L	U

Note(s):1. Calculated MDAs are a-posteriori values.

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

GENERAL ENGINEERING LABORATORIES, LLC

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10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814010**	**Client:**	**WPI**
Client Sample ID:	**Starboard Secondary Steam Gen**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Liquid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (L)	Run Date	Activity	Uncertainty	MDA	RL	Units	Qualifier
Pb-210	3.85E-01	09/26/05	1.43E-04	1.05E-03	1.70E-03		uCi/L	U
Pb-212	3.85E-01	09/26/05	1.46E-06	2.17E-05	2.24E-05		uCi/L	U
Pb-214	3.85E-01	09/26/05	1.19E-05	2.47E-05	2.78E-05		uCi/L	U
Bi-212	3.85E-01	09/26/05	7.29E-05	5.42E-05	1.20E-04		uCi/L	U
Bi-214	3.85E-01	09/26/05	1.82E-05	1.32E-05	2.84E-05		uCi/L	U
Ra-228	3.85E-01	09/26/05	3.06E-05	2.47E-05	5.64E-05		uCi/L	U
Ac-228	3.85E-01	09/26/05	3.06E-05	2.47E-05	5.64E-05		uCi/L	U
Th-230	3.85E-01	09/26/05	1.82E-05	1.32E-05	2.84E-05		uCi/L	U
Th-234	3.85E-01	09/26/05	4.09E-04	7.02E-04	5.28E-04		uCi/L	U
U-235	3.85E-01	09/26/05	8.38E-06	4.03E-05	7.02E-05		uCi/L	U
U-238	3.85E-01	09/26/05	4.09E-04	7.02E-04	4.82E-04		uCi/L	U
Np-239	3.85E-01	09/26/05	-1.62E-05	4.08E-05	6.77E-05		uCi/L	U
Am-241	3.85E-01	09/26/05	-7.63E-06	4.65E-05	5.60E-05		uCi/L	U

Note(s): **1. Calculated MDAs are a-posteriori values.**

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

GENERAL ENGINEERING LABORATORIES, LLC

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10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814011**	**Client:**	**WPI**
Client Sample ID:	**Port Secondary Steam Generato**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Liquid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (L)	Run Date	Activity[2]	Uncertainty	MDA[1]	RL	Units	Qualifier
Gamma Spec								
Be-7	4.48E-01	09/26/05	-5.61E-05	7.28E-05	1.16E-04		uCi/L	U
Na-22	4.48E-01	09/26/05	1.15E-07	8.72E-06	1.64E-05		uCi/L	U
K-40	4.48E-01	09/26/05	4.78E-05	8.18E-05	1.78E-04		uCi/L	U
Cr-51	4.48E-01	09/26/05	-2.37E-05	8.19E-05	1.44E-04		uCi/L	U
Mn-54	4.48E-01	09/26/05	3.66E-06	7.16E-06	1.47E-05		uCi/L	U
Fe-59	4.48E-01	09/26/05	6.67E-06	2.13E-05	4.23E-05		uCi/L	U
Co-56	4.48E-01	09/26/05	1.69E-06	8.37E-06	1.65E-05		uCi/L	U
Co-57	4.48E-01	09/26/05	8.24E-07	3.84E-06	6.63E-06		uCi/L	U
Co-58	4.48E-01	09/26/05	1.84E-06	9.02E-06	1.76E-05		uCi/L	U
Co-60	4.48E-01	09/26/05	-1.86E-06	7.18E-06	1.39E-05	7.00E+02	uCi/L	U
Zn-65	4.48E-01	09/26/05	-7.27E-06	1.92E-05	3.33E-05		uCi/L	U
Y-88	4.48E-01	09/26/05	-1.50E-06	9.48E-06	1.86E-05		uCi/L	U
Zr-95	4.48E-01	09/26/05	8.86E-06	1.51E-05	3.12E-05		uCi/L	U
Nb-94	4.48E-01	09/26/05	1.91E-06	6.37E-06	1.26E-05	2.00E-01	uCi/L	U
Nb-95	4.48E-01	09/26/05	-5.01E-06	1.17E-05	2.07E-05		uCi/L	U
Ru-106	4.48E-01	09/26/05	1.19E-05	6.75E-05	1.31E-04		uCi/L	U
Ag-110m	4.48E-01	09/26/05	-3.36E-06	6.62E-06	1.18E-05		uCi/L	U
Sn-113	4.48E-01	09/26/05	1.34E-05	1.15E-05	1.63E-05		uCi/L	U
Sb-124	4.48E-01	09/26/05	1.52E-05	2.25E-05	4.90E-05		uCi/L	U
Sb-125	4.48E-01	09/26/05	1.07E-05	1.54E-05	3.05E-05		uCi/L	U
Cs-134	4.48E-01	09/26/05	-8.37E-07	8.00E-06	1.50E-05		uCi/L	U
Cs-136	4.48E-01	09/26/05	1.39E-05	3.74E-05	7.49E-05		uCi/L	U
Cs-137	4.48E-01	09/26/05	9.12E-07	6.34E-06	1.14E-05	1.00E+00	uCi/L	U
Ba-133	4.48E-01	09/26/05	3.96E-06	7.27E-06	1.40E-05		uCi/L	U
Ba-140	4.48E-01	09/26/05	2.70E-05	8.89E-05	1.65E-04		uCi/L	U
Ce-139	4.48E-01	09/26/05	1.45E-06	4.37E-06	8.28E-06		uCi/L	U
Ce-141	4.48E-01	09/26/05	2.08E-06	1.25E-05	2.13E-05		uCi/L	U
Ce-144	4.48E-01	09/26/05	3.05E-06	3.12E-05	5.31E-05		uCi/L	U
Nd-147	4.48E-01	09/26/05	-7.60E-05	2.35E-04	3.97E-04		uCi/L	U
Pm-144	4.48E-01	09/26/05	-9.51E-07	6.15E-06	1.16E-05		uCi/L	U
Pm-146	4.48E-01	09/26/05	1.34E-06	7.94E-06	1.46E-05		uCi/L	U
Eu-152	4.48E-01	09/26/05	-7.87E-07	1.66E-05	2.99E-05		uCi/L	U
Eu-154	4.48E-01	09/26/05	1.18E-07	2.42E-05	4.55E-05		uCi/L	U
Eu-155	4.48E-01	09/26/05	3.28E-06	1.28E-05	2.26E-05		uCi/L	U
Ir-192	4.48E-01	09/26/05	4.62E-06	6.78E-06	1.30E-05		uCi/L	U
Hg-203	4.48E-01	09/26/05	-5.26E-07	6.94E-06	1.26E-05		uCi/L	U
Tl-208	4.48E-01	09/26/05	7.66E-06	7.90E-06	1.57E-05		uCi/L	U

Note(s):1. Calculated MDAs are a-posteriori values.

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

GENERAL ENGINEERING LABORATORIES, LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

10 CFR Part 50/61 Certificate of Analysis

GEL Sample ID:	**144814011**	**Client:**	**WPI**
Client Sample ID:	**Port Secondary Steam Generato**	**Collect Date:**	**September 01, 2005**
Matrix:	**Misc Liquid**	**Receive Date:**	**September 06, 2005**
Amount of Sample Received:		**Report Date:**	**October 04, 2005**

Analyte	Aliquot (L)	Run Date	Activity	Uncertainty	MDA	RL	Units	Qualifier
Pb-210	4.48E-01	09/26/05	0.00E+00	1.13E-04	2.12E-04		uCi/L	UUI
Pb-212	4.48E-01	09/26/05	7.54E-06	1.27E-05	1.97E-05		uCi/L	U
Pb-214	4.48E-01	09/26/05	7.79E-06	1.99E-05	2.85E-05		uCi/L	U
Bi-212	4.48E-01	09/26/05	2.40E-05	4.84E-05	1.01E-04		uCi/L	U
Bi-214	4.48E-01	09/26/05	3.00E-05	2.42E-05	3.29E-05		uCi/L	U
Ra-228	4.48E-01	09/26/05	-1.91E-05	2.72E-05	4.53E-05		uCi/L	U
Ac-228	4.48E-01	09/26/05	-1.91E-05	2.72E-05	4.53E-05		uCi/L	U
Th-230	4.48E-01	09/26/05	0.00E+00	2.42E-05	2.15E-05		uCi/L	UUI
Th-234	4.48E-01	09/26/05	0.00E+00	1.43E-04	2.40E-04		uCi/L	UUI
U-235	4.48E-01	09/26/05	1.31E-05	3.26E-05	5.65E-05		uCi/L	U
U-238	4.48E-01	09/26/05	0.00E+00	1.43E-04	2.40E-04		uCi/L	UUI
Np-239	4.48E-01	09/26/05	-2.54E-05	2.88E-05	4.45E-05		uCi/L	U
Am-241	4.48E-01	09/26/05	1.57E-06	9.99E-06	1.63E-05		uCi/L	U

Note(s): **1. Calculated MDAs are a-posteriori values.**

2. Activity concentration net +/- 2 sigma overall on reference date.

3. Results are statistically positive at the 99.9% confidence level (activity is greater than three times the one sigma uncertainty)

U Target analyte was analyzed for but not detected above the MDL or LOD.

UI Uncertain identification for gamma spectroscopy.

QUALITY CONTROL DATA

QC Summary

Report Date: October 4, 2005
Page 1 of 19

WPI
2020 Kraft Drive
Suite 2200
Blacksburg, Virginia

Contact: **Jon Stouky**

Workorder: **144814**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
High Rad Testing										
Batch 461028										
QC1200931791 144814002 DUP										
Carbon-14		-6.280E-06 +/-5.450E-05	U	6.530E-05 +/-6.270E-05	uCi/g	0		(0%-20%)	NXL1	09/22/05 22:47
QC1200931793 LCS										
Carbon-14	0.000829			0.000831 +/-4.890E-05	uCi/g		100	(75%-125%)		09/22/05 23:21
QC1200931790 MB										
Carbon-14			U	2.350E-05 +/-2.320E-05	uCi/g					09/22/05 22:30
QC1200931792 144814002 MS										
Carbon-14	0.005	-6.280E-06 +/-5.450E-05	U	0.0053 +/-0.000307	uCi/g		106	(75%-125%)		09/22/05 23:04
Batch 461039										
QC1200931828 144814002 DUP										
Technetium-99		-5.600E-05 +/-4.910E-05	U	-3.210E-05 +/-5.860E-05	uCi/g	0		(0%-20%)	NXL1	09/24/05 22:19
QC1200931830 LCS										
Technetium-99	0.00167			0.00143 +/-7.630E-05	uCi/g		86	(75%-125%)		09/24/05 21:45
QC1200931827 MB										
Technetium-99			U	-8.110E-07 +/-3.890E-05	uCi/g					09/24/05 22:36
QC1200931829 144814002 MS										
Technetium-99	0.00499	-5.600E-05 +/-4.910E-05	U	0.00414 +/-0.000213	uCi/g		83	(75%-125%)		09/24/05 22:02
Batch 461073										
QC1200931908 144814003 DUP										
Iron-55		0.00224 +/-0.00735	U	0.003 +/-0.00742	uCi/g	0		(0%-30%)	AAK	09/23/05 08:30
QC1200931910 LCS										
Iron-55	0.192			0.182 +/-0.011	uCi/g		95	(75%-125%)		09/23/05 09:04
QC1200931907 MB										
Iron-55			U	-0.00259 +/-0.00726	uCi/g					09/23/05 08:14
QC1200931909 144814003 MS										
Iron-55	0.195	0.00224 +/-0.00735	U	0.190 +/-0.0114	uCi/g		98	(75%-125%)		09/23/05 08:47
Batch 461078										
QC1200931923 144814005 DUP										
Plutonium-241		9.130E-06 +/-0.000321	U	6.210E-05 +/-0.000291	uCi/g	0		(0%-20%)	RDD	09/26/05 17:27
QC1200931925 LCS										

QC Summary

Workorder: 144814

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
High Rad Testing										
Batch 461078										
Plutonium-241	0.00358			0.00306 +/-0.000456	uCi/g		86	(75%-125%)		09/26/05 18:01
QC1200931922 MB										
Plutonium-241			U	3.660E-05 +/-0.000274	uCi/g				RDD	09/26/05 17:10
QC1200931924 144814005 MS										
Plutonium-241	0.00372	U 9.130E-06 +/-0.000321		0.0035 +/-0.000454	uCi/g		94	(75%-125%)		09/26/05 17:44
Batch 461082										
QC1200931937 144814002 DUP										
Iodine-129		U -1.310E-06 +/-6.020E-05	U	3.650E-05 +/-8.200E-05	uCi/g	215*		(0%-20%)	ADD	10/03/05 09:08
QC1200931938 LCS										
Iodine-129	0.00149			0.00175 +/-0.000275	uCi/g		117	(75%-125%)		10/04/05 08:53
QC1200931936 MB										
Iodine-129			U	4.030E-05 +/-5.170E-05	uCi/g					10/03/05 08:18
Batch 461085										
QC1200931948 144814001 DUP										
Actinium-228		U 1.880E-06 +/-3.790E-06	U	3.320E-06 +/-3.400E-06	uCi/g	56			ADD	10/03/05 07:55
Americium-241		U 7.170E-07 +/-1.830E-06	U	1.790E-08 +/-8.410E-07	uCi/g	190				
Antimony-124		U 1.180E-06 +/-1.780E-06	U	6.720E-07 +/-2.560E-06	uCi/g	55				
Antimony-125		U 4.850E-07 +/-1.200E-06	U	1.210E-06 +/-2.170E-06	uCi/g	86				
Barium-133		U 9.310E-08 +/-5.880E-07	U	-1.080E-06 +/-1.120E-06	uCi/g	238				
Barium-140		U 6.970E-06 +/-7.760E-06	U	1.500E-05 +/-3.760E-05	uCi/g	73				
Beryllium-7		U 9.540E-07 +/-5.290E-06	U	1.930E-06 +/-9.850E-06	uCi/g	68				
Bismuth-212		U 4.150E-06 +/-3.490E-06	U	-2.220E-07 +/-7.780E-06	uCi/g	223				
Bismuth-214		U 1.110E-06 +/-1.280E-06	U	1.190E-06 +/-1.870E-06	uCi/g	7				
Cerium-139		U -4.680E-08 +/-3.900E-07	U	-2.230E-07 +/-5.790E-07	uCi/g	131				
Cerium-141		U 4.530E-07 +/-8.840E-07	U	5.280E-07 +/-1.690E-06	uCi/g	15				
Cerium-144		U -4.960E-08 +/-2.150E-06	U	1.030E-06 +/-3.470E-06	uCi/g	220				
Cesium-134		U 1.400E-07 +/-4.820E-07	U	-6.750E-07 +/-1.080E-06	uCi/g	305				
Cesium-136		U -1.670E-06 +/-3.090E-06	U	1.950E-06 +/-6.290E-06	uCi/g	2610				

QC Summary

Workorder: **144814**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
High Rad Testing											
Batch 461085											
Cesium-137		7.260E-08 ±/-5.240E-07	U	1.820E-07 ±/-8.810E-07	uCi/g	86*		(0%-20%)			
Chromium-51		3.150E-06 ±/-7.010E-06	U	-7.670E-06 ±/-1.080E-05	uCi/g	479			ADD	10/03/05	07:55
Cobalt-56		-3.800E-07 ±/-7.090E-07	U	-1.800E-07 ±/-1.250E-06	uCi/g	71					
Cobalt-57		-6.680E-08 ±/-2.680E-07	U	2.180E-07 ±/-4.130E-07	uCi/g	376					
Cobalt-58		-1.090E-07 ±/-6.510E-07	U	-9.110E-07 ±/-1.090E-06	uCi/g	157					
Cobalt-60		0.00 ±/-1.000E-06	UUI	2.550E-06 ±/-1.500E-06	uCi/g	34*		(0%-20%)			
Europium-152		1.820E-07 ±/-1.200E-06	U	-4.350E-07 ±/-2.300E-06	uCi/g	487					
Europium-154		-4.170E-07 ±/-1.860E-06	U	9.190E-07 ±/-2.980E-06	uCi/g	532					
Europium-155		2.260E-07 ±/-1.020E-06	U	1.140E-06 ±/-1.710E-06	uCi/g	134					
Iridium-192		-3.210E-07 ±/-5.810E-07	U	1.100E-06 ±/-1.240E-06	uCi/g	365					
Iron-59		4.890E-07 ±/-1.590E-06	U	-1.310E-06 ±/-3.020E-06	uCi/g	437					
Lead-210		6.990E-05 ±/-5.180E-05	U	0.00 ±/-9.800E-06	uCi/g	100*		(0%-20%)			
Lead-212		6.200E-07 ±/-1.180E-06	U	9.090E-07 ±/-1.650E-06	uCi/g	38					
Lead-214		6.860E-07 ±/-1.480E-06	U	7.050E-07 ±/-1.990E-06	uCi/g	3					
Manganese-54		2.440E-09 ±/-4.270E-07	U	4.600E-07 ±/-9.580E-07	uCi/g	198					
Mercury-203		3.270E-07 ±/-6.970E-07	U	9.730E-07 ±/-1.030E-06	uCi/g	99					
Neodymium-147		4.290E-06 ±/-1.710E-05	U	-4.330E-05 ±/-5.170E-05	uCi/g	244					
Neptunium-239		-7.880E-07 ±/-1.850E-06	U	2.540E-06 ±/-2.980E-06	uCi/g	380					
Niobium-94		-3.370E-08 ±/-4.750E-07	U	1.810E-07 ±/-8.060E-07	uCi/g	292					
Niobium-95		5.010E-07 ±/-7.070E-07	U	7.900E-07 ±/-1.620E-06	uCi/g	45					
Potassium-40		0.00 ±/-1.020E-05	UUI	0.00 ±/-2.290E-05	uCi/g	111*		(0%-20%)			
Promethium-144		2.060E-07 ±/-5.250E-07	U	-1.660E-07 ±/-9.350E-07	uCi/g	1850					
Promethium-146		3.650E-07 ±/-5.040E-07	U	2.090E-07 ±/-1.030E-06	uCi/g	55					
Radium-228		1.880E-06 ±/-3.790E-06	U	3.320E-06 ±/-3.400E-06	uCi/g	56*		(0%-20%)			

