# Post-Irradiation Examination of Array Targets–Part I

December 2003

Prepared by

A. S. Icenhour R. M. Wham R. R. Brunson R. R. McMahon

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# POST-IRRADIATION EXAMINATION OF ARRAY TARGETS-PART I

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## ABSTRACT

During FY 2001, two arrays, each containing seven neptunium-loaded targets, were irradiated at the Advanced Test Reactor in Idaho to examine the influence of multi-target self-shielding on <sup>236</sup>Pu content and to evaluate fission product release data. One array consisted of seven targets that contained 10 vol % NpO<sub>2</sub> pellets, while the other array consisted of seven targets that contained 20 vol % NpO<sub>2</sub> pellets. The arrays were located in the same irradiation facility but were axially separated to minimize the influence of one array on the other. Each target also contained a dosimeter package, which consisted of a small NpO<sub>2</sub> wire that was inside a vanadium container. After completion of irradiation and shipment back to the Oak Ridge National Laboratory, nine of the targets (four from the 10 vol % array and five from the 20 vol % array) were punctured for pressure measurement and measurement of <sup>85</sup>Kr. These nine targets and the associated dosimeters were then chemically processed to measure the residual neptunium, total plutonium production, <sup>238</sup>Pu production, and <sup>236</sup>Pu concentration at discharge. The amount and isotopic composition of fission products were also measured. This report provides the results of the processing and analysis of the nine targets.

#### 1. INTRODUCTION

During FY 2001, two arrays, each containing seven neptunium-loaded targets, were irradiated at the Advanced Test Reactor (ATR) in Idaho. One array consisted of seven targets that contained 10 vol % NpO<sub>2</sub> pellets, while the other array consisted of seven targets that contained 20 vol % NpO<sub>2</sub> pellets. The arrays were located in the same irradiation facility but were axially separated to minimize the influence of one array on the other. This irradiation, which has also been referred to as Phase III irradiations in earlier reports,<sup>1</sup> was performed to examine the influence of multi-target self-shielding on <sup>236</sup>Pu content and to evaluate fission product release data. At the completion of the irradiation, the targets were shipped to Oak Ridge National Laboratory (ORNL) for post-irradiation examination.

To date, 9 of the 14 targets have been punctured for the measurement of the internal pressure and fission product gases. The results of these measurements have been reported separately.<sup>2</sup> The nine targets were subsequently dissolved and analyzed in order to evaluate the <sup>238</sup>Pu and <sup>236</sup>Pu yields, as well as the nonvolatile fission product yields. This report summarizes the results of the dissolutions. Because efforts are under way to enhance the gas analysis capability, the remaining five targets will be punctured for pressure measurement and then dissolved at a later date. Consequently, these targets will be the subject of a later report.

In the following sections, the array targets, ATR irradiation, and target processing flowsheets are described. Finally, the results of target dissolutions are presented.

#### 2. ARRAY TARGET DESCRIPTION

The array targets consisted of aluminum tubing that contained three NpO<sub>2</sub>–Al pellets and a dosimeter package. The development work for the fabrication of the targets is described in detail in Ref. 1. The pellets were prepared by mixing the desired amount of NpO<sub>2</sub> with aluminum powder and then pressing the mixture to the desired dimensions and density. Pellets that contained 10 and 20 vol % NpO<sub>2</sub> were prepared and then uniaxially pressed to 90% theoretical density. After pressing, the pellets were fired at 350°C, under vacuum, for 3 h to remove stearic acid, which served as a lubricant in the die press. The dosimeter package consisted of a NpO<sub>2</sub> wire that was contained within a vanadium can.

A schematic of the target configuration is shown in Fig. 2.1. Each target had a pellet section, containing three pellets, and a dosimeter section, containing one dosimeter package. Seven of the targets were loaded with 10 vol % NpO<sub>2</sub> pellets, while the other seven were loaded with 20 vol % NpO<sub>2</sub> pellets. The pellet and dosimeter sections, which were separated by an aluminum spacer, were located in the top half of the target. The bottom half of the target contained an aluminum tube spacer that acted as a plenum for fission gas expansion. The plenum was separated from the pellets by a porous aluminum spacer, which allowed fission product gases to expand into the plenum. The pellet and dosimeter sections could be removed from a target by cutting through the solid spacers, which resulted in a pellet section, a dosimeter section, and aluminum tube spacer section.

After assembly, a closure weld was performed and the weld area was radiographed. The targets were then hydrostatically compressed at 20,000 psig to ensure that the target tube was in contact with the pellets. The final assembly was then radiographed, and a helium leak test and a dye penetrate check were performed on each target. Tables 2.1 and 2.2 provide summary details about the pellet loading and dimensions for each of the targets irradiated in the ATR.



Fig. 2.1. Schematic of aluminum-clad target that contains three NpO<sub>2</sub>–Al pellets and a dosimeter package.

			Fraction of		Pellet di	mensions		
Target number	Pellet number	Pellet density (g/cm <sup>3</sup> )	theoretical density	NpO <sub>2</sub> (vol %)	Diameter (in.)	Length (in.)	$NpO_2(g)$	Np metal (g)
	BNP-17	3.13	0.895	10.00	0.25	0.503	0.3902	0.3351
	BNP-1	3.16	0.900	10.00	0.25	0.5	0.3902	0.3351
MK-10.0	BNP-3	3.11	0.891	10.00	0.25	0.505333	0.3901	0.3351
	Dosimeter	0-1					0.001888	0.001668
	BNP-2	3.16	0.905	10.01	0.25	0.497	0.3906	0.3355
MV 10.1	BNP-14	3.14	0.895	10.00	0.25	0.502667	0.3902	0.3351
WIK-10.1	BNP-7	3.14	0.896	10.01	0.25	0.502333	0.3907	0.3356
	Dosimeter	0-2					0.001712	0.001512
	BNP-4	3.15	0.897	10.00	0.25	0.501667	0.3902	0.3351
MK 10.2	BNP-16	3.13	0.893	10.00	0.25	0.504167	0.3903	0.3352
WIK-10.2	BNP-10	3.12	0.899	10.00	0.25	0.5005	0.3902	0.3351
	Dosimeter	0-3					0.001731	0.001529
MK 10.2	BNP-25	3.15	0.900	10.01	0.25	0.500167	0.3905	0.3354
	BNP-26	3.14	0.900	10.02	0.249833	0.500833	0.3909	0.3357
WIX-10.5	BNP-27	3.15	0.903	10.00	0.25	0.498167	0.3902	0.3351
	Dosimeter	0-11					0.001131	0.000999
	BNP-11	3.16	0.904	10.01	0.2495	0.500167	0.3905	0.3354
MK-10.4	BNP-18	3.14	0.894	10.02	0.25	0.503333	0.391	0.3358
WIR TO: I	BNP-5	3.15	0.900	10.01	0.2495	0.501833	0.3902	0.3351
	Dosimeter	0-8					0.001744	0.001541
	BNP-6	3.14	0.896	10.00	0.25	0.502167	0.3901	0.3351
MK-10.5	BNP-12	3.13	0.895	9.99	0.25	0.503	0.3899	0.3349
WIX-10.5	BNP-8	3.13	0.893	10.03	0.25	0.504167	0.3913	0.3361
	Dosimeter	0-9					0.001993	0.001761
	BNP-15	3.14	0.896	10.00	0.2495	0.504333	0.3901	0.3351
MK-10.6	BNP-23	3.14	0.897	10.00	0.25	0.501667	0.3901	0.3351
1011X 10.0	BNP-20	3.13	0.894	10.00	0.25	0.503367	0.3903	0.3352
	Dosimeter	0-10					0.001969	0.001739

Table 2.1. Summary of fabrication data for 10 vol % NpO<sub>2</sub> targets

		Dallat	Enertian of		Pellet din	nensions		
Target number	Pellet number	density (g/cm <sup>3</sup> )	theoretical density	NpO <sub>2</sub> (vol %)	Diameter (in.)	Length (in.)	$NpO_2(g)$	Np metal (g)
	BNP-40	3.82	0.886	20.02	0.25	0.50783	0.7815	0.6712
МК-20.0	BNP-47	3.82	0.887	20.00	0.2505	0.50516	0.7801	0.6700
	BNP-58	3.85	0.889	19.99	0.25	0.5065	0.7802	0.6701
	Dosimeter 0-12	2					0.001264	0.001117
	BNP-41	3.83	0.890	20.03	0.25	0.506	0.7816	0.6713
MK-20.1	BNP-53	3.83	0.890	19.98	0.25	0.50553	0.7794	0.6694
MK-20.1	BNP-59	3.83	0.892	20.00	0.25	0.50483	0.7806	0.6704
	Dosimeter 0-1	3					0.002198	0.001942
	BNP-43	3.78	0.878	20.01	0.25	0.51266	0.7808	0.6706
MK 20.2	BNP-52	3.82	0.888	19.99	0.25	0.5065	0.7797	0.6697
WIK-20.2	BNP-49	3.83	0.892	20.00	0.25	0.50466	0.7804	0.6703
	Dosimeter 0-1	4					0.00166	0.001466
	BNP-48	3.84	0.890	20.00	0.25	0.50583	0.7807	0.6705
MK 20.2	BNP-42	3.79	0.880	20.00	0.2495	0.51333	0.7806	0.6704
WIK-20.5	BNP-60	3.86	0.895	19.99	0.25	0.50283	0.7798	0.6698
	Dosimeter 0-1	5					0.002073	0.001831
	BNP-50	3.83	0.889	20.01	0.25	0.50666	0.781	0.6708
MV 204	BNP-57	3.87	0.898	20.00	0.25	0.50116	0.7807	0.6705
WIK-20.4	BNP-44	3.84	0.892	19.99	0.25	0.50466	0.7801	0.6700
	Dosimeter 0-1	6					0.001633	0.001443
	BNP-45	3.84	0.892	20.00	0.25	0.50483	0.7804	0.6703
MK-20.5	BNP-51	3.84	0.891	20.00	0.2505	0.50316	0.7804	0.6703
WIK-20.5	BNP-55	3.80	0.884	19.99	0.2505	0.50716	0.7798	0.6698
	Dosimeter 0-1	7					0.001411	0.001246
	BNP-54	3.82	0.888	20.01	0.2505	0.50466	0.7806	0.6704
MK-20.6	BNP-61	3.84	0.890	19.99	0.25	0.5055	0.7799	0.6698
1.11x 20.0	BNP-56	3.80	0.881	20.01	0.2505	0.509	0.781	0.6708
	Dosimeter 0-1	8					0.001762	0.001557

Table 2.2. Summary of fabrication data for 20 vol % NpO<sub>2</sub> targets

## **3. ATR IRRADIATION**

The 14 targets were shipped to the Idaho National Engineering and Environmental Laboratory (INEEL), where they were loaded into an aluminum basket (similar to that depicted in Fig. 3.1), thereby forming two arrays as depicted in Fig. 3.2. The seven 10 vol % targets comprised the upper array, while the seven 20 vol % targets formed the lower array. Note that, as shown in Fig. 3.2, the targets were aligned along an axis relative to the center of the reactor. This orientation was selected to aid in the evaluation of self-shielding by the targets. The arrays were irradiated for two cycles in position B-10 of the ATR (Fig. 3.3), which is a 1.5-in.-diam hole near two control drums on the east side of the reactor. The irradiation data for the two cycles are summarized in Table 3.1.