QC Summary

Workorder: **144814**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
High Rad Testing											
Batch 461085											
Ruthenium-106		U 2.690E-07 ±/-3.940E-06	U	4.080E-06 ±/-8.370E-06	uCi/g	175					
Silver-110m		U -3.520E-07 ±/-4.950E-07	U	-2.160E-07 ±/-8.780E-07	uCi/g	48			ADD	10/03/05	07:55
Sodium-22		U -7.740E-08 ±/-6.590E-07	U	3.290E-07 ±/-1.080E-06	uCi/g	323					
Thallium-208		U 1.910E-07 ±/-8.940E-07	U	9.150E-07 ±/-1.210E-06	uCi/g	131					
Thorium-230		U 1.110E-06 ±/-1.280E-06	U	1.190E-06 ±/-1.870E-06	uCi/g	7		(0%-20%)			
Thorium-234		U 5.390E-06 ±/-1.480E-05	U	1.320E-05 ±/-1.710E-05	uCi/g	84					
Tin-113		U 3.150E-08 ±/-5.630E-07	U	-7.100E-07 ±/-1.120E-06	uCi/g	219					
Uranium-235		U 2.080E-06 ±/-2.120E-06	UUI	0.00 ±/-6.280E-06	uCi/g	104*		(0%-20%)			
Uranium-238		U 5.390E-06 ±/-1.480E-05	UUI	0.00 ±/-1.710E-05	uCi/g	84*		(0%-20%)			
Yttrium-88		U 4.020E-07 ±/-7.330E-07	U	2.530E-07 ±/-1.260E-06	uCi/g	45					
Zinc-65		U -3.170E-07 ±/-1.130E-06	U	1.830E-07 ±/-2.270E-06	uCi/g	745					
Zirconium-95		U 3.280E-07 ±/-1.190E-06	U	-1.220E-06 ±/-2.140E-06	uCi/g	347					
QC1200931949 LCS											
Actinium-228			U	9.620E-07 ±/-2.630E-05	uCi/g					10/04/05	13:57
Americium-241	0.00122			0.00116 ±/-2.610E-05	uCi/g		95	(75%-125%)			
Antimony-124			U	4.830E-06 ±/-1.340E-05	uCi/g						
Antimony-125			U	-4.630E-07 ±/-1.610E-05	uCi/g						
Barium-133			U	5.460E-06 ±/-5.370E-06	uCi/g						
Barium-140			U	-1.220E-05 ±/-6.030E-05	uCi/g						
Beryllium-7			U	9.360E-06 ±/-5.550E-05	uCi/g						
Bismuth-212			U	6.630E-05 ±/-6.680E-05	uCi/g						
Bismuth-214			U	2.860E-06 ±/-1.150E-05	uCi/g						
Cerium-139				0.000225 ±/-9.720E-06	uCi/g						
Cerium-141			U	-1.610E-06 ±/-6.680E-06	uCi/g						
Cerium-144			U	-6.790E-08	uCi/g						

QC Summary

Workorder: **144814**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
High Rad Testing											
Batch 461085											
				+/-2.220E-05							
Cesium-134			U	4.170E-06	uCi/g				ADD	10/04/05	13:57
				+/-7.120E-06							
Cesium-136			U	1.060E-05	uCi/g						
				+/-2.770E-05							
Cesium-137	0.00047			0.000443	uCi/g		94	(75%-125%)			
				+/-2.320E-05							
Chromium-51			U	1.170E-05	uCi/g						
				+/-4.920E-05							
Cobalt-56			U	3.710E-07	uCi/g						
				+/-7.570E-06							
Cobalt-57				0.00024	uCi/g						
				+/-8.420E-06							
Cobalt-58			U	-8.940E-06	uCi/g						
				+/-7.440E-06							
Cobalt-60	0.000714			0.000663	uCi/g		93	(75%-125%)			
				+/-3.170E-05							
Europium-152			U	2.540E-06	uCi/g						
				+/-1.210E-05							
Europium-154			U	5.310E-06	uCi/g						
				+/-1.450E-05							
Europium-155			U	5.060E-06	uCi/g						
				+/-1.080E-05							
Iridium-192			U	-1.010E-06	uCi/g						
				+/-4.190E-06							
Iron-59			U	2.310E-05	uCi/g						
				+/-3.110E-05							
Lead-210			U	5.380E-05	uCi/g						
				+/-0.000124							
Lead-212			U	4.520E-06	uCi/g						
				+/-5.810E-06							
Lead-214			U	-1.840E-06	uCi/g						
				+/-9.100E-06							
Manganese-54			U	-8.070E-07	uCi/g						
				+/-7.340E-06							
Mercury-203				3.030E-05	uCi/g						
				+/-9.540E-06							
Neodymium-147			U	5.960E-05	uCi/g						
				+/-0.000135							
Neptunium-239			U	2.200E-06	uCi/g						
				+/-2.150E-05							
Niobium-94			U	-3.990E-06	uCi/g						
				+/-6.310E-06							
Niobium-95			U	1.520E-06	uCi/g						
				+/-9.080E-06							
Potassium-40			U	3.370E-05	uCi/g						
				+/-6.200E-05							

QC Summary

Workorder: 144814

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
High Rad Testing											
Batch 461085											
Promethium-144			U	-3.960E-06 ±/-6.620E-06	uCi/g						
Promethium-146			U	-3.890E-06 ±/-6.910E-06	uCi/g				ADD	10/04/05	13:57
Radium-228			U	9.620E-07 ±/-2.630E-05	uCi/g			(75%-125%)			
Ruthenium-106			U	-2.760E-05 ±/-5.960E-05	uCi/g						
Silver-110m			U	5.560E-06 ±/-8.360E-06	uCi/g						
Sodium-22			U	1.900E-06 ±/-5.210E-06	uCi/g						
Thallium-208			U	2.070E-06 ±/-4.770E-06	uCi/g						
Thorium-230			U	2.860E-06 ±/-1.150E-05	uCi/g						
Thorium-234			U	-5.610E-05 ±/-8.780E-05	uCi/g			(75%-125%)			
Tin-113				0.000307 ±/-1.980E-05	uCi/g						
Uranium-235			U	1.240E-05 ±/-1.990E-05	uCi/g			(75%-125%)			
Uranium-238			U	-5.610E-05 ±/-8.780E-05	uCi/g						
Yttrium-88				0.000515 ±/-3.360E-05	uCi/g						
Zinc-65			U	6.800E-06 ±/-1.700E-05	uCi/g						
Zirconium-95			U	-6.550E-07 ±/-1.280E-05	uCi/g						
QC1200931947 MB											
Actinium-228			U	2.250E-06 ±/-3.930E-06	uCi/g					10/02/05	19:53
Americium-241			U	3.990E-06 ±/-5.200E-06	uCi/g						
Antimony-124			U	-2.680E-07 ±/-2.960E-06	uCi/g						
Antimony-125			U	1.350E-07 ±/-2.970E-06	uCi/g						
Barium-133			U	1.690E-06 ±/-2.410E-06	uCi/g						
Barium-140			U	-1.350E-06 ±/-9.850E-06	uCi/g						
Beryllium-7			U	6.010E-07 ±/-1.180E-05	uCi/g						
Bismuth-212			U	2.190E-06 ±/-8.310E-06	uCi/g						
Bismuth-214			U	1.320E-06	uCi/g						

QC Summary

Workorder: **144814**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
High Rad Testing											
Batch 461085											
				+/-2.470E-06							
Cerium-139			U	-1.250E-06 +/-1.010E-06	uCi/g				ADD	10/02/05	19:53
Cerium-141			U	8.150E-07 +/-1.960E-06	uCi/g						
Cerium-144			U	-2.250E-06 +/-6.600E-06	uCi/g						
Cesium-134			U	4.920E-07 +/-1.250E-06	uCi/g						
Cesium-136			U	-1.460E-06 +/-3.820E-06	uCi/g						
Cesium-137			U	4.020E-07 +/-1.190E-06	uCi/g						
Chromium-51			U	6.840E-06 +/-1.370E-05	uCi/g						
Cobalt-56			U	-1.050E-06 +/-1.590E-06	uCi/g						
Cobalt-57			U	-2.290E-07 +/-8.290E-07	uCi/g						
Cobalt-58			U	3.800E-08 +/-1.160E-06	uCi/g						
Cobalt-60			U	-1.550E-07 +/-9.430E-07	uCi/g						
Europium-152			U	1.060E-06 +/-3.290E-06	uCi/g						
Europium-154			U	-7.630E-07 +/-3.060E-06	uCi/g						
Europium-155			U	1.520E-06 +/-3.520E-06	uCi/g						
Iridium-192			U	3.070E-07 +/-1.310E-06	uCi/g						
Iron-59			U	1.990E-06 +/-3.300E-06	uCi/g						
Lead-210			U	5.670E-05 +/-0.000137	uCi/g						
Lead-212			U	3.920E-07 +/-2.010E-06	uCi/g						
Lead-214			U	1.490E-06 +/-2.800E-06	uCi/g						
Manganese-54			U	4.400E-07 +/-1.150E-06	uCi/g						
Mercury-203			U	9.230E-07 +/-1.260E-06	uCi/g						
Neodymium-147			U	2.110E-05 +/-2.270E-05	uCi/g						
Neptunium-239			U	-1.240E-06 +/-6.030E-06	uCi/g						

QC Summary

Workorder: **144814**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
High Rad Testing											
Batch 461085											
Niobium-94			U	-3.390E-07 +/-1.230E-06	uCi/g						
Niobium-95			U	5.380E-07 +/-1.600E-06	uCi/g				ADD	10/02/05	19:53
Potassium-40			U	2.360E-06 +/-2.570E-05	uCi/g						
Promethium-144			U	1.520E-06 +/-1.430E-06	uCi/g						
Promethium-146			U	-4.240E-07 +/-1.370E-06	uCi/g						
Radium-228			U	2.250E-06 +/-3.930E-06	uCi/g						
Ruthenium-106			U	9.010E-06 +/-1.180E-05	uCi/g						
Silver-110m			U	-1.250E-07 +/-1.090E-06	uCi/g						
Sodium-22			U	-2.730E-07 +/-1.100E-06	uCi/g						
Thallium-208			U	2.910E-07 +/-1.930E-06	uCi/g						
Thorium-230			U	1.320E-06 +/-2.470E-06	uCi/g						
Thorium-234			UUI	0.00 +/-4.570E-05	uCi/g						
Tin-113			U	9.800E-07 +/-1.740E-06	uCi/g						
Uranium-235			U	6.360E-07 +/-6.760E-06	uCi/g						
Uranium-238			UUI	0.00 +/-4.570E-05	uCi/g						
Yttrium-88			U	5.070E-07 +/-1.380E-06	uCi/g						
Zinc-65			U	-2.010E-06 +/-2.890E-06	uCi/g						
Zirconium-95			U	1.150E-06 +/-2.430E-06	uCi/g						
Batch 461105											
QC1200932017 144814003 DUP											
Nickel-59		UI 0.000434 +/-0.000314	U	0.000233 +/-0.000273	uCi/g	61*		(0%-20%)	AAK	09/23/05	12:46
QC1200932019 LCS											
Nickel-59	0.0102			0.00814 +/-0.00109	uCi/g		80	(75%-125%)		09/23/05	16:25
QC1200932016 MB											
Nickel-59			U	0.000186 +/-0.000305	uCi/g					09/23/05	10:17
Batch 461107											
QC1200932021 144814003 DUP											

QC Summary

Workorder: 144814

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
High Rad Testing										
Batch 461107										
Strontium-90		1.140E-05 +/-9.040E-06	U	5.480E-06 +/-7.970E-06	uCi/g	0		(0%-20%)	AAK	10/01/05 17:39
QC1200932023 LCS										
Strontium-90	0.000558			0.000564 +/-5.500E-05	uCi/g		101	(75%-125%)		10/01/05 18:11
QC1200932020 MB										
Strontium-90			U	6.140E-07 +/-7.310E-06	uCi/g					10/01/05 17:39
QC1200932022 144814003 MS										
Strontium-90	0.00167	1.140E-05 +/-9.040E-06	U	0.00153 +/-0.000154	uCi/g		92	(75%-125%)		10/01/05 18:11
Batch 461109										
QC1200932032 144814005 DUP										
Plutonium-238		7.270E-07 +/-1.430E-06	U	8.600E-07 +/-1.180E-06	uCi/g	17		(0%-20%)	RDD	10/01/05 10:51
Plutonium-239/240		-4.840E-07 +/-4.240E-07	U	6.140E-07 +/-1.210E-06	uCi/g	1690*		(0%-20%)		
QC1200932034 LCS										
Plutonium-238			U	7.220E-07 +/-1.280E-06	uCi/g			(75%-125%)		
Plutonium-239/240	0.000128			0.000145 +/-1.320E-05	uCi/g		113	(75%-125%)		
QC1200932031 MB										
Plutonium-238			U	9.920E-07 +/-1.750E-06	uCi/g					
Plutonium-239/240			U	-5.510E-07 +/-1.140E-06	uCi/g					
QC1200932033 144814005 MS										
Plutonium-238		7.270E-07 +/-1.430E-06	U	1.720E-06 +/-2.020E-06	uCi/g			(75%-125%)		
Plutonium-239/240	0.000133	-4.840E-07 +/-4.240E-07	U	0.000131 +/-1.380E-05	uCi/g		99	(75%-125%)		
Batch 461113										
QC1200932036 144814005 DUP										
Americium-241		9.180E-07 +/-1.120E-06	U	1.360E-06 +/-1.640E-06	uCi/g	39*		(0%-20%)	RDD	10/01/05 10:51
Curium-242		-1.760E-07 +/-7.600E-07	U	-1.780E-07 +/-7.690E-07	uCi/g	1		(0%-20%)		
Curium-243/244		3.360E-07 +/-9.460E-07	U	-1.570E-07 +/-6.770E-07	uCi/g	551*		(0%-20%)		
QC1200932038 LCS										
Americium-241	0.000151			0.000143 +/-1.340E-05	uCi/g		90	(75%-125%)		
Curium-242			U	-8.160E-08 +/-6.850E-07	uCi/g					
Curium-243/244	0.000186			0.000197 +/-1.570E-05	uCi/g		100	(75%-125%)		
QC1200932035 MB										

QC Summary

Workorder: 144814

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
High Rad Testing											
Batch 461113											
Americium-241			U	-3.750E-07 +/-6.760E-07	uCi/g						
Curium-242			U	0.00 +/-6.930E-07	uCi/g				RDD	10/01/05	10:51
Curium-243/244			U	6.710E-07 +/-9.300E-07	uCi/g						
QC1200932037 144814005 MS											
Americium-241	0.000151	U 9.180E-07 +/-1.120E-06		0.00016 +/-1.380E-05	uCi/g		90	(75%-125%)			
Curium-242		U -1.760E-07 +/-7.600E-07	U	3.550E-07 +/-6.960E-07	uCi/g						
Curium-243/244	0.000186	U 3.360E-07 +/-9.460E-07		0.000185 +/-1.490E-05	uCi/g		100	(75%-125%)			
Batch 465649											
QC1200943142 144814002 DUP											
Tritium		U -5.790E-05 +/-0.000422	U	1.810E-05 +/-0.000495	uCi/g	0		(0%-20%)	NXL1	09/26/05	15:38
QC1200943144 LCS											
Tritium	0.00193			0.00152 +/-0.000293	uCi/g		79	(75%-125%)		09/26/05	16:11
QC1200943141 MB											
Tritium			U	-6.070E-06 +/-0.000193	uCi/g					09/26/05	15:21
QC1200943143 144814002 MS											
Tritium	0.00933	U -5.790E-05 +/-0.000422		0.009 +/-0.00151	uCi/g		97	(75%-125%)		09/26/05	15:54
Batch 467200											
QC1200946696 144814002 DUP											
Nickel-63		U -0.000253 +/-0.00121	U	0.000276 +/-0.0013	uCi/g	0		(0%-20%)	AAK	09/30/05	07:41
QC1200946698 LCS											
Nickel-63	0.0799			0.0666 +/-0.00228	uCi/g		83	(75%-125%)		09/30/05	08:45
QC1200946695 MB											
Nickel-63			U	-0.000166 +/-0.000865	uCi/g					09/30/05	07:09
QC1200946697 144814002 MS											
Nickel-63	0.109	U -0.000253 +/-0.00121		0.0916 +/-0.0033	uCi/g		84	(75%-125%)		09/30/05	08:13
Rad Gamma Spec											
Batch 463088											
QC1200936879 145401002 DUP											
Actinium-228		U -4.150E-06 +/-1.060E-05	U	2.270E-07 +/-1.180E-05	uCi/L	223			MJH1	09/27/05	08:04
Americium-241		U 4.040E-07 +/-4.740E-06	U	1.490E-07 +/-3.760E-06	uCi/L	92					
Antimony-124		U 6.850E-06 +/-7.400E-06	U	-8.750E-07 +/-5.090E-06	uCi/L	259					

QC Summary

Workorder: **144814**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch 463088											
Antimony-125		U 5.430E-08 ±/-7.330E-06	U	4.140E-06 ±/-5.670E-06	uCi/L	195					
Barium-133		U 1.480E-06 ±/-3.560E-06	U	-2.490E-07 ±/-2.740E-06	uCi/L	281			MJH1	09/27/05	08:04
Barium-140		U -1.110E-05 ±/-2.550E-05	U	1.040E-06 ±/-2.060E-05	uCi/L	242					
Beryllium-7		U 7.940E-06 ±/-2.490E-05	U	-6.510E-06 ±/-2.130E-05	uCi/L	2020					
Bismuth-212		U 2.040E-05 ±/-2.440E-05	U	9.570E-06 ±/-1.850E-05	uCi/L	72					
Bismuth-214		U 9.030E-06 ±/-9.550E-06	UUI	0.00 ±/-1.130E-05	uCi/L	28					
Cerium-139		U -6.780E-07 ±/-2.110E-06	U	-1.740E-06 ±/-1.790E-06	uCi/L	88					
Cerium-141		U 2.890E-06 ±/-4.790E-06	U	-1.660E-06 ±/-4.110E-06	uCi/L	738					
Cerium-144		U -3.040E-06 ±/-1.440E-05	U	2.300E-06 ±/-1.170E-05	uCi/L	1460					
Cesium-134		U 1.300E-06 ±/-3.060E-06	U	6.310E-07 ±/-2.590E-06	uCi/L	70					
Cesium-136		U -3.990E-06 ±/-1.020E-05	U	2.120E-07 ±/-7.200E-06	uCi/L	222					
Cesium-137		U 3.260E-06 ±/-5.430E-06	U	-1.440E-07 ±/-2.330E-06	uCi/L	219					
Chromium-51		U 9.030E-06 ±/-3.230E-05	U	5.480E-07 ±/-2.200E-05	uCi/L	177					
Cobalt-56		U 5.520E-06 ±/-3.070E-06	U	1.010E-06 ±/-2.710E-06	uCi/L	138					
Cobalt-57		U -2.130E-07 ±/-1.900E-06	U	-7.080E-08 ±/-1.530E-06	uCi/L	100					
Cobalt-58		U -1.150E-06 ±/-2.910E-06	U	-8.460E-07 ±/-2.670E-06	uCi/L	30					
Cobalt-60		U 7.180E-06 ±/-9.940E-06	U	4.670E-07 ±/-2.150E-06	uCi/L	176					
Europium-152		U 2.580E-07 ±/-7.770E-06	U	5.870E-07 ±/-5.860E-06	uCi/L	78					
Europium-154		U -1.470E-07 ±/-5.190E-06	U	-2.580E-06 ±/-8.450E-06	uCi/L	178					
Europium-155		U -6.430E-06 ±/-7.770E-06	U	1.610E-06 ±/-5.760E-06	uCi/L	334					
Iridium-192		U 1.220E-06 ±/-2.670E-06	U	1.150E-06 ±/-1.950E-06	uCi/L	6					
Iron-59		U 5.680E-06 ±/-6.240E-06	U	1.950E-06 ±/-5.990E-06	uCi/L	98					
Lead-210		U 3.980E-05 ±/-7.500E-05	U	4.810E-05 ±/-8.020E-05	uCi/L	19					
Lead-212		U 3.190E-06 ±/-4.610E-06	U	3.320E-06 ±/-6.120E-06	uCi/L	4					

QC Summary

Workorder: **144814**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 463088										
Lead-214		U 4.450E-06 ±/-5.820E-06	U	1.120E-06 ±/-8.130E-06	uCi/L	120				
Manganese-54		U -1.350E-06 ±/-2.860E-06	U	2.460E-06 ±/-2.330E-06	uCi/L	689			MJH1	09/27/05 08:04
Mercury-203		U -5.240E-08 ±/-3.100E-06	U	7.020E-07 ±/-2.420E-06	uCi/L	232				
Neodymium-147		U -3.880E-05 ±/-5.210E-05	U	3.230E-05 ±/-3.990E-05	uCi/L	2180				
Neptunium-239		U 4.530E-06 ±/-1.570E-05	U	3.250E-06 ±/-1.110E-05	uCi/L	33				
Niobium-94		U 9.640E-07 ±/-3.000E-06	U	-1.630E-06 ±/-2.140E-06	uCi/L	776				
Niobium-95		U 9.180E-07 ±/-3.620E-06	U	4.500E-07 ±/-3.030E-06	uCi/L	68				
Potassium-40		UUI 0.00 ±/-5.890E-05	U	9.370E-06 ±/-2.530E-05	uCi/L	138				
Promethium-144		U -8.570E-08 ±/-3.110E-06	U	-1.110E-06 ±/-2.190E-06	uCi/L	171				
Promethium-146		U 3.390E-06 ±/-3.650E-06	U	8.720E-07 ±/-2.590E-06	uCi/L	118				
Radium-228		U -4.150E-06 ±/-1.060E-05	U	2.270E-07 ±/-1.180E-05	uCi/L	223				
Ruthenium-106		U -1.540E-06 ±/-2.560E-05	U	2.760E-06 ±/-1.950E-05	uCi/L	705				
Silver-110m		U -4.470E-08 ±/-2.700E-06	U	8.050E-07 ±/-2.130E-06	uCi/L	224				
Sodium-22		U -5.290E-08 ±/-1.860E-06	U	-9.480E-07 ±/-3.020E-06	uCi/L	179				
Thallium-208		U 2.080E-06 ±/-3.050E-06	U	8.080E-07 ±/-5.710E-06	uCi/L	88				
Thorium-230		U 9.030E-06 ±/-9.550E-06	UUI	0.00 ±/-1.130E-05	uCi/L	28				
Thorium-234		UUI 0.00 ±/-6.030E-05	UUI	0.00 ±/-6.230E-05	uCi/L	48				
Tin-113		U -3.190E-07 ±/-3.410E-06	U	-2.340E-06 ±/-2.820E-06	uCi/L	152				
Uranium-235		U 1.450E-05 ±/-1.630E-05	U	1.730E-05 ±/-1.330E-05	uCi/L	17				
Uranium-238		UUI 0.00 ±/-6.030E-05	UUI	0.00 ±/-6.230E-05	uCi/L	48				
Yttrium-88		U -3.320E-08 ±/-3.860E-06	U	-1.090E-06 ±/-2.460E-06	uCi/L	188				
Zinc-65		U 2.190E-06 ±/-5.760E-06	U	2.290E-06 ±/-5.900E-06	uCi/L	4				
Zirconium-95		U -3.950E-06 ±/-6.260E-06	U	8.250E-06 ±/-7.940E-06	uCi/L	567				
QC1200936881 LCS										
Actinium-228			U	0.000271	uCi/L					09/26/05 21:57

QC Summary

Workorder: **144814**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch 463088											
				+/-0.000332							
Americium-241	0.00488			0.00585 +/-0.00088	uCi/L		120	(75%-125%)	MJH1	09/26/05	21:57
Antimony-124			U	1.560E-05 +/-6.900E-05	uCi/L						
Antimony-125			U	2.580E-05 +/-9.210E-05	uCi/L						
Barium-133			U	-2.160E-05 +/-4.240E-05	uCi/L						
Barium-140			U	-2.110E-05 +/-0.000172	uCi/L						
Beryllium-7			U	-0.000322 +/-0.0003	uCi/L						
Bismuth-212			U	-0.00013 +/-0.000296	uCi/L						
Bismuth-214			U	-6.570E-06 +/-7.180E-05	uCi/L						
Cerium-139				0.00112 +/-0.000105	uCi/L						
Cerium-141			U	5.190E-05 +/-4.990E-05	uCi/L						
Cerium-144			U	0.000162 +/-0.000228	uCi/L						
Cesium-134			U	1.440E-05 +/-4.270E-05	uCi/L						
Cesium-136			U	2.510E-05 +/-7.640E-05	uCi/L						
Cesium-137	0.00188			0.00201 +/-0.000188	uCi/L		107	(75%-125%)			
Chromium-51			U	-0.000215 +/-0.000282	uCi/L						
Cobalt-56			U	-5.650E-06 +/-4.000E-05	uCi/L						
Cobalt-57				0.00107 +/-9.760E-05	uCi/L						
Cobalt-58			U	-1.500E-05 +/-4.020E-05	uCi/L						
Cobalt-60	0.00285			0.0031 +/-0.000305	uCi/L		109	(75%-125%)			
Europium-152			U	-2.710E-05 +/-0.000106	uCi/L						
Europium-154			U	3.720E-06 +/-8.720E-05	uCi/L						
Europium-155			U	4.940E-05 +/-0.000114	uCi/L						
Iridium-192			U	1.920E-05 +/-2.970E-05	uCi/L						

QC Summary

Workorder: **144814**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch 463088											
Iron-59			U	-6.090E-06 +/-9.250E-05	uCi/L						
Lead-210			U	-0.00609 +/-0.00756	uCi/L				MJH1	09/26/05	21:57
Lead-212			U	-3.060E-05 +/-5.550E-05	uCi/L						
Lead-214			U	-1.640E-05 +/-6.710E-05	uCi/L						
Manganese-54			U	1.670E-05 +/-3.750E-05	uCi/L						
Mercury-203				0.000309 +/-6.090E-05	uCi/L						
Neodymium-147			U	4.490E-05 +/-0.000344	uCi/L						
Neptunium-239			U	-0.000198 +/-0.000248	uCi/L						
Niobium-94			U	2.480E-05 +/-3.590E-05	uCi/L						
Niobium-95			U	-4.650E-06 +/-3.770E-05	uCi/L						
Potassium-40			U	1.850E-05 +/-0.000338	uCi/L						
Promethium-144			U	9.530E-07 +/-3.750E-05	uCi/L						
Promethium-146			U	2.790E-05 +/-4.550E-05	uCi/L						
Radium-228			U	0.000271 +/-0.000332	uCi/L						
Ruthenium-106			U	-2.080E-06 +/-0.00034	uCi/L						
Silver-110m			U	4.620E-05 +/-6.700E-05	uCi/L						
Sodium-22			U	1.510E-06 +/-3.110E-05	uCi/L						
Thallium-208			U	3.510E-05 +/-3.750E-05	uCi/L						
Thorium-230			U	-6.570E-06 +/-7.180E-05	uCi/L						
Thorium-234			U	-0.00148 +/-0.00193	uCi/L						
Tin-113				0.0015 +/-0.000138	uCi/L						
Uranium-235			U	6.060E-05 +/-0.000196	uCi/L						
Uranium-238			U	-0.00148 +/-0.00193	uCi/L						
Yttrium-88				0.00211 +/-0.000199	uCi/L						

QC Summary

Workorder: **144814**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch 463088											
Zinc-65			U	3.390E-05 +/-0.000114	uCi/L						
Zirconium-95			U	2.420E-05 +/-6.630E-05	uCi/L				MJH1	09/26/05	21:57
QC1200936878 MB											
Actinium-228			U	4.630E-06 +/-1.180E-05	uCi/L					09/26/05	21:01
Americium-241			U	4.330E-06 +/-1.620E-05	uCi/L						
Antimony-124			U	-1.180E-07 +/-4.680E-06	uCi/L						
Antimony-125			U	2.090E-06 +/-9.280E-06	uCi/L						
Barium-133			U	-2.730E-06 +/-4.200E-06	uCi/L						
Barium-140			U	-1.000E-05 +/-1.410E-05	uCi/L						
Beryllium-7			U	5.360E-06 +/-2.670E-05	uCi/L						
Bismuth-212			U	1.990E-05 +/-2.210E-05	uCi/L						
Bismuth-214			U	5.750E-06 +/-7.220E-06	uCi/L						
Cerium-139			U	1.360E-06 +/-2.950E-06	uCi/L						
Cerium-141			U	3.560E-06 +/-7.440E-06	uCi/L						
Cerium-144			U	-1.910E-05 +/-1.930E-05	uCi/L						
Cesium-134			U	-1.670E-06 +/-4.150E-06	uCi/L						
Cesium-136			U	7.050E-07 +/-5.930E-06	uCi/L						
Cesium-137			U	-1.830E-06 +/-2.800E-06	uCi/L						
Chromium-51			U	2.370E-05 +/-3.010E-05	uCi/L						
Cobalt-56			U	1.830E-06 +/-3.470E-06	uCi/L						
Cobalt-57			U	-2.300E-06 +/-2.230E-06	uCi/L						
Cobalt-58			U	-1.760E-06 +/-2.960E-06	uCi/L						
Cobalt-60			U	7.130E-06 +/-5.740E-06	uCi/L						
Europium-152			U	-2.670E-07 +/-8.610E-06	uCi/L						
Europium-154			U	1.380E-06	uCi/L						

QC Summary

Workorder: **144814**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch 463088											
				+/-8.210E-06							
Europium-155			U	4.590E-07 +/-9.340E-06	uCi/L				MJH1	09/26/05	21:01
Iridium-192			U	-3.260E-06 +/-3.420E-06	uCi/L						
Iron-59			U	1.660E-06 +/-6.370E-06	uCi/L						
Lead-210			U	7.280E-05 +/-0.000795	uCi/L						
Lead-212			U	2.460E-06 +/-5.750E-06	uCi/L						
Lead-214			U	1.280E-06 +/-6.800E-06	uCi/L						
Manganese-54			U	9.800E-07 +/-3.390E-06	uCi/L						
Mercury-203			U	-5.660E-07 +/-3.690E-06	uCi/L						
Neodymium-147			U	-1.740E-05 +/-2.920E-05	uCi/L						
Neptunium-239			U	-1.310E-05 +/-1.710E-05	uCi/L						
Niobium-94			U	-1.880E-07 +/-3.270E-06	uCi/L						
Niobium-95			U	1.350E-06 +/-3.390E-06	uCi/L						
Potassium-40			U	4.650E-05 +/-3.970E-05	uCi/L						
Promethium-144			U	-4.260E-07 +/-3.160E-06	uCi/L						
Promethium-146			U	-4.980E-07 +/-4.070E-06	uCi/L						
Radium-228			U	4.630E-06 +/-1.180E-05	uCi/L						
Ruthenium-106			U	-3.710E-06 +/-2.560E-05	uCi/L						
Silver-110m			U	8.720E-08 +/-2.650E-06	uCi/L						
Sodium-22			U	1.770E-07 +/-3.000E-06	uCi/L						
Thallium-208			U	2.490E-06 +/-5.520E-06	uCi/L						
Thorium-230			U	5.750E-06 +/-7.220E-06	uCi/L						
Thorium-234			U	0.000108 +/-0.000132	uCi/L						
Tin-113			U	-8.740E-10 +/-4.150E-06	uCi/L						