Fig. 3.1. Depiction of aluminum basket similar to that used in the array target irradiations.



Fig. 3.2. Depiction of configuration of the 10 vol % and 20 vol %  $NpO_2$  arrays relative to the center of the ATR core.



Fig. 3.3. Cross section of the ATR core showing position B-10, which was used in the array target irradiation.

	Cycle					
Start date and time Finish date and time Cycle length, days Core burnup, MWd East quadrant burnup, MWd	125B	126A				
Start date and time	07:00, 23JUL01	12:00, 24SEP01				
Finish date and time	14:00, 11SEP01	15:00, 03NOV01				
Cycle length, days	50.292	40.125				
Core burnup, MWd	5337.60	4139.80				
East quadrant burnup, MWd	1321.02	1044.45				
Average core power, MW(t)	106.13	103.17				
Average east quadrant power, MW(t)	26.27	26.03				

 Table 3.1. Summary of data for the two ATR cycles used to irradiate the array targets

# 4. TARGET PROCESSING

Nine of the targets (four from the 10 vol % array and five from the 20 vol % array) were processed using a two-stage dissolution process, which consisted of first dissolving the aluminum in a caustic solution and then dissolving the remaining actinides and fission products in an acid solution. The caustic decladding solution and acid product solution were sampled and analyzed by a gamma scan, gross beta scan, gross alpha scan, and inductively coupled plasma (ICP)–mass spectroscopy. Analysis for <sup>236</sup>Pu was performed by using a 2-thenoyltrifluroacetone (TTA) extraction of the acid product solution, which was then followed by a 96-h alpha count. Based on the analytical results, a material balance was performed to determine the amounts of <sup>238</sup>Pu, <sup>236</sup>Pu, total Pu, <sup>237</sup>Np, and fission products that were recovered in the dissolution process. The following subsections describe the equipment and chemical processing steps used in the target processing.

## 4.1 TARGET-CUTTING JIG

A target-cutting jig, shown in Fig. 4.1, was designed to remove the pellet and dosimeter sections from the target body. The apparatus was constructed as a stainless steel trough, with slots cut into the trough to guide a saw blade through the aluminum spacers in the target. A target was placed in the trough and then held in place by using five push clamps mounted on the side of the jig. A fine-tooth hacksaw, fabricated with manipulator grips, was placed in the cutting slots, and the target was cut into four sections. Each cut was made through a spacer that separated the various sections of the target (see Fig. 2.1).



Fig. 4.1. Photograph of stainless steel saw jig used to section targets.

#### 4.2 DISSOLVER EQUIPMENT

The pellet dissolutions were performed in a hot cell using a Teflon dissolver as shown in Fig. 4.2. The Teflon dissolver was developed after previous dissolutions with a glass dissolver vessel revealed that the silica competed with the actinides for the fluoride ions, which promoted the degradation of the glass and produced a gelatinous material in the bottom of the dissolver.

The Teflon dissolver was designed with three penetrations for a condenser, an input/output tube, and a thermometer. The dissolver was fitted with a reflux condenser that was cooled with chilled water from a constant-temperature recirculation bath. The dissolver solution was effectively refluxed during both the caustic and acid dissolution. The dissolver off-gas was passed through a condensate trap and then scrubbed with about 300 mL of 2 M NaOH to neutralize any acid fumes. The inlet/outlet tube was a 1/4-in. stainless steel tube containing a 2- $\mu$ m stainless steel filter.



Fig. 4.2. Photograph of dissolver used for pellet dissolution.

A peristaltic pump was connected to the dissolver inlet/outlet line to transfer solution into and out of the dissolver. Tests indicated that the pump would transfer the caustic solutions through the 2-µm filter in a reasonable amount of time and that the filter would not allow actinide solids to pass through.

The dissolver was placed on a hot plate that also had a stirrer motor. Mixing during the caustic dissolution was very important in breaking up the pellet as the aluminum matrix was being dissolved. In previous dissolutions carried out in a glass dissolver, it was observed that a hard skeleton of the pellet remained as the aluminum was dissolved from the pellet core. This pellet skeleton was easily broken up when a magnetic stirring bar was used.

#### 4.3 CAUSTIC DISSOLUTION OF TARGET SECTIONS

The caustic dissolution (also referred to as aluminum dejacketing) dissolves the aluminum target tube and aluminum matrix in the pellet core. This dissolution was performed by placing a target section in the dissolver with NaNO<sub>3</sub> solution. (The NaNO<sub>3</sub> reacts with H<sub>2</sub> to produce NH<sub>3</sub> and thereby suppresses the H<sub>2</sub> concentration in the off-gas.) The solution was heated to ~96°C and mixed using a stirring bar with the magnetic stirrer. Sodium hydroxide was then metered into the solution. The overall chemical reaction is shown by the following equation:<sup>3</sup>

 $AI + 0.63NaOH + 0.38NaNO_3 + 0.26H_2O = NaAIO_2 + 0.37NH_3 + 0.01NaNO_2 + 0.02H_2$ .

The amount of aluminum in each pellet section was calculated based on the aluminum mass in the target tube, spacers, and three pellets. The pellet sections of the target were estimated to contain  $\sim$ 8.5 g of aluminum. An excess of NaOH was used to promote complete dissolution of the aluminum metal.

Figure 4.3 is a typical flowsheet for the caustic dissolution. The caustic dissolved all of the aluminum associated with one pellet section, which contained three pellets. The pellet section was first placed in the dissolver, and 200 mL of 2.2 M NaNO<sub>3</sub> was then added using the pump. The solution was heated to a gentle reflux with temperatures ranging from 90 to 96°C. Approximately 60 mL of 10 M NaOH was then added at a rate of ~1 mL/min.<sup>\*</sup> The solution was gently refluxed for 4 h after the NaOH addition at a temperature of ~103°C. If the dissolution reaction were instantaneous, then ~125 sccm

<sup>&</sup>lt;sup>\*</sup> At first, the 10 *M* NaOH solution was added at 5-min intervals, waiting for the reaction to slow before adding additional caustic. However, no problems with overheating or uncontrolled off-gas flow occurred; therefore, the NaOH was added continuously at a 1-mL/min rate without interruption.



Fig. 4.3. Typical flowsheet for the caustic dissolution.

of gas would evolve during the addition of NaOH. During the dissolution, the pump was left in operation, which continuously purged the dissolver with air from the hot cell.

After a 4-h digestion period, the solution was allowed to settle and cool for 4 h. The solution was then slowly transferred out of the dissolver through the 2- $\mu$ m stainless steel filter into a 500-mL volumetric flask. The dissolver and solids were then washed with 2 *M* NaOH solution, which also flushed any solids on the filter back into the dissolver vessel. The dissolver was washed at least twice using ~100 mL of 2 *M* NaOH or until the volumetric flask reached a volume of 500 mL. The 500-mL caustic solution was sampled using a pipette to pull a 0.5-mL sample, which was then submitted for analysis.

#### 4.4 ACID DISSOLUTION

The acid dissolution of the neptunium and plutonium oxides was carried out using HNO<sub>3</sub> with a small amount of added HF. Figure 4.4 depicts a typical flowsheet for the acid dissolution. A 150-mL acid solution containing 8.0 *M* HNO<sub>3</sub> and 0.02 *M* HF was added to the dissolver. It should be noted that  $Al(NO_3)_3$  was not added to the acid solution, since the quantity of fluoride was so small that it was not necessary to bind any possible excess fluoride. The solution was heated to gentle reflux and continuously stirred for 3 h while the temperature was maintained between 106 and 108°C. The solution was usually allowed to cool to <50°C overnight.

The acid product solution was then pumped from the dissolver, through a 2- $\mu$ m filter, and into a 500-mL volumetric flask. After the initial product removal, a series of acid flushes using 8 *M* HNO<sub>3</sub>–0.02 *M* HF were performed to wash any residual product or solids from the dissolver and filter. The acid flushes were then transferred to the 500-mL volumetric flask. The first acid flush contained about 50 mL of solution. The second, consisting of about 150 mL, was heated to a gentle reflux for ~30 min. This hot acid flush was pulled up into the filter several times. This step was performed to contact the filter surfaces and thus dissolve any residual product present on the surfaces. Three more 50-mL acid flushes of the dissolver were carried out after the hot acid flush. The 500-mL volumetric product flask was then sampled by pipetting a 0.5-mL sample volume, which was submitted for analysis.



Fig. 4.4. Typical flowsheet for the acid dissolution.

#### 4.5 DOSIMETER DISSOLUTION

The dosimeter within the array target consisted of  $NpO_2$  wire that was placed in a vanadium can and then seal welded. The vanadium can was placed in a zircaloy cylinder, which was then sealed with a press-fit seal. The target section containing the dosimeter packages was precisely cut through the top 0.375 in. of the zircaloy package, a process that usually resulted in the vanadium can sliding out of the target section.

The dissolution process for the dosimeters was carried out using a two-step acid dissolution in a 10-mL Teflon screw-top vial. In order to handle the vials using in-cell manipulators and to heat the vials on a hot plate, an aluminum vial holder was fabricated. The vial holder was slotted to allow the dissolution and liquid level to be visually observed. The receptacle, which was fabricated to hold up to seven vials and holders, was a rectangular-shaped aluminum block into which seven slotted cavities had been machined. Each cavity held a vial and a vial holder, and the slots allowed the vial to be visually inspected during the dissolution process. A thermometer or thermocouple well was drilled into the receptacle to allow the temperature of the dissolution process to be monitored. Figure 4.5 is a photograph of the Teflon vials, vial holders, and receptacle.

The vanadium cans were placed in a 10-mL Teflon vial, where the vanadium was dissolved using  $\sim$ 6–7 mL of 3 *M* HNO<sub>3</sub> during a 12–18-h digestion period. As the vanadium dissolved, the solution became emerald green in color. After the digestion period, the dissolver solution was carefully pipetted out of the vial, while leaving the solids. The solids were washed three times using  $\sim$ 6 mL of 3 *M* HNO<sub>3</sub>.

The solids remaining from the first acid dissolution were then dissolved using ~ 6 mL of an  $8 M \text{HNO}_3$ -0.1 *M* HF acid solution. The temperature of the solution was maintained above 90°C for at least 6 h; however, the dissolution was allowed to digest overnight. The acid product was then carefully pipetted out of the vials, and the vials were washed three times with 6 mL of clean 8 *M* HNO<sub>3</sub>-0.1 *M* HF solution. The acid product and the washes were sampled by pipetting out about 0.4 mL of the solution.





Fig. 4.5. Photographs of vials, vial holders, and receptacle used in the dosimeter dissolution.

#### 5. RESULTS AND DISCUSSION

Table 5.1 provides a list of the targets that were processed. The two target dissolution numbers reflect the two-step dissolution process that was performed. The single dosimeter dissolution number reflects essentially the one-step acid dissolution of the NpO<sub>2</sub> dosimeter. The analytical results from each dissolution sample were used to calculate the amount of neptunium converted to plutonium, the amount of <sup>238</sup>Pu recovered, and the amount of <sup>236</sup>Pu produced. The results of the analyses are summarized in Table 5.2, while the detailed results for each set of target pellets and dosimeters are presented in Appendix A. To provide some insight into the effect of position and target self-shielding, results are presented in terms of the relative power. The relative power reported for each target was calculated by dividing the neutron flux at a target by the average flux in the region. Note that this calculation was performed for one point in time during the irradiation and is therefore representative of only a particular control drum configuration. Calculations are being performed to establish the relative power based on the total fluence at each target.<sup>4</sup> However, it is not expected that the relative powers will change significantly. The quantities reported in Table 5.2 are briefly defined in the following paragraph.

The neptunium recovery in both the caustic and acid dissolutions is provided, and the sum of these two quantities divided by the initial quantity of neptunium is reported as the residual neptunium. For the plutonium acid recovery, the plutonium product is reported for both <sup>238</sup>Pu and total plutonium. The weight percentage of <sup>238</sup>Pu (on the basis of total plutonium) is also shown. The conversion of neptunium to both plutonium and fission products is calculated by dividing the moles of each of these quantities by the initial moles of neptunium. The values for neptunium and plutonium loss to waste are the weight percentages of the recovered neptunium and plutonium in the caustic dissolution stream. The concentration of <sup>236</sup>Pu reported is the amount (in parts per million on a total plutonium basis) present at discharge of the target from the reactor. This amount was calculated from the measured concentration of the processed target and the time since discharge.

The isotopic distributions of the fission products are shown for the caustic dissolution and the acid dissolution streams in Tables 5.3 and 5.4, respectively. These amounts are reported in terms of parts per million of the <sup>238</sup>Pu produced and can therefore be used to estimate fission product concentrations in waste streams for a particular <sup>238</sup>Pu production rate. A summary of the data measured for the dosimeters is presented in Table 5.5. Samples were taken and analyzed for the acid dejacket solution of two dosimeters. The analysis for the MK-10.1 dosimeter revealed that 1.4 and 2.4 wt % of the Np and <sup>238</sup>Pu were in the dejacket solution, respectively. For the MK-20.4 dosimeter, these quantities were 0.4 and 0.5 wt %.

Figures 5.1–5.3 provide graphical representations of the data as a function of the relative power. In Fig. 5.1, the percentages of neptunium converted to plutonium are shown. The percentages of total plutonium that consist of <sup>238</sup>Pu are shown in Fig. 5.2. Finally, the <sup>236</sup>Pu concentration (parts per million on a total plutonium basis) are presented in Fig. 5.3.

Target number	Reactor Position	Target dissolution numbers <sup>a</sup>	NpO <sub>x</sub> (vol %)	Dosimeter dissolution number <sup>b</sup>
MK-10.1	U-5	DJ-19/AD-19	10	ADD-25
MK-10.2	U-6	DJ-23/AD-23	10	С
MK-10.4	U-2	DJ-20/AD-20	10	ADD-26
MK-10.6	U-7	DJ-21/AD-21	10	ADD-27
MK-20.1	L-5	DJ-16/AD-16	20	ADD-21
MK-20.2	L-6	DJ-22/AD-22	20	ADD-22
MK-20.4	L-2	DJ-17/AD-17	20	ADD-23
MK-20.5	L-3	DJ-24/AD-24	20	С
MK-20.6	L-7	DJ-18/AD-18	20	ADD-24

Table 5.1. List of the array targets that were processed

<sup>*a*</sup> DJ = dejacket caustic dissolution; AD = acid dissolution.

<sup>b</sup> ADD = acid dissolution of dosimeter.

<sup>c</sup> Not analyzed.

Table 5.2. Summary of results for array target analysis													
Target	Relative	Initial Np	Np recov	very (g)	Residual Nn	Pu acid re	covery (g)	<sup>238</sup> Pu/Total Pu	Conversio	on (mol %)	Loss to was	ste (wt %)	<sup>236</sup> Pu at discharge
number	Power	(g)	Caustic	Acid	(wt %)	<sup>238</sup> Pu	Total Pu	(wt %)	Np to Pu	Np to FP <sup>a</sup>	Np	Pu	$(ppm)^b$
MK-10.4	0.49	1.0063	0.0119	0.965	97.08	0.101	0.112	89.99	11.14	0.06	1.22	0.29	$3.26\pm8.5\%$
MK-10.6	0.91	1.0054	0.0115	0.870	87.67	0.113	0.129	87.81	12.76	0.09	1.30	0.12	$3.86 \pm 5.1\%$
MK-10.2	1.32	1.0054	0.0073	0.855	85.76	0.118	0.137	86.06	13.52	0.09	0.84	0.07	$3.30\pm11.2\%$
MK-10.1	1.7	1.0062	0.0059	0.890	89.04	0.140	0.165	84.80	16.34	0.18	0.66	0.05	$2.96\pm6.2\%$
MK-20.4	0.46	2.0113	0.0030	1.825	90.89	0.184	0.204	90.09	10.08	0.05	0.17	0	$6.24\pm2.5\%$
MK-20.5	0.72	2.0104	0.0026	1.715	85.44	0.215	0.246	87.36	12.18	0.08	0.15	0.0077	$4.58\pm6.3\%$
MK-20.6	0.81	2.0110	0.0021	1.810	90.11	0.209	0.236	88.51	11.69	0.08	0.12	0	$5.36\pm3.7\%$
MK-20.2	1.25	2.0106	0.0113	1.780	89.09	0.259	0.297	87.17	14.69	0.10	0.63	0.07	$3.58\pm2.7\%$
MK-20.1	1.72	2.0111	0.0007	1.675	83.32	0.242	0.285	84.68	14.11	0.15	0.04	0	3.88 ± 5.1%

 $^{a}$  FP = fission products.  $^{b}$  Relative error based on 2 standard deviations as derived from the counting statistics.

	Target number (Relative power) <sup>a</sup>											
Isotope	MK-10.4 (0.49)	MK-10.6 (0.91)	MK-10.2 (1.32)	MK-10.1 (1.7)	MK-20.4 (0.46)	MK-20.5 (0.72)	MK-20.6 (0.81)	MK-20.2 (1.25)	MK-20.1 (1.72)			
<sup>106</sup> Ru	57	76	73	105	40	29	39	46	36			
<sup>134</sup> Cs	11	18	19	33	9	12	14	15	28			
<sup>137</sup> Cs	1430	2199	2379	3328	1270	1517	1709	1743	2766			

Table 5.3. Fission products in	caustic dejacket stream	(ppm) relative to	<sup>238</sup> Pu production
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<sup>*a*</sup> The value for relative power is listed parenthetically following the target number.

	Target number $(\text{Relative power})^a$											
Isotope	MK-10.4 (0.49)	MK-10.6 (0.91)	MK-10.2 (1.32)	MK-10.1 (1.7)	MK-20.4 (0.46)	MK-20.5 (0.72)	MK-20.6 (0.81)	MK-20.2 (1.25)	MK-20.1 (1.72)			
<sup>95</sup> Zr	2	2	1	4	3	1	4	2	7			
<sup>106</sup> Ru	275	362	348	526	290	323	391	380	711			
<sup>125</sup> Sb	23	< 10	< 10	< 10	23	25	26	24	37			
<sup>134</sup> Cs	7	9	10	14	9	13	10	12	26			
<sup>137</sup> Cs	907	1086	1243	1331	1185	1662	1338	1502	2444			
<sup>144</sup> Ce	353	488	470	698	416	395	508	476	879			
<sup>154</sup> Eu	< 20	< 23	< 25	< 26	< 15	< 16	< 18	< 16	< 23			
<sup>155</sup> Eu	23	33	37	42	21	31	36	25	57			

Table 5.4. Fission products in acid dissolution stream (ppm) relative to <sup>238</sup>Pu production

<sup>*a*</sup> The value for relative power is listed parenthetically following the target number.