QC Summary

Workorder: **144814**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 463088										
Uranium-235			U	1.870E-05 +/-2.850E-05	uCi/L					
Uranium-238			U	0.000108 +/-0.000132	uCi/L				MJH1	09/26/05 21:01
Yttrium-88			U	3.000E-07 +/-3.200E-06	uCi/L					
Zinc-65			U	-2.280E-06 +/-6.800E-06	uCi/L					
Zirconium-95			U	4.340E-07 +/-4.970E-06	uCi/L					
QC1200936880 145401002 MS										
Actinium-228		U -4.150E-06 +/-1.060E-05	U	0.000174 +/-0.000804	uCi/L					09/26/05 21:54
Americium-241	0.00976	U 4.040E-07 +/-4.740E-06		0.0113 +/-0.00162	uCi/L		116			
Antimony-124		U 6.850E-06 +/-7.400E-06	U	9.760E-05 +/-0.000456	uCi/L					
Antimony-125		U 5.430E-08 +/-7.330E-06	U	0.000111 +/-0.000492	uCi/L					
Barium-133		U 1.480E-06 +/-3.560E-06	U	5.080E-06 +/-0.000188	uCi/L					
Barium-140		U -1.110E-05 +/-2.550E-05	U	-3.730E-05 +/-0.00156	uCi/L					
Beryllium-7		U 7.940E-06 +/-2.490E-05	U	-0.00141 +/-0.0018	uCi/L					
Bismuth-212		U 2.040E-05 +/-2.440E-05	U	-0.000392 +/-0.0014	uCi/L					
Bismuth-214		U 9.030E-06 +/-9.550E-06	U	0.000439 +/-0.0005	uCi/L					
Cerium-139		U -6.780E-07 +/-2.110E-06		0.00182 +/-0.000299	uCi/L					
Cerium-141		U 2.890E-06 +/-4.790E-06	U	-0.000204 +/-0.000316	uCi/L					
Cerium-144		U -3.040E-06 +/-1.440E-05	U	0.000268 +/-0.00112	uCi/L					
Cesium-134		U 1.300E-06 +/-3.060E-06	U	-0.00016 +/-0.000206	uCi/L					
Cesium-136		U -3.990E-06 +/-1.020E-05	U	0.000281 +/-0.000626	uCi/L					
Cesium-137	0.00376	U 3.260E-06 +/-5.430E-06		0.00373 +/-0.000643	uCi/L		99			
Chromium-51		U 9.030E-06 +/-3.230E-05	U	-0.000251 +/-0.00214	uCi/L					
Cobalt-56		U 5.520E-06 +/-3.070E-06	U	-1.240E-05 +/-0.000249	uCi/L					
Cobalt-57		U -2.130E-07 +/-1.900E-06		0.00207 +/-0.000278	uCi/L					
Cobalt-58		U -1.150E-06	U	-4.580E-05	uCi/L					

QC Summary

Workorder: **144814**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch 463088											
		+/-2.910E-06		+/-0.000213							
Cobalt-60	0.00572	U 7.180E-06		0.00602	uCi/L		105		MJH1	09/26/05	21:54
		+/-9.940E-06		+/-0.000744							
Europium-152		U 2.580E-07	U	-6.180E-05	uCi/L						
		+/-7.770E-06		+/-0.000425							
Europium-154		U -1.470E-07	U	-0.000318	uCi/L						
		+/-5.190E-06		+/-0.000431							
Europium-155		U -6.430E-06	U	-0.000244	uCi/L						
		+/-7.770E-06		+/-0.000537							
Iridium-192		U 1.220E-06	U	2.230E-05	uCi/L						
		+/-2.670E-06		+/-0.000166							
Iron-59		U 5.680E-06	U	-0.000299	uCi/L						
		+/-6.240E-06		+/-0.000459							
Lead-210		U 3.980E-05	U	0.00549	uCi/L						
		+/-7.500E-05		+/-0.014							
Lead-212		U 3.190E-06	U	8.400E-05	uCi/L						
		+/-4.610E-06		+/-0.00034							
Lead-214		U 4.450E-06	U	0.000423	uCi/L						
		+/-5.820E-06		+/-0.000358							
Manganese-54		U -1.350E-06	U	4.140E-06	uCi/L						
		+/-2.860E-06		+/-0.0002							
Mercury-203		U -5.240E-08		0.00121	uCi/L						
		+/-3.100E-06		+/-0.000267							
Neodymium-147		U -3.880E-05	U	0.000663	uCi/L						
		+/-5.210E-05		+/-0.0035							
Neptunium-239		U 4.530E-06	U	0.000175	uCi/L						
		+/-1.570E-05		+/-0.000969							
Niobium-94		U 9.640E-07	U	-2.140E-05	uCi/L						
		+/-3.000E-06		+/-0.000176							
Niobium-95		U 9.180E-07	U	-2.640E-05	uCi/L						
		+/-3.620E-06		+/-0.000263							
Potassium-40		UUI 0.00	U	-0.000597	uCi/L						
		+/-5.890E-05		+/-0.00163							
Promethium-144		U -8.570E-08	U	0.000142	uCi/L						
		+/-3.110E-06		+/-0.000194							
Promethium-146		U 3.390E-06	U	-0.000107	uCi/L						
		+/-3.650E-06		+/-0.000214							
Radium-228		U -4.150E-06	U	0.000174	uCi/L						
		+/-1.060E-05		+/-0.000804							
Ruthenium-106		U -1.540E-06	U	-0.00148	uCi/L						
		+/-2.560E-05		+/-0.00177							
Silver-110m		U -4.470E-08	U	0.000151	uCi/L						
		+/-2.700E-06		+/-0.000251							
Sodium-22		U -5.290E-08	U	-0.000115	uCi/L						
		+/-1.860E-06		+/-0.000154							
Thallium-208		U 2.080E-06	U	0.000106	uCi/L						
		+/-3.050E-06		+/-0.000251							

QC Summary

Workorder: **144814**

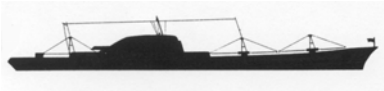
Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch 463088											
Thorium-230		U 9.030E-06 ±/-9.550E-06	U	0.000439 +/-0.0005	uCi/L						
Thorium-234		UUI 0.00 ±/-6.030E-05	U	-0.00351 +/-0.00739	uCi/L				MJH1	09/26/05	21:54
Tin-113		U -3.190E-07 ±/-3.410E-06		0.00295 +/-0.000622	uCi/L						
Uranium-235		U 1.450E-05 ±/-1.630E-05	U	0.000321 +/-0.000949	uCi/L						
Uranium-238		UUI 0.00 ±/-6.030E-05	U	-0.00351 +/-0.00739	uCi/L						
Yttrium-88		U -3.320E-08 ±/-3.860E-06		0.00531 +/-0.000749	uCi/L						
Zinc-65		U 2.190E-06 ±/-5.760E-06	U	-0.00049 +/-0.00048	uCi/L						
Zirconium-95		U -3.950E-06 ±/-6.260E-06	U	0.000231 +/-0.000322	uCi/L						

Notes:
The Qualifiers in this report are defined as follows:

- ** Indicates the analyte is a surrogate compound.
- B Target analyte was detected in the sample as well as the associated blank.
- BD Results below the MDC or low tracer recovery.
- E Concentration of the target analyte exceeds the instrument calibration range.
- H Analytical holding time exceeded.
- J Indicates an estimated value.
- U Target analyte was analyzed for but not detected above the MDL or LOD.
- UI Uncertain identification for gamma spectroscopy.
- X Lab-specific qualifier-please see case narrative, data summary package or contact your project manager for details.
- d The 2:1 depletion requirement was not met for this sample
- h Sample preparation or preservation holding time exceeded.

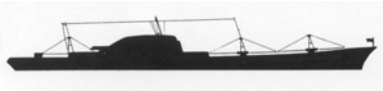
N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.



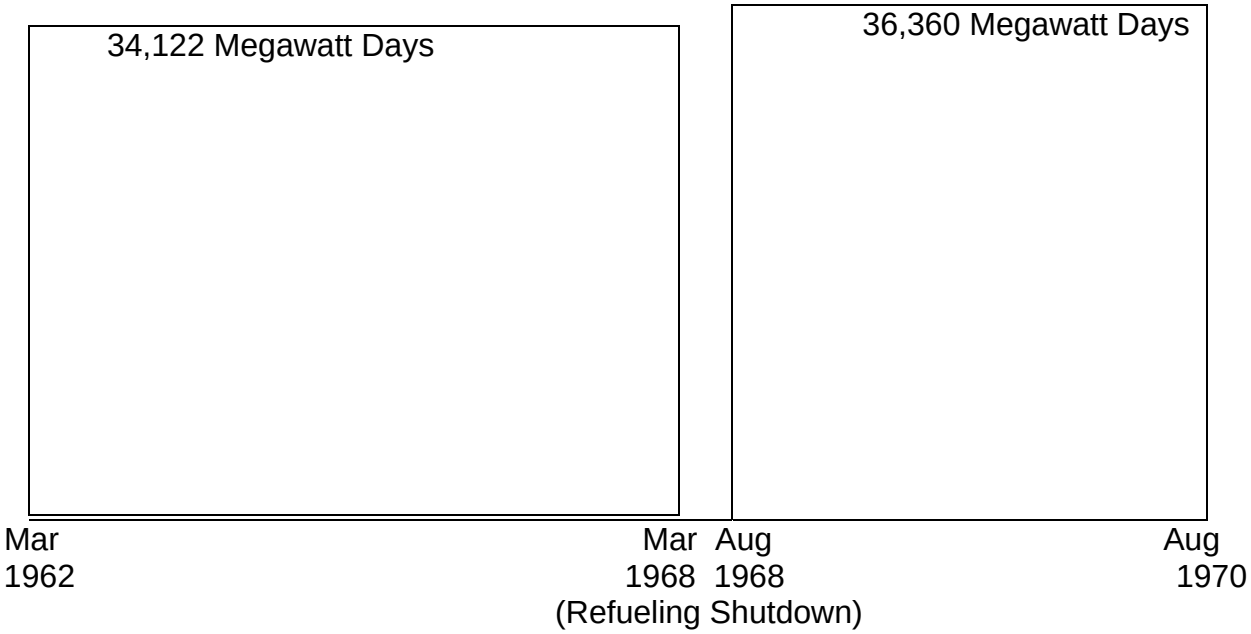
APPENDIX B

Explanation and Certification of Data Anomalies



APPENDIX C

Reactor Power Profile & History Documentation



The following pages provide voyage history documentation and representative reactor power profiles for the NS SAVANNAH. The reactor plant operated from 1962 to 1970 at an average plant capacity factor of 30% resulting in 2.423 years of effective full power operation.

N. S. SAVANNAH

TABLE OF DISTANCES SINCE LAUNCHING

DATES	PASSAGE	DISTANCE	VOYAGE DISTANCE	GRAND TOTAL
	States Marine Lines			
1962				
Jan. 31 - Feb. 2	Camden to Yorktown	320	320	320
Mar. 23 - Mar. 25	Sea Trial # 1	790	1110	1110
Apr. 3 - Apr. 6	Sea Trial # 2	1219	2329	2329
Apr. 13	Sea Trial # 3	122	2451	2451
Apr. 24 - Apr. 26	Sea Trial # 4	807	3258	3258
May 20 - May 26	Sea Trial # 5	2805	6063	6063
June 11 - June 12	Sea Trial # 6	496	6559	6559
June 18	Demonstration Run # 1	50	6609	6609
June 21	Demonstration Run # 2	103	6712	6712
June 21 - June 24	Sea Trial # 7	1326	8038	8038
June 26 - June 27	Demonstration Run # 3	527	8565	8565
July 28 - July 29	Demonstration Run # 4	344	8909	8909
	Voyage # 1			
Aug. 20 - Aug. 22	Yorktown to Savannah	698	698	9607
Aug. 28 - Aug. 30	Savannah to Norfolk	804	1502	10411
Sept. 12 - Sept. 13	Sea Trial	177	1679	10588
Sept. 13 - Sept. 18	Norfolk to Cristobal	1972	3651	12560
Sept. 18	Cristobal to Balboa	55	3706	12615
Sept. 18 - Oct. 1	Balboa to Seattle	4241	7947	16856
Oct. 18	Demonstration Run	85	8032	16941
Nov. 10 - Nov. 11	Sea Trial	321	8353	17262
Nov. 13 - Nov. 15	Sea Trial	604	8957	17866
Nov. 16 - Nov. 18	Seattle to San Francisco	875	9832	18741
Nov. 26 - Nov. 27	San Francisco to Long Beach	379	10211	19120
Nov. 29	Demonstration Run	81	10292	19201
Dec. 11	Long Beach to Los Angeles	9	10301	19210
Dec. 17 - Dec. 22	Los Angeles to Honolulu	2316	12617	21526
Dec. 28 - 1963 Jan. 4	Honolulu to Portland, Ore.	2670	15287	24196
Jan. 10 - Jan. 12	Portland to San Francisco	700	15987	24896
Jan. 12 - Jan. 14	San Francisco to San Diego	629	16616	25525
Jan. 22 - Jan. 28	San Diego to Balboa	2891	19507	28415
Jan. 31	Demonstration Run	67	19574	28483
Feb. 1	Balboa to Cristobal	-54	19620	28537
Feb. 1 - Feb. 5	Cristobal to Galveston	1539	21167	30076
May 1 - May 3	Sea Trial	646	21813	30722
	American Export - Isbrandtsen Lines			
1964				
Feb. 21 - Feb. 23	Sea Trial # 1	510	510	31232
Feb. 29 - Mar. 8	Sea Trial # 2	2576	3086	33808
Mar. 16 - Mar. 17	Sea Trial # 3	337	3423	34146
Mar. 24 - Mar. 25	Sea Trial # 4	346	3769	34491
Apr. 16 - Apr. 17	Sea Trial # 5	369	4138	34860
	U.S. Maritime Administration			
Apr. 28 - Apr. 29	Sea Trial	349	349	35209

Distances are those actually steamed dock to dock.

DATES	PASSAGE	DISTANCE	DISTANCE	TOTAL
	American Export - Isbrandtsen Lines			
1964	Voyage # 1 - Coastwise			
May 5	Galveston to Houston	51	51	35200
May 11 - May 14	Houston to New Orleans	1336	1387	36586
May 17 - May 20	New Orleans to Baltimore	1674	3061	38[illegible]
May 24 - May 26	Baltimore to Boston	688	3749	39[illegible]
May 31 - June 2	Boston to New York	398	4147	39[illegible]
	Voyage # 1 - Foreign			
June 8 - June 18	New York to Bremerhaven	4031	4031	43387
June 22	Demonstration Run	44	4075	43431
June 23	Bremerhaven to Hamburg	123	4198	43554
June 29 - July 2	Hamburg to Dublin	1050	5248	44604
July 6 - July 7	Dublin to Southampton	460	5708	45064
July 9	Demonstration Run	47	5755	45111
July 12 - July 20	Southampton to New York	3575	9330	48686
	Voyage # 2 - Foreign			
July 30 - July 31	New York to Providence	195	196	49882
Aug. 4 - Aug. 5	Providence to Portland, Me.	335	533	49217
Aug. 9 - Aug. 18	Portland to Oslo	3589	4120	52[illegible]
Aug. 24 - Aug. 25	Oslo to Copenhagen	303	4423	53109
Aug. 27	Demonstration Run	44	4467	53153
Sept. 1	Copenhagen to Helsingborg	28	4495	53181
Sept. 4	Helsingborg to Malmo	44	4539	53225
Sept. 8 - Sept. 17	Malmo to New York	4394	8933	57619
	Voyage # 3 - Foreign			
Sept. 21 - Sept. 30	New York to Rotterdam	3488	3488	61107
Oct. 6	Rotterdam to Antwerp	144	3632	61251
Oct. 12 - Oct. 13	Antwerp to Le Havre	261	3893	61512
Oct. 14	Demonstration Run	52	3945	61564
Oct. 18 - Oct. 26	Le Havre to New York	3565	7510	65127
	Voyage # 4 - Foreign			
Nov. 3 - Nov. 4	New York to Philadelphia	240	240	65369
Nov. 8 - Nov. 17	Philadelphia to Lisbon	3485	3725	69094
Nov. 19	Demonstration Run	55	3780	69149
Nov. 23 - Nov. 25	Lisbon to Barcelona	832	4612	69981
Nov. 26	Demonstration Run	49	4661	69030
Nov. 30 - Dec. 2	Barcelona to Naples	663	5324	70513
Dec. 4	Demonstration Run	59	5383	70513
Dec. 7 - Dec. 17	Naples to New York	4674	10057	75174
	Voyage # 5 - Foreign			
Dec. 19	New York Shift	3	3	75193
Dec. 21 - Dec. 23	New York to Wilmington	588	591	75[illegible]
Dec. 29 - Dec. 30	Wilmington to Charleston	247	838	76[illegible]
1965				
Jan. 3 - Jan. 4	Charleston to Jacksonville	202	1040	76[illegible]
Jan. 12 - Jan. 13	Jacksonville to Trial Run	90	1130	76[illegible]
Jan. 14 - Jan. 17	Jacksonville to San Juan	1239	2369	77[illegible]
Jan. 21 - Feb. 2	San Juan to Piraeus	5048	7417	82[illegible]
Feb. 3	Piraeus Demonstration Run	64	7481	82[illegible]
Feb. 7 - Feb. 18	Piraeus to New York	4942	12423	87[illegible]