_										
	Target ID for dosimeter	Relative power	Initial Np (g)	Np recovery (g)	Residual Np (wt %)	<sup>238</sup> Pu recovery (g)	Total Pu recovery (g)	<sup>238</sup> Pu/Total Pu (wt %)	Conversion of Np to Pu (mol %)	<sup>236</sup> Pu at discharge (ppm) <sup><i>a</i></sup>
	MK-10.4	0.49	0.0015	0.0012	79.14	0.00015	0.00017	88.46	11.07	$2.76 \pm 6.2\%$
	MK-10.6	0.91	0.0017	0.0014	82.21	0.00021	0.00024	86.75	14.11	$2.39\pm5.0\%$
	MK-10.2	1.32	b	b	b	b	b	b	b	b
	MK-10.1	1.7	0.0015	0.0009	60.42	0.00016	0.00019	84.12	12.47	$3.79\pm4.2\%$
	MK-20.4	0.46	0.0014	0.0007	51.59	0.00012	0.00014	85.76	9.62	$3.55\pm5.2\%$
	MK-20.5	0.72	b	b	b	b	b	b	b	b
	MK-20.6	0.81	0.0016	0.0010	61.09	0.00018	0.00022	83.18	13.75	$4.24\pm4.5\%$
	MK-20.2	1.25	0.0015	0.0011	76.01	0.00021	0.00026	81.56	17.81	$3.33\pm6.2\%$
	MK-20.1	1.72	0.0019	0.0014	72.05	0.00030	0.00038	79.56	19.29	$4.20 \pm 3.7\%$

Table 5.5. Summary of dosimeter data

<sup>*a*</sup> Relative error based on 2 standard deviations as derived from the counting statistics. <sup>*b*</sup> Not analyzed.



Fig. 5.1. Percentage of neptunium converted to plutonium as a function of relative power for the targets and dosimeters.



Fig. 5.2. Plutonium-238 production (percentage of total plutonium production) as a function of relative power for the targets and dosimeters.



Fig. 5.3. Plutonium-236 content at discharge from the ATR as a function of relative power for the targets and dosimeters.

Several trends that reflect the different flux (and target self-shielding) at the various target positions are evident in the figures. The percentage of neptunium that is converted to plutonium increases with relative power—ranging from about 10 to 16 mol % for the pellets. The results for the 10 and 20 vol % targets are similar. The <sup>238</sup>Pu production, as a percentage of total plutonium, generally decreases with increasing relative power. This value ranged from about 85 to 90 wt % for the pellets. The specification for <sup>238</sup>Pu production is 82 wt %, as of the date of processing. Again, the 10 and 20 vol % targets provided similar results. In Fig. 5.3, the <sup>236</sup>Pu production at discharge tends to decrease with increasing relative power. Additionally, the <sup>236</sup>Pu production is higher in the 20 vol % pellets than in the 10 vol % targets. The <sup>236</sup>Pu production in the pellets ranged from about 3 to 6 ppm. The specification for <sup>236</sup>Pu is 2 ppm, as of the date of processing. Hence, these targets would require a cooling period of 1.7 to 4.5 years.

The processing of the remaining five targets, which will be the subject of a future report, will help to further establish the trends that are observed for the various target positions. Additionally, the preparation of the final calculations for the relative power at each position will provide better insight into the flux depression caused by each of the targets and the role of target self-shielding in the production of <sup>238</sup>Pu and <sup>236</sup>Pu.

#### 6. SUMMARY

Fourteen targets were irradiated in two arrays during two cycles at the ATR. One array consisted of a set of seven targets that contained 10 vol % NpO<sub>2</sub> pellets, while the other array consisted of seven targets that contained 20 vol % NpO<sub>2</sub> pellets. The pellets consisted of a mixture of NpO<sub>2</sub> and aluminum powder. Each target also contained a dosimeter package, which consisted of a small NpO<sub>2</sub> wire that was inside a vanadium container.

After completion of irradiation and shipment back to ORNL, nine of the targets (four from the 10 vol % array and five from the 20 vol % array) were punctured for pressure measurement and measurement of <sup>85</sup>Kr. These nine targets and the associated dosimeters were then chemically processed to measure the residual neptunium, total plutonium production, <sup>238</sup>Pu production, and <sup>236</sup>Pu concentration at discharge. The amount and isotopic composition of fission products were also measured. These data will be useful in designing the production targets, as well as in planning for the handling of waste streams.

The five remaining targets will be punctured for pressure measurement after additional gas analysis equipment is brought on-line. Finally, calculations on the expected yield are being performed by INEEL personnel. When available, these calculations will be compared with the experimental results to confirm the model used for the ATR and to identify the appropriate cross-section data set for <sup>236</sup>Pu production.

## REFERENCES

- 1. Interim Status of Array Target Fabrication Report for the Advanced Test Reactor (ATR), Oak Ridge National Laboratory, Oak Ridge, Tennessee, DRAFT, September 30, 2001.
- "Results of Np Target Capsule Testing," memo from R. N. Morris, Oak Ridge National Laboratory, to R. M. Wham, Oak Ridge National Laboratory, August 9, 2001.
- L. J. King, *TRU Operating Manual*, Section 1333, Radiochemical Engineering Development Center, Oak Ridge National Laboratory, January 1975.
- 4. Personal communication from B. G. Schnitzler, Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho, October 2003.

APPENDIX A: Detailed Data Sheets for Targets and Dosimeters

				MK-10.4	DJ-20	Input			1						
				Pellet Number = Pellet Number =	BNP-11 BNP-18	0.3354			-						
				Pellet Number =	BNP-5	0.3351	0.00425	a molos							
				Total Np =	1.0005	·g -	0.00425	g-moles	1						
Add 2.2	2M NaNO <sub>3</sub> to dis	solver	1						Output	Caustic Disso	lver Waste				
Vol (mL) =	200			Ţ		+		1		Sample # DJ3	DJ-20, 03051	5-001		(D.: 02)	D hanin)
			-			Caustic Dissolutio	on		Ru-106	1.40E+06	3.7838E-05	g 5.72E-06	5.40E-08	57 ppm (Pu-230	b basis)
Meter of 10M NaOH	caustic into dis (rate 1mL.min)	solver			Dige	DJ-20 est for 4 hour at gentl	le reflux		Cs-134 Cs-137	1.10E+05 9.30E+05	2.973E-06 2.5135E-05	1.15E-06 1.44E-04	8.58E-09 1.06E-06	11 1430	
Vol (mL) =	60		1			Temp = 104 C		-		ppb (ng/mL)		g	g-mole		
(	Caustic Washe	8	1	<u> </u>					Pu-238	6.50E+02		3.25E-04	1.37E-06		
2M NaOH Vol (ml.) =	240.0000							-	Pu-239 Vol(ml.) =	<8.0e1 500 0000		0	0		
			4		-	¥									
		Acid	Addition	1		Acid Dissolution AD-20	1		Back Flushes						
		8.0M HNO3			D	bigest using gentle re	eflux		8M HNO3- 0.02M N	laF 50					
		0.02 W Nar 0.04 M Al(NO <sub>3</sub> ) <sub>3</sub>			1	Femperature = 100-1	09C	` 1	vor (mE) =	50					
		Vol (mL) =	150						Filter Back F	lueboe / Acid I	Nachoe				
									Three washes with	8M HNO3- 0.0	2M NaF				
						Filter	1		Vol (mL) =	300					
						2um SS									
							1								
					Product Output	and Back Flushes		ſ		Fission Prode Acid Dissolut	ucts in Produ	ct Output			
					Acid Disso	Iution Product	,		Elomont	Sample =	AD-20, 03051	5-002	a mol	nnm (Bu 22)	P basis)
				Element	ppb (ng/mL)	g	g-mol		Co-60	2.40E+04	6.49E-07	2.87E-07	4.7873E-09	3 -	b basis)
				Np-237 Pu-238	1.93E+06 2.02E+05	0.9650	4.07E-03 4.24E-04		Zr-95 Ru-106	3.10E+05 6.80E+06	8.38E-06 1.84E-04	1.95E-07 2.78E-05	2.056E-09 2.6245E-07	2 275	
				Pu-239 Pu-240	2.07E+04 1.64E+03	0.0104	4.33E-05 3.42E-06		SB-125 Cs-134	1.80E+05 6.50E+04	4.86E-06 1.76E-06	2.32E-06 6.79E-07	1.8582E-08 5.0693E-09	23 7	
				Pu-241	1.90E+02	0.0001	3.94E-07		Cs-137	5.90E+05	1.59E-05	9.16E-05	6.6938E-07	907	
				Pu-242 Total Pu	2.25E+05	0.1123	4.71E-04		Eu- 155	7.90E+04	2.27E-04 2.14E-06	2.30E-06	2.4762E-07 1.4819E-08	23	
				Vol (mL)	500			l	Eu-154	3.90E+04	1.05E-06	2.00E-06	1.297E-08	20	
	1				1		1								
	Target	Pellet	Dissolution	Dissolution	% Donoity	Pellet	Pellet Mass Np	Pellet	Bu 226	Adjusted					
Pellet Input	MK-10.4	BNP-11	20	Sample Code	90.36%	10.01%	0.33540	0.00141	2.21	3.26					
Pellet Input Pellet Input	MK-10.4 MK-10.4	BNP-18 BNP-5	20		89.43% 89.99%	10.02%	0.33580	0.00142	2						
Total Deiacket Waste	MK-10.4	BNP-11, 18, 5	20	DJ-20. 030515-001			1.00630	0.00425	5						
Acid Dissol	MK-10.4	BNP-11, 18, 5	20	AD-20, 030515-002			0.96500	0.00407	7						
						Actual		Bradiated (BC	201	Actual/Brad					
Np Residual Amo	ount (wt basis)	= (Np caustic +	Np acid)/ Np input =			0.9708		Fredicted (BC	33)	#DIV/0!	I				
Conversion of Np	(wt basis) = to Pu (mol basis)	sis) = Pu-238 ca	= iustic + Pu-239 cau	stic + total Pu )/ Np ii	nput =	0.8999				#DIV/0! #DIV/0!					
Conversion of Np Fractional loss of	o to FP (mol bas f Np in Liq Wast	is) = (Sum of fiss e (wt basis) = N	sion product) in cau lp caustic/ (Np acid	stic and acid / Np inp + Np dejacket) =	out )=	0.0006									
Fractional loss of	f Pu in Liq Wast	e (wt basis) = F	Pu caustic /(Pu caus	stic + Pu acid) =		0.0029									
				1		1	1	r							
Pu-236 content	Discharge		Time elapsed (t)	Pu-236 t1/2	Pu-236 t1/2	Adjusted		Pu-238	Pu238 t1/2	Adjusted					
ppm 2.21	Date 11/1/2001	Analysis Date 6/6/2003	days -582.00	years 2.85	days 1040.96	Pu-236 ppm 3.26		t1/2, years 87.7	days 32032.425	Pu-238, g 0.1026					
							-								
Reference Inform	mation	Doroite			Analysis	Sample	Co-60	Zr-95	Ru-106	SB-125	Cs-134	Cs-137	Ce-144	Eu- 155	Eu- 154
	IVÍ VV	g/cc			Gr gamma	DJ-20, 030515-001	Bq/ML	Bq/ML	1.40E+06	Bq/ML	1.10E+05	9.30E+05	вų/mL	By/ITL	Bq/INL
NpO2 <sup>237</sup> (oxide) Np237	269.047 237.0482	11.143 20.476				AD-20, 030515-002	2.40E+04	3.10E+05	6.80E+06	1.80E+05	6.50E+04	5.90E+05	8.40E+06	7.90E+04	3.90E+04
Pu-238	238.0496	19.851			Alpha & Beta	D 1 20, 020515 001	Alpha Bq/mL	Beta Bq/mL	total activity Bq/mL						
Pu-240	240.0538	19.851				AD-20, 030515-001	1.20E+08	4.00E+07	1.60E+08						
Pu241 Pu-242	241.0568 242.0587	19.851 19.851			ICP	1	Np-237	Pu-238	Pu-239	Pu-240	Pu-241	Pu-242	Pu-244		
Conversion 365.25	3.70E+10 days/year	Bq/Ci	-			DJ-20, 030515-001	ppb (ng/mL) 2.38E+04	ppb (ng/mL) 6.50E+02	ppb (ng/mL) <8.0e1	ppb (ng/mL) <5.0e1	ppb (ng/mL) <5.0e1	ppb (ng/mL) <5.0e1	ppb (ng/mL) <5.0e1		
			1			AD-20, 030515-002	1.93E+06	2.02E+05	5 2.07E+04	1.64E+03	1.90E+02	<5.0E1	<5.0E1		
					Pu-Alpha Scan	1	Pu-236/Pu-238	Relative error	-						
					I A extraction	AD-20, 030515-002	ppm (ug/mL) 2.21	%							
Specific activity (	Calculation				T										
Factor =	1.13E+13	T1/2	M g/mol	Specific activity		Pu-236/238 nnm =	(5.80 MeV Ares	Counts X Pu-	236 X 236) X 1F6	4.30E+06					
Co-60		166328640	59.9338222	1130.360	t	. 5 200 200 ppm -	(Full Spectru	m Counts X Pu	I-238 <sub>F1/2</sub> X 238)						
Zr-95 Ru-106		5531328 32278176	94.9080427	21469.00	ł	Relative Error =	2 X /5	80 MeV Area C	counts <sup>1/2</sup>						
SB-125		87042172.32	124.9052478	1048.00	ţ		2 / (0.	5.80 Area Coun	its	]					
Cs-134 Cs-137		948937032	136.9070835	87.00	t		1925.1								
Ce-144 Eu- 155		24614755.2 150248889.4	143.9136427 154.9228894	3182.80 465.00	ł										
Pu-238		2767601520	238.0495534	17.12	Į										
11 4-6-94	1	03939100	152 022075	2 64E±03	ł										