AMERICAN EXPORT ISBRANDTSEN LINES
N/S SAVANNAH-VOY. #6 C/W

DATES	PASSAGE	DISTANCE	VOYAGE DISTANCE	GRAND TOTAL
Feb.23 - Feb.25	Hoboken to Port Everglades	965	965	88,574
Mar. 3 - Mar. 5	Port Everglades to Mobile	776	1,741	89,350
Mar. 9 - Mar.10	Mobile to Galveston	467	2,208	89,817
Mar.15	Shift to Todd Shipyard	1	2,209	89,818

N.S. SAVANNAH
PORT DEMONSTRATION VISITS
1962 - 1965

Port	Visitors Aboard	Date of Visit
States Marine Operation		
Yorktown	4,613*	2-1 to 8-20-62
Savannah	38,268	8-22 to 8-28
Norfolk	18,394	8-30 to 9-4
Panama Canal	134	9-18
Seattle	55,999	10-1 to 10-21
San Francisco	39,957	11-18 to 11-26
Long Beach	25,867	11-27 to 12-10
Los Angeles	16,494	12-11 to 12-17
Honolulu	21,581	12-22 to 12-28
Portland	34,915	1-4 to 1-10-63
San Diego	42,378	1-14 to 1-22
Balboa, C.Z.	8,292	1-29 to 1-31
Galveston	37,736	2-5-63 to 5-17-63
Subtotal	344,628	
AEIL Operation		
Galveston	7,342	3-21-64 to 5-4-64
Houston	40,894	5-5 to 5-10
New Orleans	14,883	5-14 to 5-16
Baltimore	28,792	5-20 to 5-24
Boston	21,286	5-26 to 6-1
New York	36,030	6-1 to 6-8
Bremerhaven	30,390	6-18 to 6-23
Hamburg	49,919	6-23 to 6-29
Dublin	40,585	7-2 to 7-6
Southampton	32,742	7-7 to 7-12
Hoboken	33,001	7-20 to 7-30
Providence	38,871	7-31 to 8-4
Portland	33,066	8-5 to 8-9
Oslo	30,874	8-18 to 8-24
Copenhagen	44,956	8-25 to 9-1
Hälsingborg	22,964	9-1 to 9-4
Malmö	30,401	9-4 to 9-8
New York	3,106	9-17 to 9-22
Rotterdam	50,929	9-30 to 10-6
Antwerp	50,578	10-6 to 10-12
LeHavre	11,090	10-13 to 10-19
Brooklyn	38,842	10-26 to 11-3
Philadelphia	42,575	11-4 to 11-8
Lisbon	35,389	11-17 to 11-23
Barcelona	25,454	11-25 to 12-1
Naples	22,616	12-2 to 12-8
New York	219	12-18 to 12-22
Wilmington	13,919	12-23 to 12-29
Charleston	17,195	12-30 to 1-3-65
Jacksonville	47,460	1-4 to 1-14
San Juan, P.R.	15,381	1-17 to 1-21
Piraeus-Athens	38,976	2-2 to 2-7
Hoboken	258	2-18 to 2-23
Pt. Everglades	48,535	2-25 to 3-3
Mobile	18,597	3-5 to 3-9
Galveston	27,037	3-10 to 8-20-65
Subtotal	1,045,152	

Total Visitors All Ports - 1,389,780

*Includes Demonstration Run Passengers.

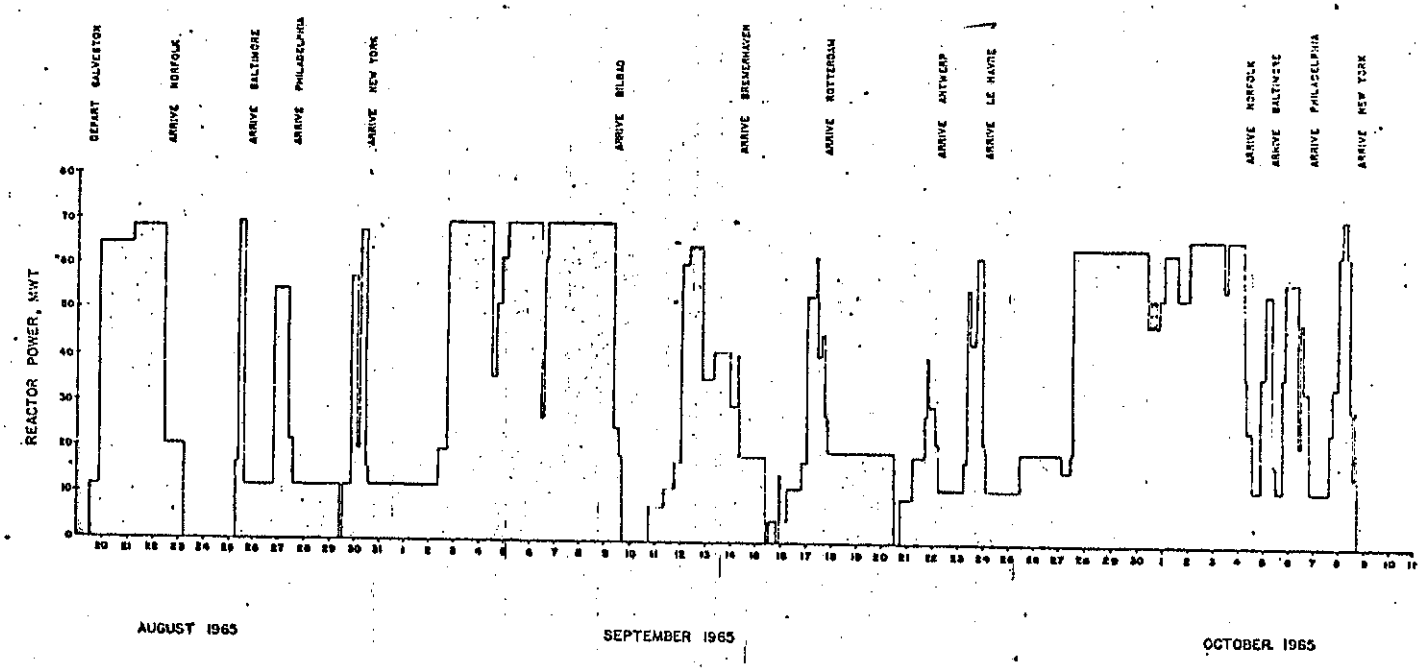


FIGURE 2.1 POWER HISTORY (VOYAGE I)

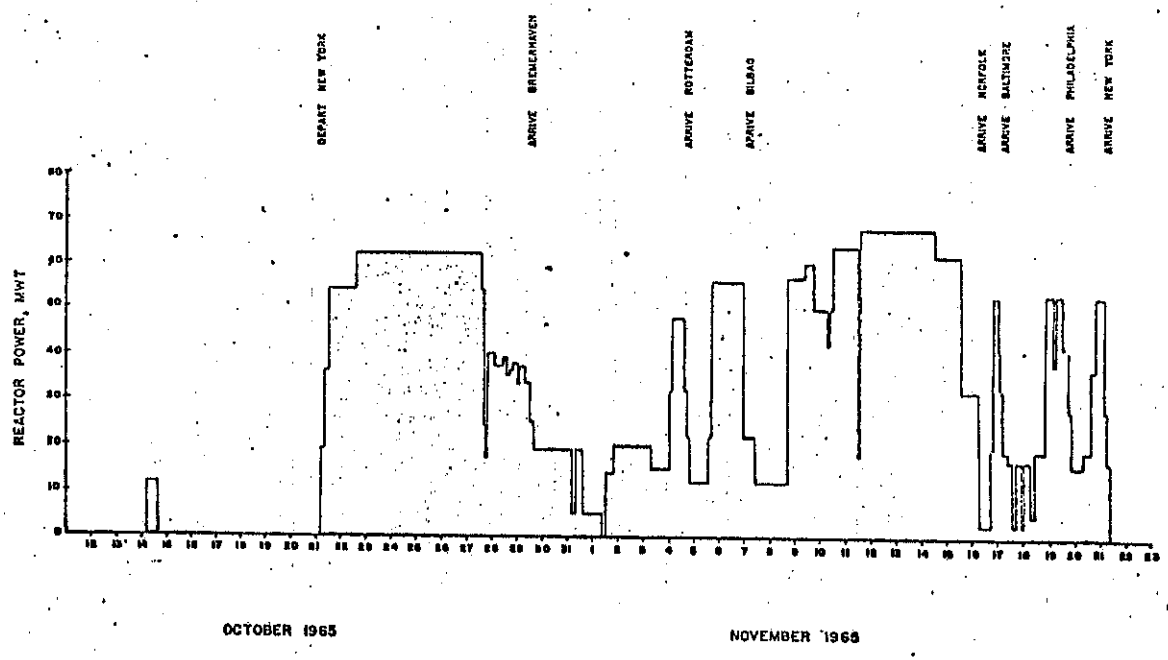


FIGURE 2.2 POWER HISTORY (VOYAGE 2)

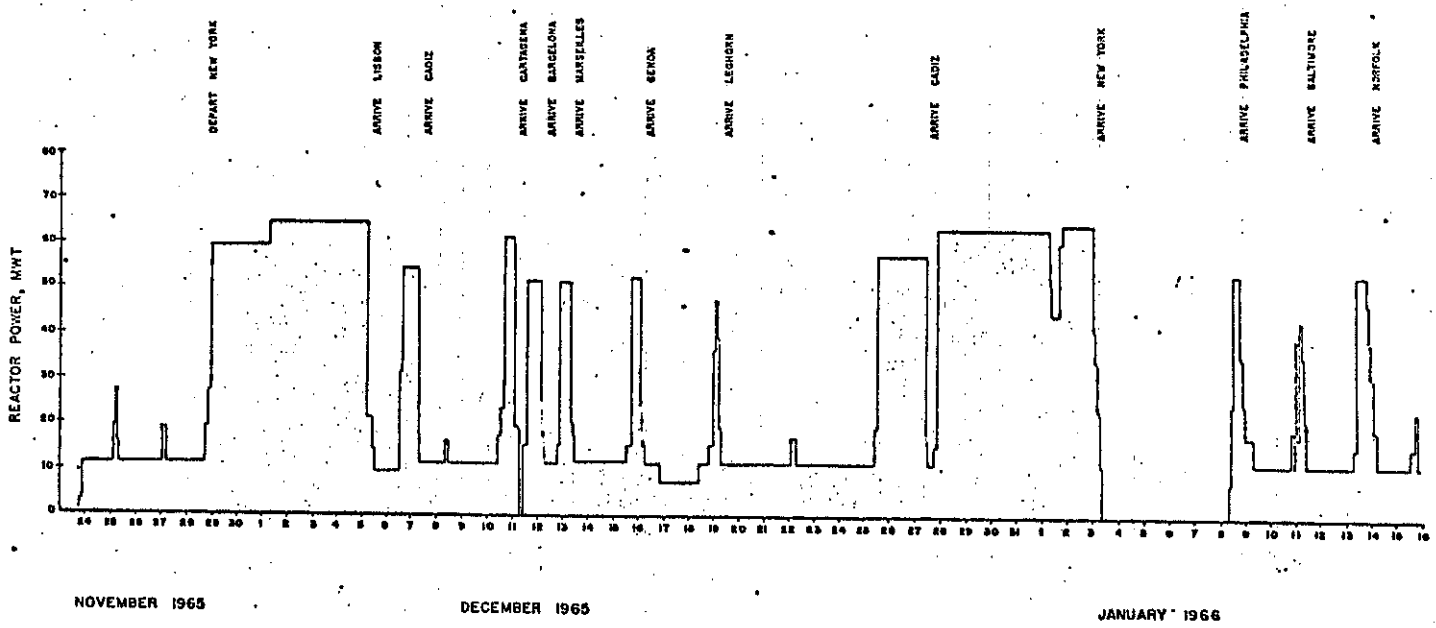


FIGURE 2.3 POWER HISTORY (VOYAGE 3)

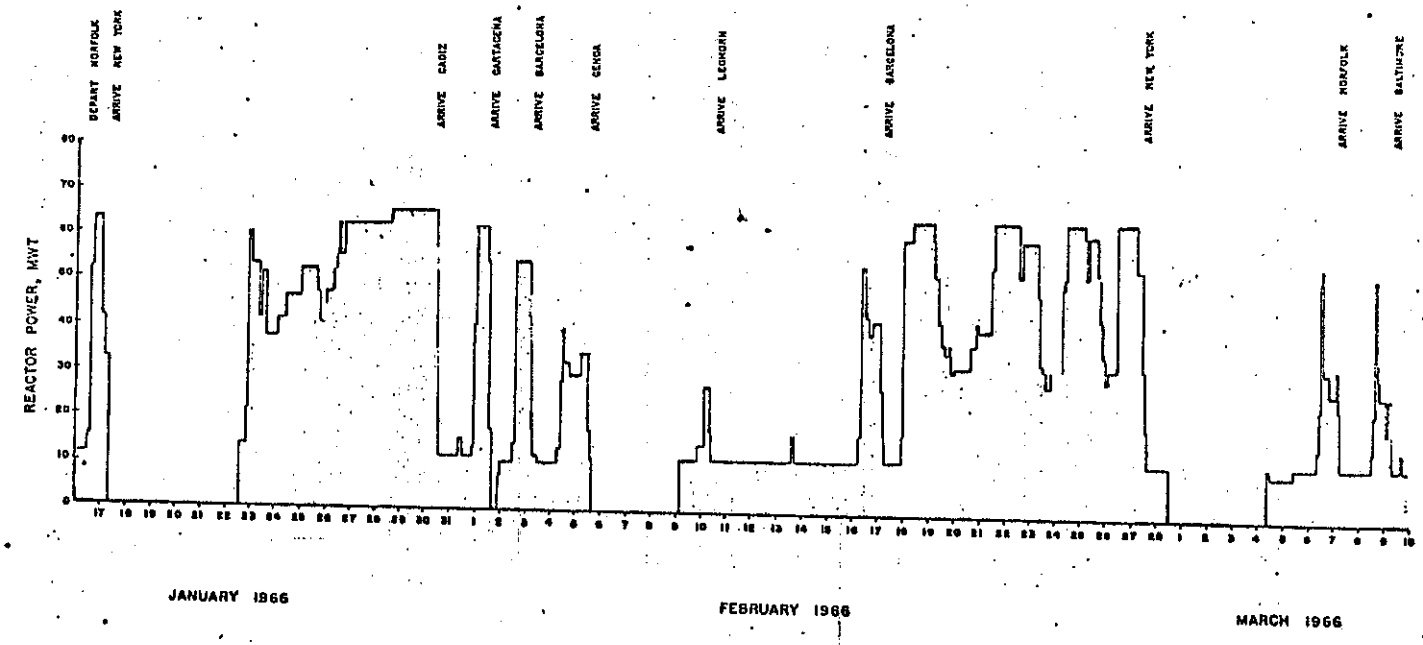


FIGURE 2.4 POWER HISTORY (VOYAGE 4)