|  |   
  |  
   |   | MK-10.6   
   | DJ-21  | Input  |   
   |   | l l  |  
  |  |  |  |                              |                              |
--
--|--
---|---|--
--
---|---|--
---|--|--|--|------------------------------|------------------------------|
|  |   
  |  
   |   | Pellet Number =   
   | BNP-15<br>BNP-23   | 0.3351   | | | |
   |   |  |  
  |  |  |  |                              |                              |
|  |   
  |  
   |   | Pellet Number =   
   | BNP-20   | 0.3352   | | | |
   |   |  |  
  |  |  |  |                              |                              |
|  |   
  |  
   |   | Total Np <sup>237</sup> =                                     
   | 1.0054   | g =  | 0.00424   
   | g-moles   | L  |  
  |  |  |  |                              |                              |
|  |   
  |  
   |   |   
   |  |  | | | |
   |   |  |  
  |  |  |  |                              |                              |
| Add 2.   | .2M NaNO <sub>3</sub> to dis  
  | solver   
   | T   |   
   |  |  |   
   |   | Output   | Caustic Disso  
  | lver Waste   |  |  | 1                            |                              |
| Vol (mL) =   | = 200   
  |  
   |   | I   
   |  | •  |   
   |   |  | Sample # DJ3   
  | DJ-21, 03052   | 3-001  |  |                              |                              |
|  |   
  |  
   |   |   
   |  | Countin Dissolutio   |   
   |   | Bu 106   | Bq/mL<br>2.10E+06  
  | Ci/mL  | 9 595 06   | g-mol  | ppm (Pu-23                   | 8 basis)                     |
| Motor  | caustic into dis  
  | solver   
   | Ţ,  | l '   
   |  | Caustic Dissolutio   | on  
   |   | RU-106<br>Ce-134   | 2.10E+06<br>1.90E+05   
  | 5.6/5/E-05   | 8.58E-06   | 8.11E-08   | 7b<br>18                     |                              |
| 10M NaOH   | (rate 1mL.min)  
  | 301461   
   |   | *   
   | Dig  | est for 4 hour at gent   | le reflux   
   |   | Cs-137   | 1.60E+06   
  | 4.3243E-05   | 2.49E-04   | 1.82E-06   | 2199                         |                              |
| Vol (mL) =   | = 60  
  |  
   | 1   |   
   | Ť  | Temp = 104 C   |   
   |   |  | ppb (ng/mL)  
  |  | g  | g-mole   |                              |                              |
| -  |   
  |  
   | 7   |   
   |  |  |   
   |   | Np-237   | 2.29E+04   
  |  | 1.15E-02   | 4.83E-05   |                              |                              |
| 214 N-01   | Caustic Washes  
  | 3  
   |   | _! !  
   |  | 1  |   
   |   | Pu-238   | 3.10E+02   
  |  | 1.55E-04   | 6.51E-07   |                              |                              |
| ZM NaOF<br>Vol.(ml.)   | 1<br>= 240.0000   
  |  
   |   |   
   |  |  |   
   |   | Pu-239<br>Vol(ml.) =   | <5.0E+01<br>500.0000   
  |  | 0  | 0  |                              |                              |
| VOI (IIIE)   | 210.0000  
  |  
   | 1   |   
   |  | •  |   
   |   | vo(me)   | 000.0000   
  |  |  |  | 1                            |                              |
|  |   
  |  
   |   | 1   
   |  | Acid Dissolution   | ı   
   |   | _  |  
  |  |  |  |                              |                              |
|  |   
  | Acid   
   | Addition  |   
   |  | AD-21  | | | |
   |   | Back Flushes   |  
  |  |  |  |                              |                              |
|  |   
  | 8.0M HNO <sub>3</sub>  
   |   |   
   |  | ligest using gentle re   | eflux   
   |   | 8M HNO3- 0.02M N   | aF   
  |  |  |  |                              |                              |
|  |   
  | 0.02M NaF  
   |   |   
   |  | for 3 -4 hours.  | 000   
   | <b>`</b> ↑  | Vol (mL) =   | 50   
  |  |  |  |                              |                              |
|  |   
  | $V_{0}$ (ml ) =  
   | 150   |   
   |  | remperature = 100-1  | 090   
   |   |  |  
  |  |  |  |                              |                              |
|  |   
  | vor (mc) =   
   | 150   | 1   
   |  |  |   
   |   | Filter Back F  | lushes / Acid  
  | Washes   |  |  |                              |                              |
|  |   
  |  
   |   |   
   |  |  |   
   |   | Three washes with  | 8M HNO3- 0.0   
  | 2M NaF   |  |  |                              |                              |
|  |   
  |  
   |   |   
   |  | <b>t</b>   | -   
   |   | Vol (mL) =   | 300  
  |  |  |  |                              |                              |
|  |   
  |  
   |   |   
   |  | Filter   | | | |
   |   |  |  
  |  |  |  |                              |                              |
|  |   
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   |  | 2011 33  | | | |
   |   |  |  
  |  |  |  |                              |                              |
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   |   |  |  
  |  |  |  | _                            |                              |
|  |   
  |  
   |   |   
   | _  | *  |   
   |   |  | Fission Prod   
  | ucts in Produ  | ct Output  |  | 1                            |                              |
|  |   
  |  
   |   |   
   | Product Outpu  | t and Back Flushes   |   
   |   |  | Acid Dissolut  
  | tion Product   | 2 002  |  |                              |                              |
|  |   
  |  
   |   |   
   | Sample # =   | AD-21 030523-003   | ,   
   |   | Flement  | Sample =   
  | Ci/ml  | -002<br>0  | a-mol  | ppm (Pu-23                   | 8 basis)                     |
|  |   
  |  
   |   | Element   
   | ppb (ng/mL)  | g  | g-mol   
   |   | Co-60  | 2.40E+04   
  | 6.49E-07   | 2.87E-07   | 4.7873E-09   | 3                            | 0 00313)                     |
|  |   
  |  
   |   | Np-237  
   | 1.74E+06   | 0.8700   | 3.67E-03  
   |   | Zr-95  | 4.40E+05   
  | 1.19E-05   | 2.77E-07   | 2.9181E-09   | 2                            |                              |
|  |   
  |  
   |   | Pu-238  
   | 2.26E+05   | 0.1130   | 4.75E-04  
   |   | Ru-106   | 1.00E+07   
  | 2.70E-04   | 4.09E-05   | 3.8596E-07   | 362                          |                              |
|  |   
  |  
   |   | Pu-239<br>Pu-240  
   | 2.70E+03   | 0.014  | 5.62E-06  
   |   | Cs-134   | 9.60E+04   
  | 2.59E-06   | 1.00E-06   | 7.4869E-09   | 9                            |                              |
|  |   
  |  
   |   | Pu-241  
   | 4.60E+02   | 0.0002   | 9.54E-07  
   |   | Cs-137   | 7.90E+05   
  | 2.14E-05   | 1.23E-04   | 8.9629E-07   | 1086                         |                              |
|  |   
  |  
   |   | Pu-242  
   | 6.00E+01   | 0.0000   | 1.24E-07  
   |   | Ce-144   | 1.30E+07   
  | 3.51E-04   | 5.52E-05   | 3.8353E-07   | 488                          |                              |
|  |   
  |  
   |   | Vol (ml.)   
   | 2.57E+0  | 0.1287   | 5.40E-04  
   |   | EU- 155<br>Eu-154  | 1.30E+05<br>5.10E+04   
  | 3.51E-06   | 2.61E-06   | 2.4386E-08   | 33                           |                              |
|  |   
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|  | Т   
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   |  | 1  | T   
   |   | 1  |  
  |  |  |  |                              |                              |
|  | Target  
  | Pellet   
   | Dissolution   | Dissolution   
   |  | Pellet   | Pellet Mass Nn  
   | Pellet  |  | ∆diusted   
  |  |  |  |                              |                              |
|  | Number  
  | Number   
   | Number  | Sample Code   
   | % Density  | Vol % NpOX   | g   
   | g-mole Np   | Pu-236 ppm   | Pu-236 ppm   
  |  |  |  |                              |                              |
| Pellet Input   | MK-10.6   
  | BNP-15   
   | 21  |   
   | 89.59%   | 10.00%   | 0.33510   
   | 0.00141   | 2.62   | 3.86   
  |  |  |  |                              |                              |
| Pellet Input   | MK-10.6   
  | BNP-23   
   | 21  |   
   | 89 71%   | 10.00%   | 0.33510   
   | 0.00141   |  |  
  |  |  |  |                              |                              |
| Dellet least   | MIC 40.C  
  | DND 00   
   |   |   
   | 00.200   | 10.00%   | 0.00500   
   | 0.00111   |  |  
  |  |  |  |                              |                              |
| Pellet Input<br>Total  | MK-10.6   
  | BNP-20   
   | 21  |   
   | 89.39%   | 10.00%   | 0.33520   
   | 0.00141   |  |  
  |  |  |  |                              |                              |
| Pellet Input<br>Total<br>Dejacket Waste  | MK-10.6<br>MK-10.6  
  | BNP-20<br>BNP-15, 23, 20   
   | 21  | DJ-21, 030523-001   
   | 89.39%   | 10.00%   | 0.33520<br>1.00540<br>0.01145   
   | 0.00141 0.00424 0.00005   |  |  
  |  |  |  |                              |                              |
| Pellet Input<br>Total<br>Dejacket Waste<br>Acid Dissol   | MK-10.6<br>MK-10.6<br>MK-10.6   
  | BNP-20<br>BNP-15, 23, 20<br>BNP-15, 23, 20   
   | 21<br>21<br>21<br>21<br>21  | DJ-21, 030523-001<br>AD-21, 030523-002                        
   | 89.39%<br>1<br>2   | 10.00%   | 0.33520<br>1.00540<br>0.01145<br>0.87000  
   | 0.00141<br>0.00424<br>0.00005<br>0.00367  |  |  
  |  |  |  |                              |                              |
| Pellet Input<br>Total<br>Dejacket Waste<br>Acid Dissol   | MK-10.6<br>MK-10.6<br>MK-10.6   
  | BNP-20<br>BNP-15, 23, 20<br>BNP-15, 23, 20   
   | 21<br>21<br>21<br>21  | DJ-21, 030523-001<br>AD-21, 030523-002                        
   | 89.39%<br>1<br>2   | 10.00%   | 0.33520<br>1.00540<br>0.01145<br>0.87000  
   | 0.00141<br>0.00424<br>0.00005<br>0.00367  |  |  
  |  |  |  |                              |                              |
| Pellet Input<br>Total<br>Dejacket Waste<br>Acid Dissol   | MK-10.6<br>MK-10.6<br>MK-10.6   
  | BNP-20<br>BNP-15, 23, 20<br>BNP-15, 23, 20   
   | 21<br>21<br>21<br>21  | DJ-21, 030523-001<br>AD-21, 030523-00                         
   | 89.39%<br>1<br>2   | Actual   | 0.33520<br>1.00540<br>0.01145<br>0.87000  
   | 0.00141<br>0.00424<br>0.00005<br>0.00367<br>Predicted (BC   | is)  | Actual/Pred  
  |  |  |  |                              |                              |
| Pellet Input<br>Total<br>Dejacket Waste<br>Acid Dissol   | MK-10.6<br>MK-10.6<br>MK-10.6   
  | BNP-20<br>BNP-15, 23, 20<br>BNP-15, 23, 20<br>: (Np caustic + N  
   | 21<br>21<br>21<br>21<br>21<br>21  | DJ-21, 030523-001<br>AD-21, 030523-00                         
   | 89.39%<br>1<br>2   | Actual 0.8767  | 0.33520<br>1.00540<br>0.01145<br>0.87000  
   | 0.00141<br>0.00424<br>0.00005<br>0.00367<br>Predicted (BC   | S)   | Actual/Pred<br>#DIV/0!   
  |  |  |  |                              |                              |
| Pellet Input<br>Total<br>Dejacket Waste<br>Acid Dissol<br>Np Residual Am<br>Pu-238/Total Pu<br>Conversion of Na  | MK-10.6<br>MK-10.6<br>MK-10.6<br>(wt basis) =<br>(wt basis) =<br>to Pu (mol bas   
  | BNP-20<br>BNP-15, 23, 20<br>BNP-15, 23, 20<br>: (Np caustic + N<br>is) = Pu-238 cau                          
   | 21<br>21<br>21<br>21<br>21<br>21<br>21<br>21<br>21<br>21<br>21<br>21<br>21<br>2   | DJ-21, 030523-001<br>AD-21, 030523-001                        
   | 89.39%   | Actual 0.8767 0.8767 0.8767  | 0.33520<br>1.00540<br>0.01145<br>0.87000  
   | 0.00141<br>0.00424<br>0.00005<br>0.00367<br>Predicted (BC   | S)   | Actual/Pred<br>#DIV/0!<br>#DIV/0!<br>#DIV/0!   
  |  |  |  |                              |                              |
| Pellet Input<br>Total<br>Dejacket Waste<br>Acid Dissol<br>Np Residual Am<br>Pu-238/Total Pu<br>Conversion of Np<br>Conversion of Np  | MK-10.6<br>MK-10.6<br>MK-10.6<br>(wt basis) =<br>p to Pu (mol bas<br>p to FP (mol bas   
  | BNP-20<br>BNP-15, 23, 20<br>BNP-15, 23, 20<br>(Np caustic + N<br>is) = Pu-238 cau<br>s) = (Sum of fiss       
   | 21<br>21<br>21<br>21<br>21<br>21<br>21<br>21<br>21<br>21<br>21<br>21<br>21<br>2   | DJ-21, 030523-001<br>AD-21, 030523-001<br>itc + total Pu )/ Np
in<br>tic and acid / Np inp  | 89.39%   | Actual<br>0.8767<br>0.8781<br>0.1276<br>0.0005   | 0.33520<br>1.00540<br>0.01145<br>0.87000  
   | 0.00141<br>0.00424<br>0.00005<br>0.00367<br>Predicted (BC   | 55)  | Actual/Pred<br>#DIV/0!<br>#DIV/0!<br>#DIV/0!   
  |  |  |  |                              |                              |
| Pellet Input<br>Total<br>Dejacket Waste<br>Acid Dissol<br>Np Residual Am<br>Pu-238/Total Pu<br>Conversion of Ny<br>Conversion of Ny<br>Fractional loss of  | MK-10.6<br>MK-10.6<br>MK-10.6<br>(wt basis) =<br>p to Pu (mol bas)<br>f Np in Lig Waste<br>G Di = Lig Waste   
  | BNP-20<br>BNP-15, 23, 20<br>BNP-15, 23, 20<br>(Np caustic + N<br>is) = Pu-238 cat<br>s) = (Sum of fiss<br>(wt
basis) = N   | 21<br>21<br>21<br>21<br>21<br>21<br>21<br>21<br>21<br>21<br>21<br>21<br>21<br>2   | DJ-21, 030523-001<br>AD-21, 030523-000<br>tic + total Pu )/ Np
in<br>tic and acid / Np inp<br>• Np dejacket) =  | 89.39%<br>1<br>2<br>1put =<br>but )=   | Actual 0.8767 0.8767 0.000 0.013 0.000 0.0   | 0.33520<br>1.00540<br>0.01145<br>0.87000  
   | 0.00141<br>0.00424<br>0.00005<br>0.00367<br>Predicted (BC   | S)   | Actual/Pred<br>#DIV/0!<br>#DIV/0!<br>#DIV/0!   
  |  |  |  |                              |                              |
| Pellet Input<br>Total<br>Dejacket Waste<br>Acid Dissol<br>Np Residual Am<br>Pu-238/Total Pu<br>Conversion of Ny<br>Fractional loss of<br>Fractional loss of  | MK-10.6<br>MK-10.6<br>MK-10.6<br>(wt basis) =<br>(wt basis) =<br>p to Pu (mol bas<br>p to FP (mol bas<br>f Np in Liq Waste<br>f Pu in Liq Waste   
  | BNP-20<br>BNP-15, 23, 20<br>BNP-15, 23, 20<br>(Np caustic + N<br>is) = Pu-238 cat<br>s) = (Sum of fiss<br>t
(wt basis) = Nj<br>(wt basis) = P  | 4p acid)/ Np input =<br>= stic + Pu-239 causi<br>ion product) in caus<br>o caustic /(Np acid +<br>u caustic /(Pu caust  | DJ-21, 030523-001<br>AD-21, 030523-003<br>tic + total Pu )/
Np in<br>tic and acid / Np inp  | 89.39%<br>2<br>1<br>1<br>2<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1  | Actual<br>0.8767<br>0.8787<br>0.0000<br>0.0130<br>0.0012   | 0.33520<br>1.00540<br>0.01145<br>0.87000   
  | 0.00141<br>0.00424<br>0.00005<br>0.00367<br>Predicted (BC   | iS)  | Actual/Pred<br>#DIV/0!<br>#DIV/0!<br>#DIV/0!  
   |  |  |  |                              |                              |
| Pellet Input<br>Total<br>Dejacket Waste<br>Acid Dissol<br>Pu-238/Total Pu<br>Conversion of Nj<br>Conversion of Nj<br>Fractional Ioss of<br>Fractional Ioss of  | MK-10.6<br>MK-10.6<br>MK-10.6<br>MK-10.6<br>(wt basis) =<br>p to FP (mol bas<br>p to FP (mol bas<br>p to FP (mol bas<br>f Pu in Liq Waste   
  | BNP-20<br>BNP-15, 23, 20<br>BNP-15, 23, 20<br>• (Np caustic + N<br>is) = Pu-238 cau<br>s) = (Sum of fiss<br>•
(wt basis) = N<br>• (wt basis) = P   | 4p acid)/ Np input =<br>=<br>=<br>stic + Pu-239 causi<br>ion product) in caus<br>p caustic/ (Np acid 4<br>u caustic/ (Pu caust  | DJ-21, 030523-00<br>AD-21, 030523-00<br>AD-21,
030523-00<br>tic + total Pu )/ Np in<br>tic and acid / Np inp<br>+ Np dejacket) =<br>ic + Pu acid) =   | 89.39%   | Actual<br>0.8767<br>0.8781<br>0.1276<br>0.0005<br>0.0130<br>0.0012   | 0.33520<br>1.00540<br>0.01145<br>0.87000  
   | 0.00141<br>0.00424<br>0.00005<br>0.00367<br>Predicted (BC   | 38)  | Actual/Pred<br>#DIV/0!<br>#DIV/0!<br>#DIV/0!   
  |  |  |  |                              |                              |
| Pellet Input<br>Total<br>Dejacket Waste<br>Acid Dissol<br>Np Residual Am<br>Pu-230/Total Pu<br>Conversion of Nj<br>Fractional loss of<br>Fractional loss of  | MK-10.6<br>MK-10.6<br>MK-10.6<br>(wt basis) =<br>p to Pu (mol bas<br>p to FP (mol bas<br>p to FP (mol bas<br>f Pp in Liq Waste  
  | BNP-20<br>BNP-15, 23, 20<br>BNP-15, 23, 20<br>(Np caustic + N<br>is) = Pu-238 cat<br>s) = (Sum of fiss<br>(wt
basis) = N<br>(wt basis) = P   | P acidy Np input = 2<br>stic + Pu-239 causi<br>ion product) in caus<br>p caustic (Np acid +<br>u caustic /(Pu caust   | DJ-21, 030523-00<br>[AD-21, 030523-00<br>itic + total Pu J/ Np
in<br>itic and acid / Np inp<br>* Np dejackett) =<br>ic + Pu acid) =   | 89.39%   | Actual<br>0.8767<br>0.8787<br>0.1277<br>0.0005<br>0.0130<br>0.0012   | 0.33520<br>1.00540<br>0.01145<br>0.87000  
   | 0.00141<br>0.0042<br>0.00020<br>0.000367<br>Predicted (BC   | SS)  | Actual/Pred<br>#DIV/01<br>#DIV/01<br>#DIV/0!   
  |  |  |  |                              |                              | | | | | | | | | | | |
| Pellet Input<br>Total<br>Dejacket Waste<br>Acid Dissol<br>Np Residual Am<br>Pu-238/Total Pu<br>Conversion of Nj<br>Conversion of   | MK-10.6<br>MK-10.6<br>MK-10.6<br>(wt basis) =<br>(wt basis) =<br>p to Pu (mol basis)<br>p to FP (mol basis)<br>f Np in Liq Waster<br>f Pu in Liq Waster<br>t Discharge   | BNP-20<br>BNP-15, 23, 20<br>BNP-15, 23, 20<br>(Np caustic + N<br>(s) = Pu-238 cau<br>s) = (Sun of fiss<br>(wt basis) = N<br>(wt basis) = P   | 21<br>21<br>21<br>21<br>22<br>21<br>22<br>23<br>25<br>24<br>24<br>24<br>24<br>24<br>24<br>24<br>24<br>24<br>24<br>24<br>24<br>24  | DJ-21, 030523-00<br>AD-21, 030523-00<br>tic + total Pu // Np in<br>tic and acid / Np ing<br>tic and acid / Np ing<br>tic + Dy dejackt) =<br>tic + Pu acid) =<br>Pu-236 t1/2   | 89.39%   | Actual<br>Actual<br>0.8767<br>0.1276<br>0.0002<br>0.0133<br>0.0012<br>Adjusted<br>Adjusted   | 0.33520<br>1.00540<br>0.01145<br>0.87000  | 0.00141<br>0.00424<br>0.00005<br>0.000367<br>Predicted (BC  | Pu23811/2  | Actual/Pred<br>#DIV/0!<br>#DIV/0!<br>#DIV/0!<br>#DIV/0!   |  |  |  |                              |                              |