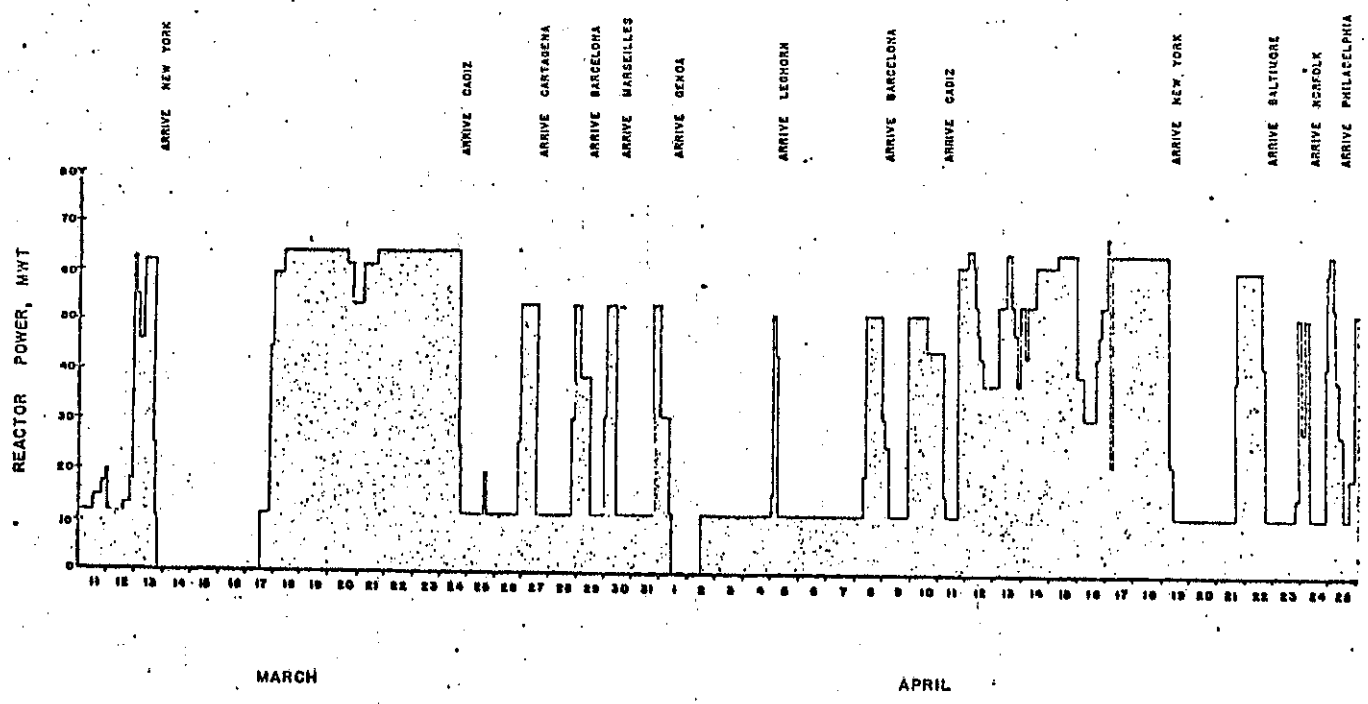


FIGURE 2.1 POWER HISTORY (VOYAGE 5)

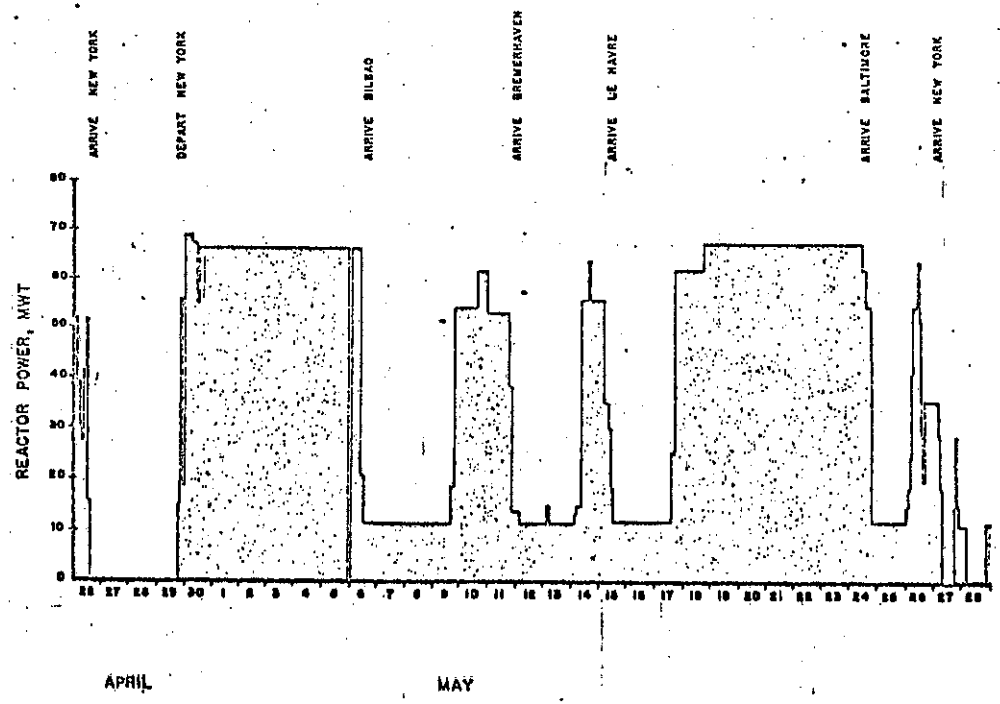


FIGURE 2.2 POWER HISTORY (VOYAGE 6)

1964

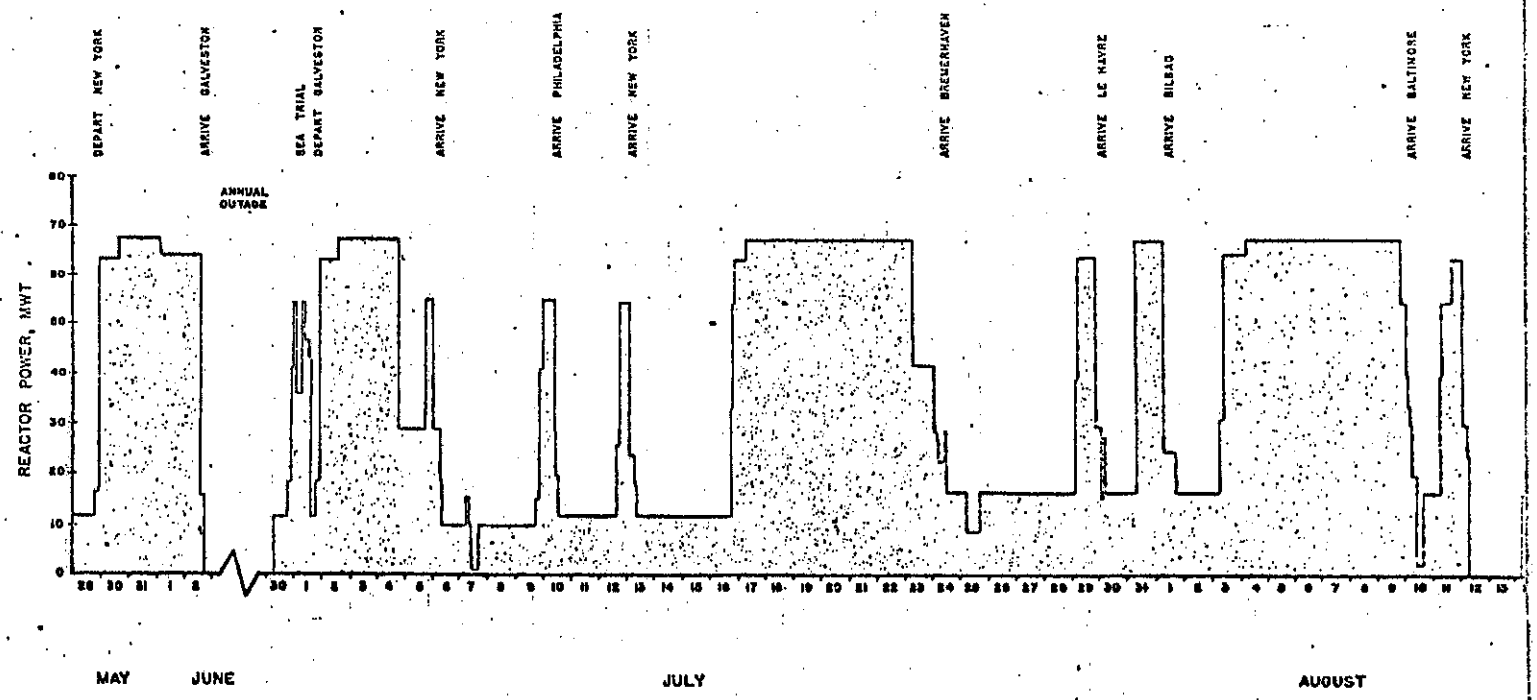


FIGURE 2.3 POWER HISTORY (VOYAGE 7)

1966

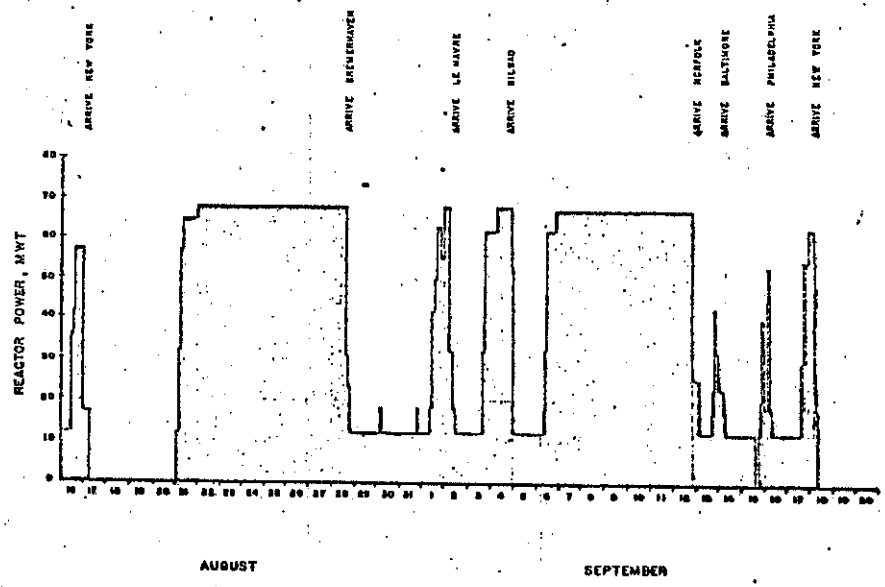


FIGURE 2.1 POWER HISTORY (VOYAGE 8)

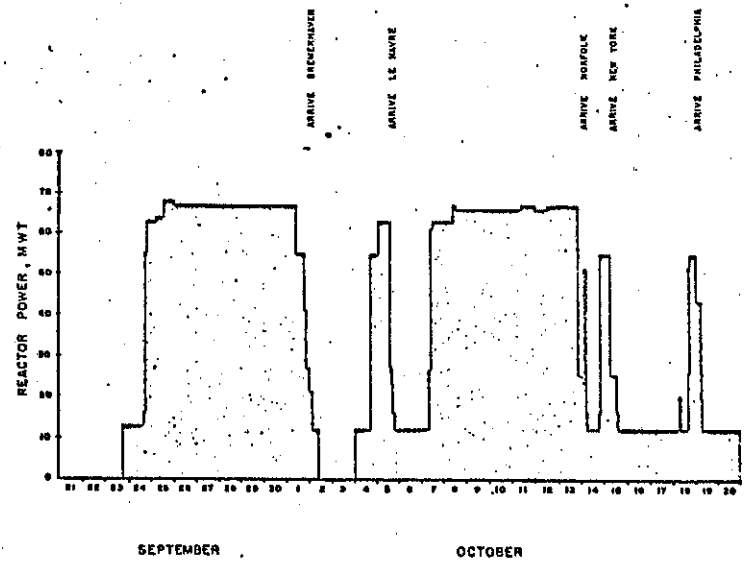


FIGURE 2.2 POWER HISTORY (VOYAGE 9)

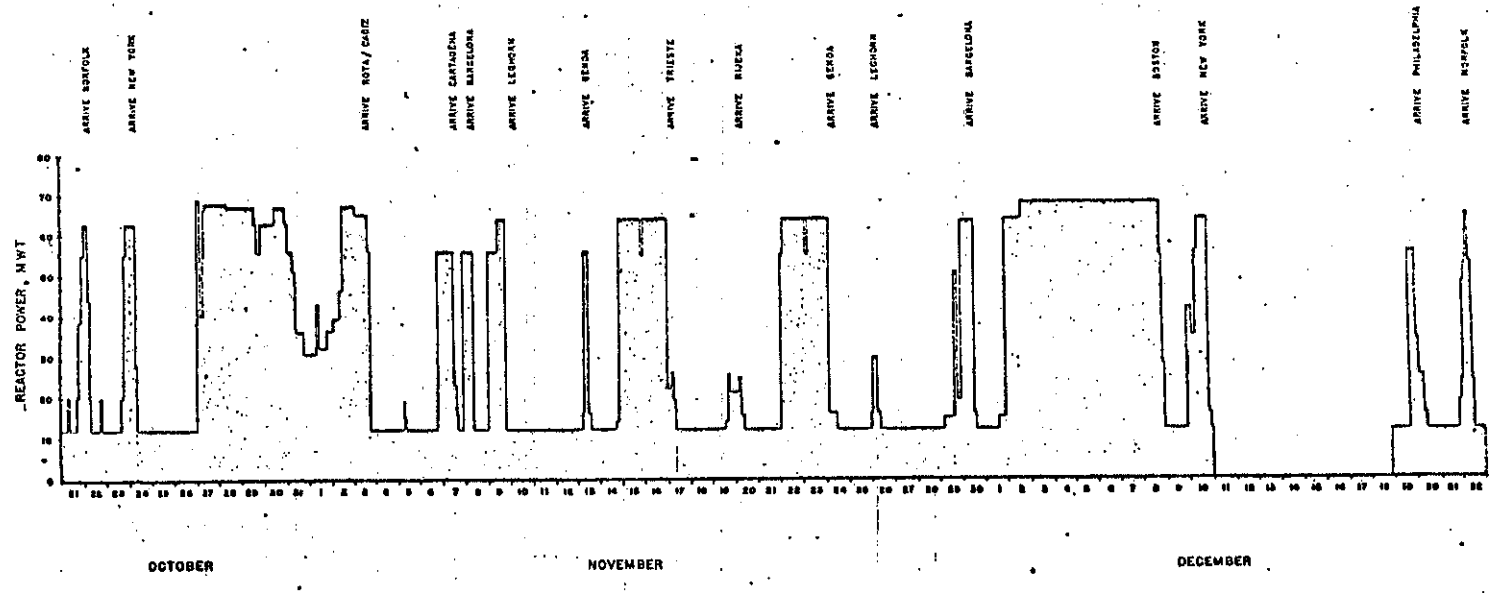


FIGURE 2.3 POWER HISTORY (VOYAGE 10)

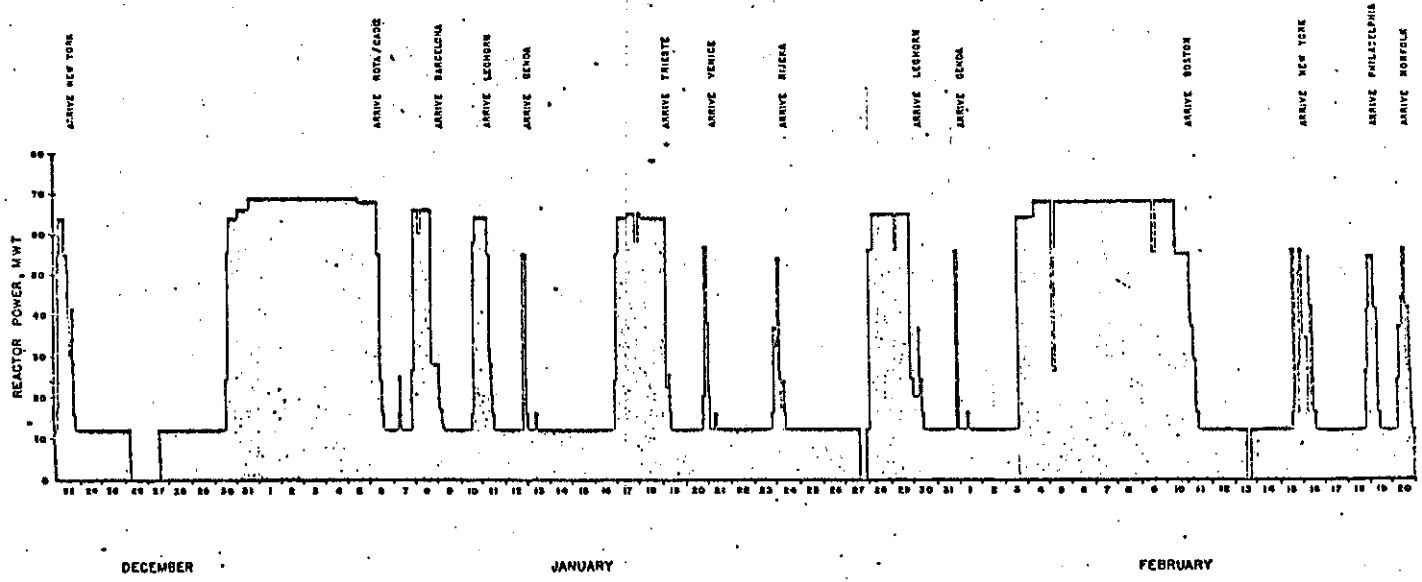


FIGURE 2.4 POWER HISTORY (VOYAGE 11)

1967

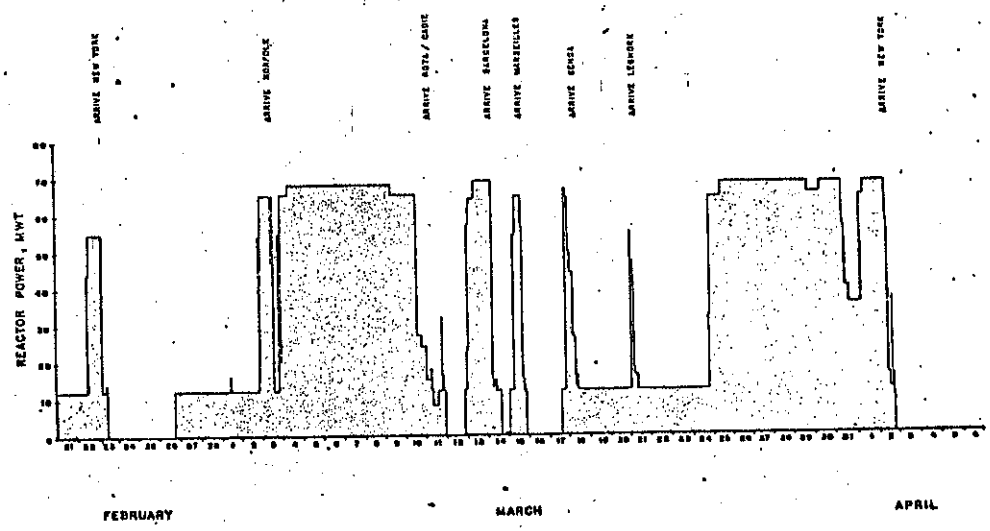


FIGURE 2.1 POWER HISTORY (VOYAGE 12)

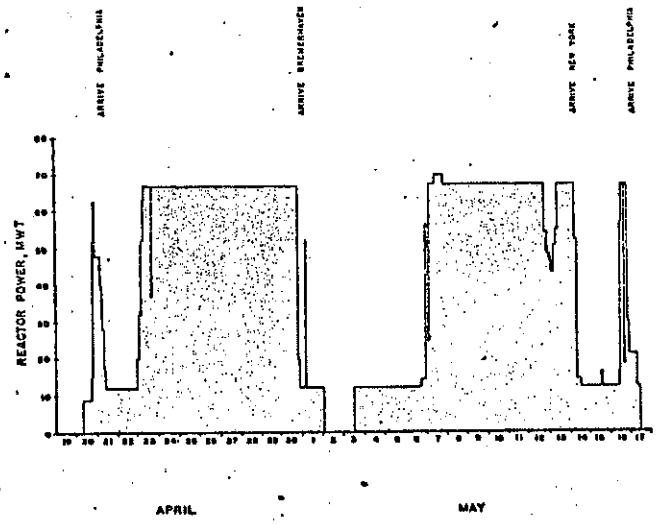
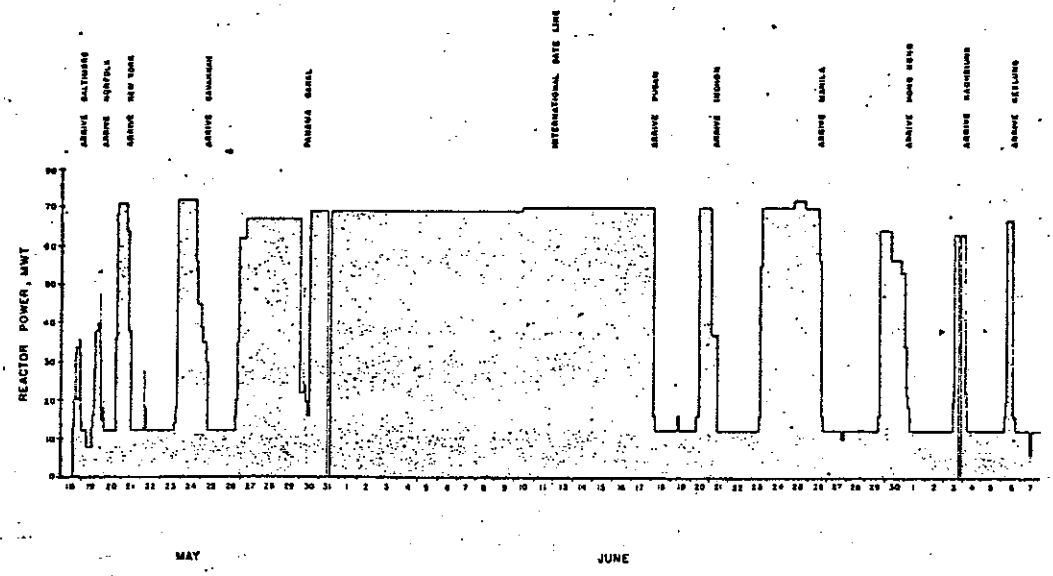


FIGURE 2.2 POWER HISTORY (VOYAGE 13)



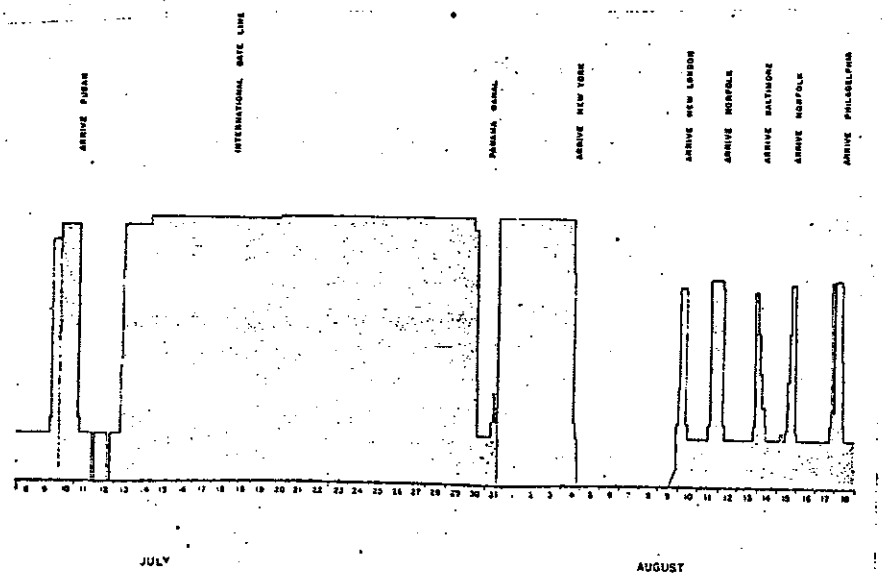


FIGURE 2.3 POWER HISTORY (VOYAGE 14)

67

1967

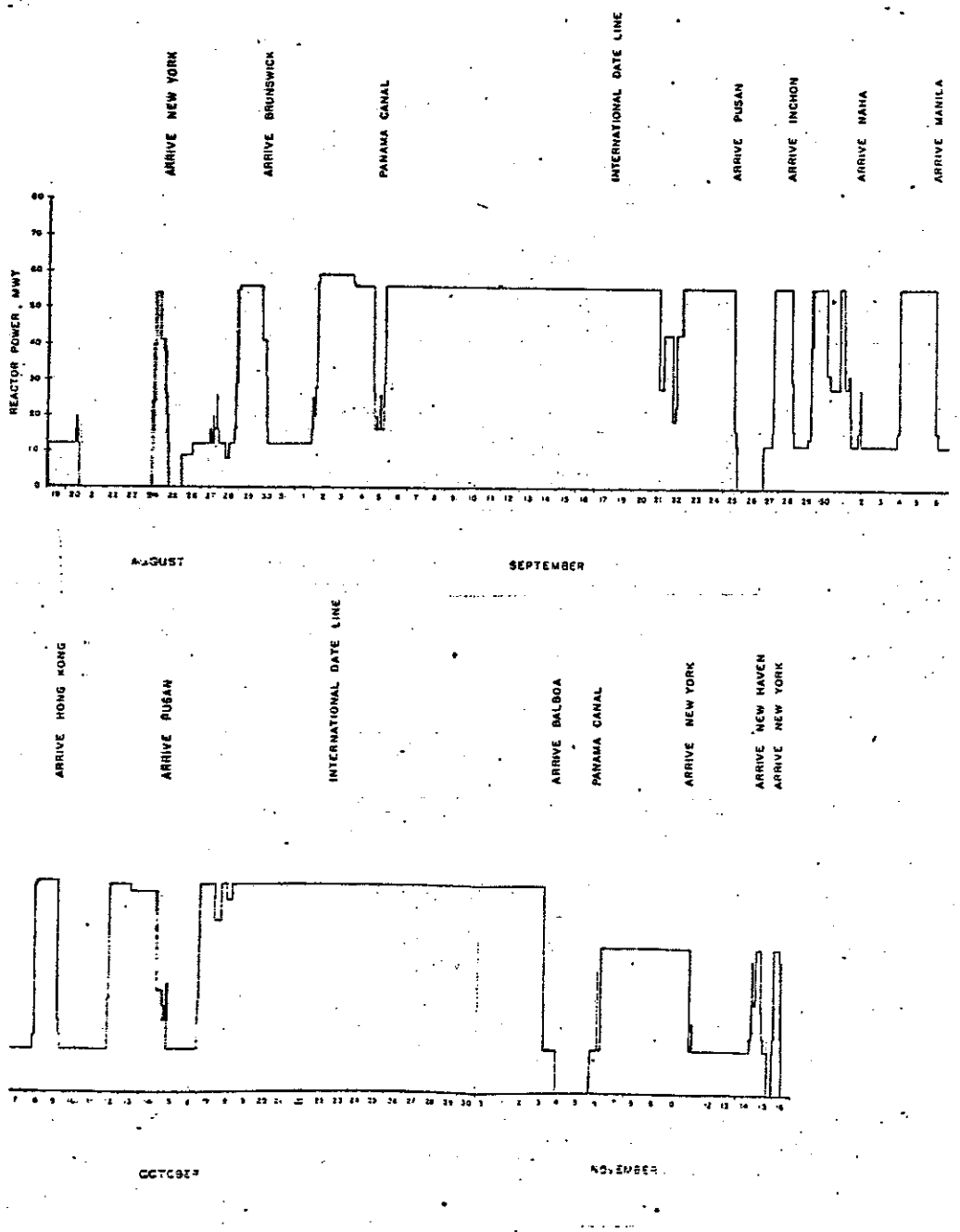


FIGURE 2.1 POWER HISTORY (VOYAGE 15)

1967

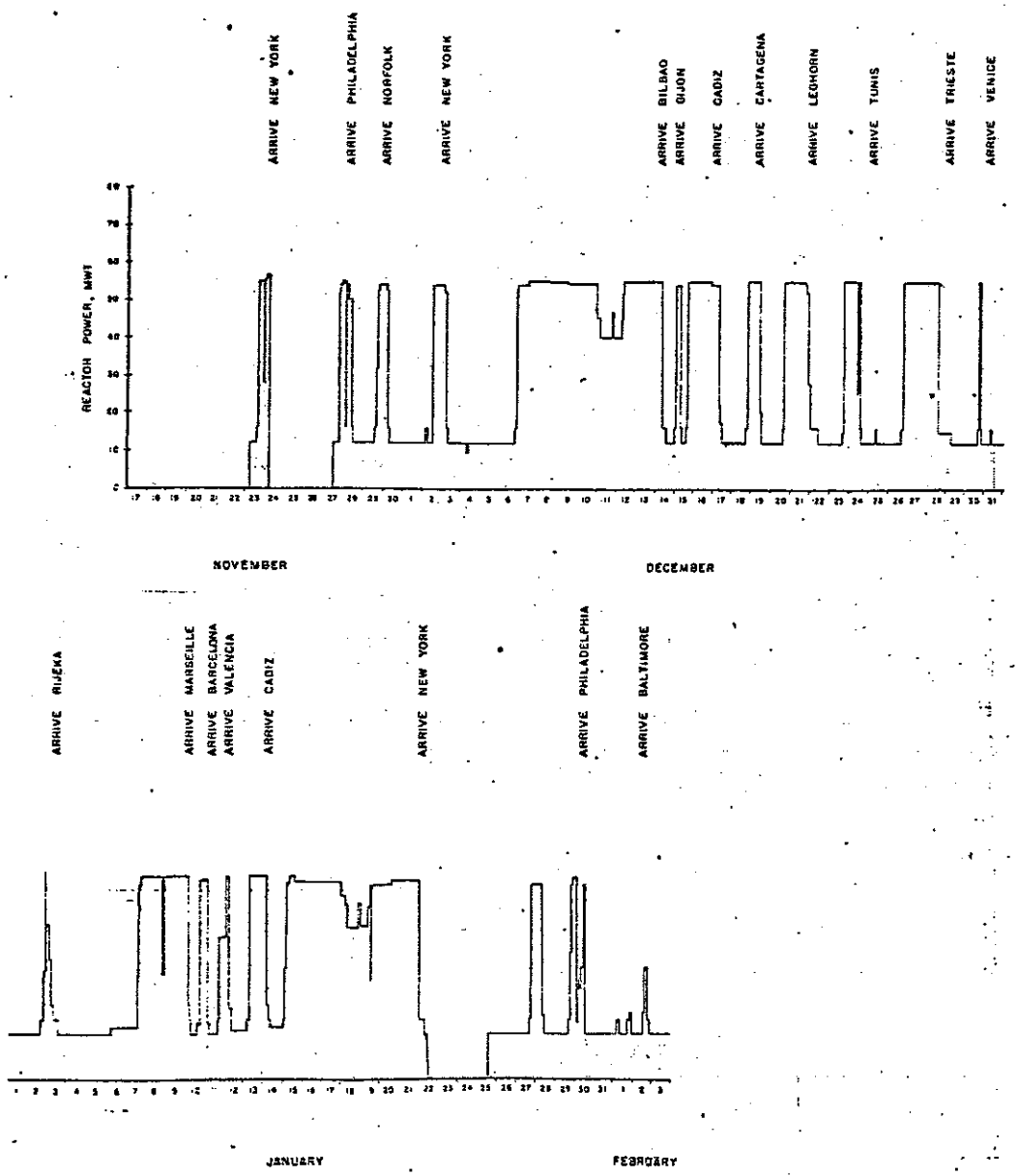


FIGURE 2.2 POWER HISTORY (VOYAGE 16)

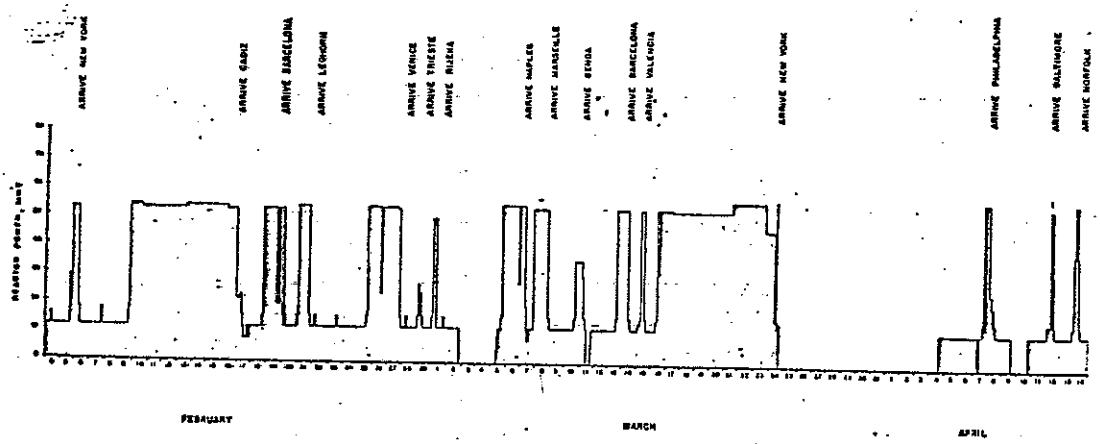


FIGURE 2.1 POWER HISTORY (VOYAGE 17)

1968

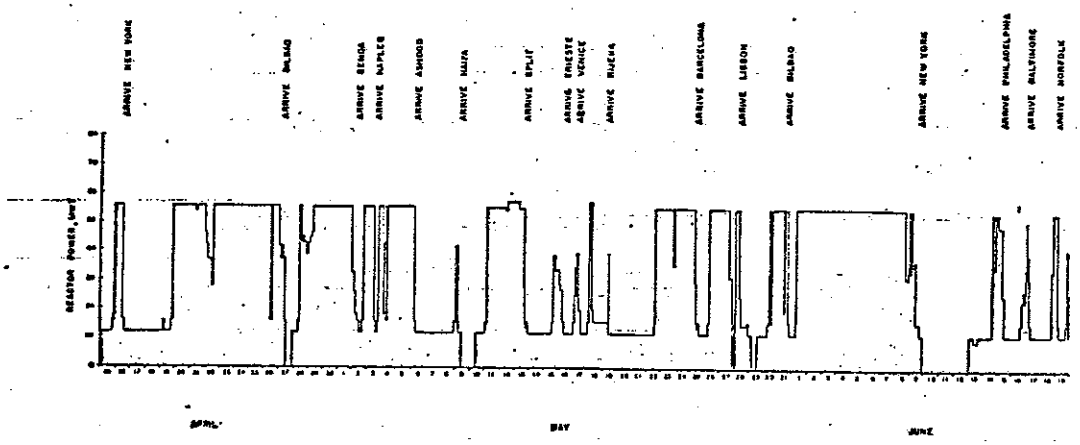


FIGURE 2.2 POWER HISTORY (VOYAGE 18)

1968

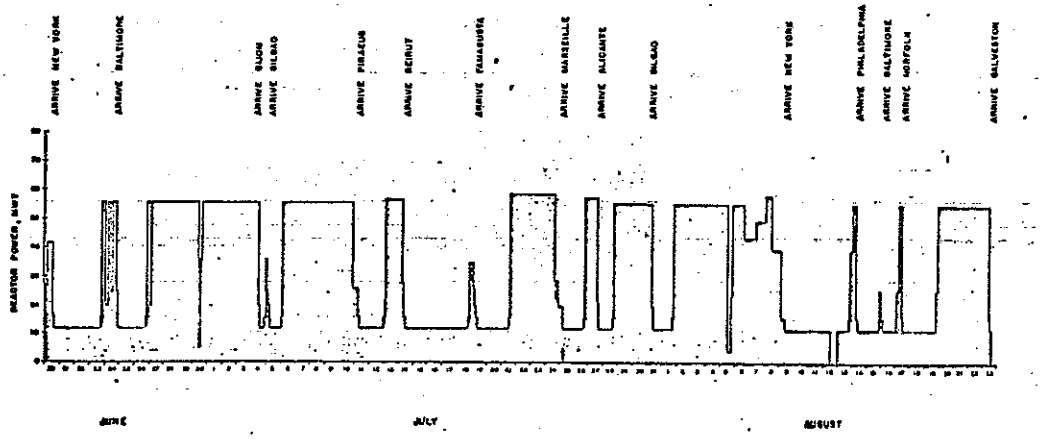
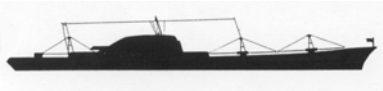


FIGURE 2.3 POWER HISTORY (VOYAGE 19)

1968



APPENDIX D

ORIGEN ARP Code Description & Inputs

ORIGEN-ARP performs isotopic activation and depletion/decay calculations for pressurized and boiling water reactors. Oak Ridge National Laboratory developed ORIGEN-ARP (and its predecessors) for the Nuclear Regulatory Commission and the Department of Energy to satisfy the need for a standardized method of isotope depletion/decay analysis of spent fuel, fissile material and radioactive material. It can be used for spent fuel characterization, isotopic inventory, radiation source terms and decay heat.

Reactor type: Pressurized Water
Peak Power: 80 MWt (megawatts thermal)
Fuel Enrichment: 4.4% (Uranium-235)
Fuel Load: 7.1MTU (metric tons of uranium)
Fuel Power/MTU (based on 2.423 years of effective full power operation)
Fuel Composition (computed by ORIGEN based on fuel load & enrichment):

Fuel	grams*
U-234	2780
U-235	312400
U-236	1437
U-238	6787500

RPV/Internals**	grams*
Co (cobalt)	5144
Fe (iron)	2575804
Ni (nickel)	364668
Nb (niobium)	329
N (nitrogen)**	1641

* ORIGEN requires fuel and reactor component weights in grams.
** Quantities refer to naturally occurring elements that are inputted to ORIGEN based on material composition of stainless steel and carbon steel shown in Table D.1.
******* Nitrogen is included because Carbon-14 is produced by neutron irradiation of nitrogen – a trace element found in stainless steel and carbon steel.

Decay time from reactor shutdown: 38 years (inputted to ORIGEN) based on the assumption that October 2008 would be the earliest realistic date for reactor pressure vessel disposal.

Component volumes from which Curie concentrations (Ci/m^3) were calculated are shown in Table D.2.

A power profile was derived from manual integration of the ship's log data. The documented total power of 2.423 full power years of operation was distributed over the eight year operating period of NSS resulting in a plant capacity factor of 30.3%. The power profile was split into two irradiation segments (shown in Figure C.1) separated by a 158 day shutdown (decay period) from March 1968 to August 1968. A final decay period of 38 years was used, corresponding to October 2008 as the projected date for burial of the Reactor Pressure Vessel with internals.

The power profile input to ORIGEN includes the following:

Basis: 7.1 MTU

- Irradiation (Case Data #1&2 on ORIGEN menu)
  Power (MW/Basis) = 4.39
  Total time: 1095 days

- Decay (Case Data #3 on ORIGEN menu)
  Total time: 158 days

- Irradiation (Case Data #4&5 on ORIGEN menu)
  Power (MW/Basis) = 2.83
  Total time: 1825 days

- Decay (Case Data #6 on ORIGEN menu)
  Total time: 38 years (assumes RPV burial in October 2008)

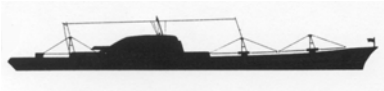


TABLE D.1
Material Composition (Weight %)
Data taken from NUREG/CR-3474

Material / Element	304 Stainless Steel	Carbon Steel
Nitrogen	0.045	0.008
Chromium	18.400	0.000
Manganese	1.530	1.350
Iron	70.600	97.570
Nickel	10.00	0.610
Molybdenum	0.260	0.580
Niobium	0.009	0.002
Cobalt	0.141	0.012

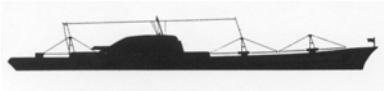
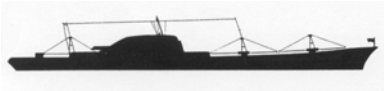


TABLE D.2

NSS Component Volumes

Component	**Volume (m^3)**
Core Basket	0.186
Upper Transition Nozzles (32)	0.094
Lower Transition Nozzles (32)	0.094
Control Rods (22)	0.008
Core Barrel	0.924
Inner Thermal Shield	0.336
Outer Thermal Shield	0.439
Lower Grid Plate and Flow Baffle Plate	0.189
Upper Grid Plate (Bottom Plate)	0.073
Upper Grid Plate Shrouds	0.175
Lower Flow Baffle Shrouds	0.149
Upper Flow Baffle Shrouds	0.212
Upper Flow Baffle Shrouds	0.245
Pressure Vessel (Middle Cylinder)	3.349
Neutron Shield Tank Inner Wall	0.286
Vessel Head and Lower Flange	6.015
Total:	12.774



APPENDIX E

ORIGEN ARP Output

Core basket

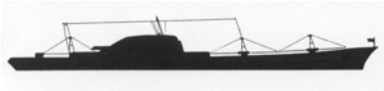
units of concentrations: curies

nuclide	time (years)		
	3.000E-01	1.000E+01	3.800E+01
co60	6.905E+03	1.928E+03	4.847E+01
ni63	2.809E+02	2.627E+02	2.164E+02
fe55	7.333E+03	6.246E+02	5.102E-01
ni59	2.379E+00	2.379E+00	2.378E+00
c14	3.644E-05	3.640E-05	3.628E-05
nb94	1.359E-05	1.359E-05	1.357E-05
total	1.452E+04	2.817E+03	2.677E+02

Upper & Lower Transition Nozzle

units of concentrations: curies

nuclide	time (years)		
	3.000E-01	1.000E+01	3.800E+01
co60	3.495E+03	9.757E+02	2.453E+01
ni63	1.422E+02	1.330E+02	1.095E+02
fe55	3.712E+03	3.162E+02	2.583E-01
ni59	1.204E+00	1.204E+00	1.204E+00
total	7.351E+03	1.426E+03	1.355E+02



Control Rods

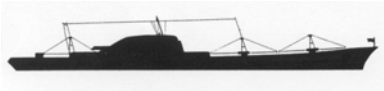
units of concentrations: curies

nuclide	time (years)			
	1.000E-02	3.000E-01	3.000E+00	3.700E+01
co60	1.070E+02	1.030E+02	7.221E+01	8.245E-01
ni63	4.190E+00	4.182E+00	4.105E+00	3.244E+00
fe55	1.175E+02	1.092E+02	5.501E+01	9.793E-03
ni59	3.542E-02	3.542E-02	3.542E-02	3.540E-02
c14	3.657E-05	3.657E-05	3.656E-05	3.641E-05
nb94	1.364E-05	1.364E-05	1.364E-05	1.362E-05
total	2.288E+02	2.164E+02	1.314E+02	4.113E+00

Inner Thermal Shield

units of concentrations: curies

nuclide	time (years)		
	3.000E-02	1.000E+00	3.800E+01
co60	2.592E+03	2.282E+03	1.756E+01
ni63	1.019E+02	1.012E+02	7.835E+01
fe55	2.844E+03	2.223E+03	1.847E-01
ni59	8.615E-01	8.614E-01	8.611E-01
c14	3.653E-05	3.652E-05	3.636E-05
nb94	1.362E-05	1.362E-05	1.361E-05
total	5.539E+03	4.607E+03	9.695E+01



Middle Thermal Shield

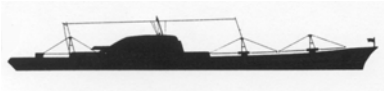
units of concentrations: curies

nuclide	time (years)		
	1.000E-02	1.000E+00	3.700E+01
co60	3.578E+02	3.141E+02	2.757E+00
ni63	1.403E+01	1.393E+01	1.086E+01
fe55	3.934E+02	3.060E+02	3.278E-02
ni59	1.186E-01	1.186E-01	1.185E-01
c14	3.656E-05	3.656E-05	3.640E-05
nb94	1.364E-05	1.364E-05	1.362E-05
total	7.653E+02	6.341E+02	1.377E+01

Outer Thermal Shield

units of concentrations: curies

nuclide	time (years)		
	1.000E-01	1.000E+01	3.800E+01
co60	8.411E+01	2.287E+01	5.750E-01
ni63	3.339E+00	3.118E+00	2.568E+00
fe55	9.156E+01	7.412E+00	6.055E-03
ni59	2.824E-02	2.823E-02	2.823E-02
c14	3.657E-05	3.653E-05	3.640E-05
nb94	1.364E-05	1.364E-05	1.362E-05
total	1.790E+02	3.343E+01	3.177E+00



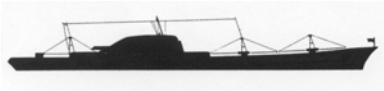
Lower grid plate & flow baffle plate

units of concentrations: curies

nuclide	time (years)		
	3.000E-01	1.000E+01	3.800E+01
co60	7.123E+01	1.988E+01	4.999E-01
ni63	2.864E+00	2.678E+00	2.206E+00
fe55	7.477E+01	6.368E+00	5.202E-03
ni59	2.426E-02	2.425E-02	2.425E-02
c14	3.657E-05	3.653E-05	3.640E-05
nb94	1.364E-05	1.364E-05	1.362E-05

total units of concentrations: curies

nuclide	time (years)		
	3.000E-01	1.000E+01	3.800E+01
co60	7.123E+01	1.988E+01	4.999E-01
ni63	2.864E+00	2.678E+00	2.206E+00
fe55	7.477E+01	6.368E+00	5.202E-03
ni59	2.426E-02	2.425E-02	2.425E-02
c14	3.657E-05	3.653E-05	3.640E-05
nb94	1.364E-05	1.364E-05	1.362E-05
total	1.489E+02	2.895E+01	2.735E+00



Upper Grid Plate

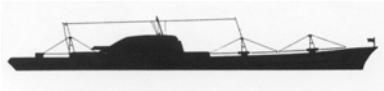
units of concentrations: curies

nuclide	time (years)		
	1.000E-01	1.000E+01	3.800E+01
co60	2.712E+01	7.375E+00	1.854E-01
ni63	1.108E+00	1.035E+00	8.526E-01
fe55	3.039E+01	2.460E+00	2.010E-03
ni59	9.374E-03	9.374E-03	9.371E-03
c14	3.657E-05	3.653E-05	3.640E-05
total	5.863E+01	1.088E+01	1.049E+00

Upper Grid Plate Shroud

units of concentrations: curies

nuclide	time (years)		
	3.000E-02	1.000E+01	3.800E+01
co60	1.341E+02	3.613E+01	9.083E-01
ni63	5.314E+00	4.960E+00	4.085E+00
fe55	1.483E+02	1.179E+01	9.634E-03
ni59	4.492E-02	4.492E-02	4.490E-02
total	2.877E+02	5.292E+01	5.048E+00



APPENDIX F

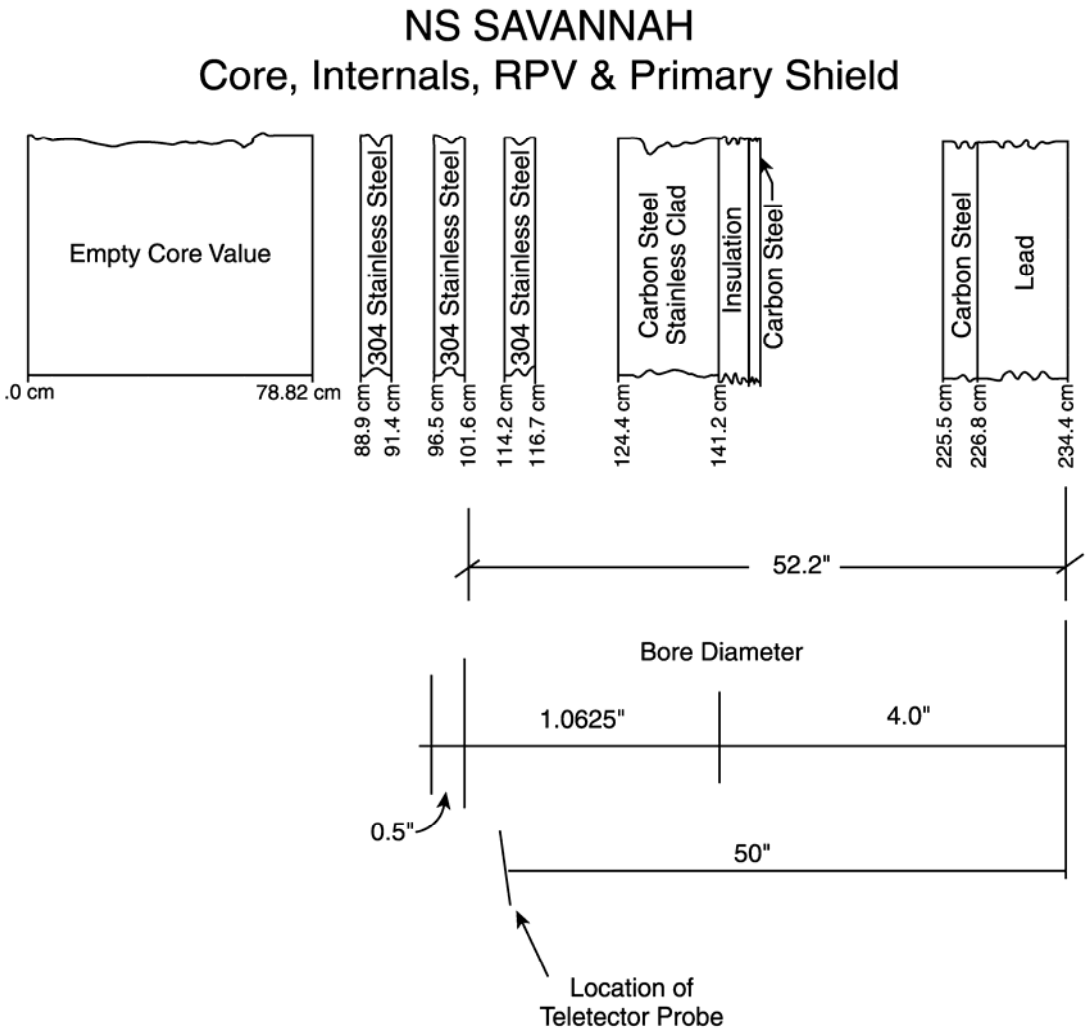



FIGURE FS-1