| Pellet Input<br>Total<br>Dejacket Waste<br>Acid Dissol<br>Np Residual Arm<br>Pu-238/Total Pu<br>Conversion of Nj<br>Conversion of Nj<br>Conversion of Sy<br>Conversion of  | MK-10.6           MK-10.6           MK-10.6           wtbasis) =           p to Pu (mol bas<br>p to FP (mol bas<br>p to FP (mol bas<br>f Pu in Liq Waste           t         Discharge<br>Date           11/1/2001   | BNP-20<br>BNP-15, 23, 20<br>BNP-15, 23, 20<br>(Np caustic + N<br>is) = Pu-238 cat<br>s) = (Sum of fiss<br>(wt basis) = N<br>(wt basis) = N<br>(wt basis) = N<br>Analysis Date<br>6///2009  | 21<br>21<br>21<br>21<br>21<br>stic + Pu-239 causi<br>on product) in caus<br>p caustic (Np acid 4<br>u caustic (Pu caust<br>Time elapsed (t)<br>days<br>-582 n0  | DJ-21, 030523-00<br>AD-21, 030523-00<br>tic + total Pu // Np in<br>tic and acid / Np inp<br>tic and acid / Np inp<br>tic + Dta did =<br>tic + Pu acid) =<br>tic + Pu acid) =<br>Pu-236 t1/2<br>years<br>2 85  | 89.39%   | Actual<br>Actual<br>0.8767<br>0.8787<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.8781<br>0.8767<br>0.8767<br>0.8767<br>0.8767<br>0.8767<br>0.8767<br>0.8767<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076<br>0.0076   | 0.33520<br>1.00540<br>0.01145<br>0.87000  | 0.00141<br>0.00424<br>0.00005<br>0.00367<br>Predicted (BC<br>Pu-238<br>t1/2, years<br>87 7  | Pu238 t1/2<br>days<br>2003 425   | Actual/Pred<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01  |  |  |  |                              |                              |
| Pellet Input<br>Total<br>Dejacket Waste<br>Acid Dissol<br>Np Residual Am<br>Pu-238/Total Pu<br>Conversion of Nj<br>Fractional loss of<br>Fractional loss of<br>Pu-236 content<br>ppm<br>2.66   | MK-10.6           MK-10.6           MK-10.6           MK-10.6           ount (wt basis) =<br>(wt basis) =<br>to FP (mol bas<br>p to FP (mol bas)) = (mol bas p to FP (mol bas)) = (mol baba)) = (mol bas p to FP (mol bas)) = (mol baba)) = (mo  | BNP-20<br>BNP-15, 23, 20<br>BNP-15, 23, 20<br>• (Np caustic + N<br>is) = Pu-238 cau<br>s) = (Sum of fiss<br>• (wt basis) = N<br>• (wt basis) = P<br>• (wt basis) = P<br>Analysis Date<br>6/6/2003  | 21<br>21<br>21<br>21<br>22<br>21<br>22<br>23<br>22<br>24<br>25<br>22<br>25<br>22<br>25<br>22<br>25<br>22<br>25<br>22<br>25<br>22<br>25<br>22<br>25<br>25  | DJ-21, 030523-00<br>AD-21, 030523-00<br>tic + total Pu // Np in<br>tic and acid / Np inp<br>+ Np dejacket) =<br>tic + Pu acid) =<br>Pu-236 t1/2<br>years<br>2.85  | 89.39%   | Actual<br>Actual<br>0.8767<br>0.0076<br>0.0076<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014<br>0.0014   | 0 33520<br>1.00540<br>0.01145<br>0.01145<br>0.87000<br>7<br>2<br>2  | 0.0014<br>0.00424<br>0.00006<br>0.00367<br>Predicted (BC  | Pu238 t1/2<br>days<br>32032.425  | Actual/Pred<br>#DIV/01<br>#DIV/02<br>#DIV/02<br>#DIV/02<br>#DIV/02<br>#DIV/02<br>#DIV/02<br>#DIV/02<br>#DIV/02<br>#DIV/02<br>#DIV/01  |  |  |  |                              |                              |
| Pellet Input<br>Total<br>Dejacket Waste<br>Acid Dissol<br>Np Residual Am<br>Pu-23877total Pu<br>Conversion of Ny<br>Fractional loss o<br>Fractional loss o<br>Pu-236 content<br>ppm<br>2.62<br>Reference 1   | MK-10.6<br>MK-10.6<br>MK-10.6<br>MK-10.6<br>(wt basis) =<br>(wt basis) =<br>p to Pu (mol basis)<br>f Np in Liq Waster<br>f Pu in Liq Waster<br>t Discharge<br>Date<br>2 11/1/2001<br>mation  | BNP-20<br>BNP-15, 23, 20<br>BNP-15, 23, 20<br>(Np caustic + N<br>(is) = Pu-238 caused<br>(intermediate of the second<br>second second second second second second<br>second second second second second second<br>(intermediate of the second secon   | 21<br>21<br>21<br>22<br>21<br>22<br>21<br>22<br>23<br>24<br>24<br>24<br>24<br>24<br>24<br>24<br>24<br>24<br>24<br>24<br>24<br>24  | DJ-21, 030523-00<br>AD-21, 030523-00<br>tic + total Pu // Np ir<br>tic and acid // pi nc<br>+ Np dejacket) =<br>tic + Pu acid) =<br>Pu-236 t1/2<br>years<br>2.85  | 89.39%   | Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Act  | 0 33520<br>1.0540<br>0.01145<br>0.87000<br>   | 0.00141<br>0.00424<br>0.00005<br>0.00367<br>Predicted (BC<br>Pu-238<br>t1/2, years<br>87.7<br>7.05  | Pu238 t1/2<br>days<br>32032.425  | Actual/Pred<br>#DIV/0!<br>#DIV/0!<br>#DIV/0!<br>#DIV/0!<br>Adjusted<br>Pu-238,g<br>0.1146   | Co. 194  |  | 00.444   | Eu. 465                      | E11 464                      |
| Pellet Input<br>Total<br>Dejacket Waste<br>Acid Dissol<br>Np Residual Arm<br>Pu-238/Total Pu<br>Conversion of Ny<br>Fractional loss o<br>Fractional loss o<br>Pu-236 content<br>ppm<br>2.62<br>Reference Infor   | MK-10.6           MK-10.6           MK-10.6           MK-10.6           intervention           (wt basis) =           p to Pu (mol basis) =           p to Pu in Liq Waster           p to Intervention           t           Discharge           Date           t           mation           MW   | BNP-20<br>BNP-15, 23, 20<br>BNP-15, 23, 20<br>BNP-15, 23, 20<br>(Np caustic + N<br>is) = Pu-238 cat<br>s) = (Sum of fiss<br>(wt basis) = N<br>(wt basis) = P<br>Analysis Date<br>6/6/2003<br>Density   | 21           21           21           21           21           21           30           asid: + Pu-239 causi ion product) in cause p caustic (Np acid 4 u caustic / Pu caustic   | DJ-21, 030523-00<br>AD-21, 030523-00<br>tic + total Pu // Np in<br>tic and acid / Np in<br>tic and acid / Np in<br>tic + Pu acid =<br>tic + Pu acid =<br>Pu-236 t1/2<br>years<br>2.85   | 89.39%<br>2<br>2<br>Pu-236 11/2<br>days<br>1040.9/<br>Analysis   | Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Act  | 0.33520<br>1.00540<br>0.0145<br>0.0145<br>0.87000<br>   | 0.00141<br>0.00424<br>0.00026<br>0.00367<br>Predicted (BC<br>Pu-238<br>t1/2, years<br>87.7<br>2/r-95<br>Bg/ml   | Pu238 t1/2<br>days<br>32032.425<br>Ru-106<br>Bg/ml   | Actual/Prod<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#D | Cs-134<br>Bo/mi  | Cs-137<br>Bg/ml  | Ce-144<br>Ba/mi  | Eu-155<br>Ba/mi              | Eu- 154<br>Ba/mi             |
| Pellet Input<br>Total<br>Dejacket Waste<br>Acid Dissol<br>Pu-238/Total Pu<br>Conversion of Nj<br>Fractional loss o<br>Fractional loss o<br>Pu-236 content<br>ppm<br>2.66<br>Reference Infor  | MK-10.6           MK-10.6           MK-10.6           MK-10.6           MK-10.8           ount (wt basis) =           (wt basis) =           to PL (mol basis) =<  | BNP-20<br>BNP-15, 23, 20<br>BNP-15, 23, 20<br>BNP-15, 23, 20<br>(Np caustic + N<br>is) = Pu-28 cate<br>) = Sund fission<br>) = (Sund fission<br>) = (Wind fission  | ip acidy Np input =<br>acidy Np input =<br>acidy Np input =<br>acidy Np acidy in acidy<br>p acidy (Np acid +<br>u caustic (Np acid +<br>u caustic (Pu caust<br>Time etapsed (t)<br>days<br>-582.00  | DJ-21, 030523-00<br>AD-21, 030523-00<br>itic + total Pu /y Np in<br>tic and acid / Np ing<br>▶ Np dejacket) =<br>itic + Pu acid) =<br>Pu-236 t1/2<br>years<br>2.85  | 89.39%<br>1 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4  | Actual<br>0.8767<br>0.8787<br>0.0276<br>0.0276<br>0.0030<br>0.0132<br>0.0132<br>0.0012<br>Adjusted<br>Pu-236 ppm<br>9.3.86<br>Sample<br>DJ-21,030523-001   | 0 33520<br>1.0540<br>0.0145<br>0.0145<br>0.87000<br>2<br>2<br>2<br>Co-60<br>Bq/mL   | 0.00141<br>0.00424<br>0.00005<br>0.00367<br>Predicted (BC<br>Predicted (BC<br>Pu-238<br>t1/2, years<br>87.7<br>Zr-95<br>Bq/mL   | Pu238 t1/2<br>days<br>32032.425<br>Ru-106<br>Bq/mL<br>2.10E+06   | Actual/Pred<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01  | Cs-134<br>Bq/mL<br>1.90E+05  | Cs-137<br>Bq/mL<br>1.60E+06  | Ce-144<br>Bg/mL  | Eu- 155<br>Bg/mL             | Eu- 154<br>Bg/mL             |
| Pellet Input<br>Total<br>Dejacket Waste<br>Acid Dissol<br>Np Residual Am<br>Pu-2387 Total Pu<br>Conversion of Ni<br>Fractional loss o<br>Fractional loss o<br>Fractional loss o<br>Reference Infor<br>NpO <sub>2</sub> <sup>237</sup> (oxide)  | MK-10.6           MK-10.6           MK-10.6           MK-10.6           MK-10.6           Optimized State           Out (wt basis) =           0 to PU (mol basis) =           10 to PU (mol basis) =           1 to PU (mol basis) =           2           1 tri/i2001           mation           MW           283.047  | BNP-20<br>BNP-15, 23, 20<br>BNP-15, 23, 20<br>(Np caustic + N<br>is) = Pu-238 cat<br>) =   | 21       | DJ-21, 030523-00<br>AD-21, 030523-00<br>itic + total Pu / Np ir<br>dic and acid / Np ing<br>+ Np dejacket) =<br>tic + Pu acid) =<br>Pu-236 t1/2<br>years<br>2.85  | 89.39%<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>4<br>2<br>1<br>4<br>2<br>1<br>4<br>2<br>1<br>2<br>1<br>4<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>2<br>1<br>1<br>2<br>1<br>1<br>2<br>1<br>1<br>2<br>1<br>1<br>2<br>1<br>1<br>2<br>1<br>1<br>2<br>1<br>1<br>2<br>1<br>1<br>2<br>1<br>1<br>2<br>1<br>1<br>2<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1 | Actual<br>Actual<br>Actual<br>0.8767<br>0.0276<br>0.0076<br>0.0012<br>0.0130<br>0.0130<br>0.0130<br>0.0130<br>0.0130<br>0.0012<br>Adjusted<br>Pu-236 ppm<br>3.866<br>Sample<br>DJ-21,030523-001<br>AD-21,030523-002  | Co-60<br>Bq/mL<br>2.40E+04  | 0.00141<br>0.00424<br>0.00002<br>0.000367<br>Predicted (BC<br>Predicted (BC<br>Pu-238<br>t1/2, years<br>87.7<br>Zr-95<br>Bq/mL<br>4.40E+05  | Pu238 t1/2<br>days<br>32032.425<br>Ru-106<br>Bq/mL<br>2.10E+06<br>1.00E+07   | Actual/Pred<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#D | Cs-134<br>Bg/mL<br>1.90E+05<br>9.60E+04  | Cs-137<br>Bq/mL<br>1.60E+06<br>7.90E+05  | Ce-144<br>Bq/mL<br>1.30E+07  | Eu- 155<br>Bq/mL<br>1.30E+05 | Eu-154<br>Bq/mL<br>5.10E+04  |
| Pellet Input<br>Total<br>Dejacket Waste<br>Acid Dissol<br>Np Residual Am<br>Pu-238/Total Pu<br>Conversion of Nj<br>Fractional loss o<br>Fractional loss o<br>Fractional loss o<br>Reference Infor<br>NpO <sub>3</sub> <sup>227</sup> (oxide)<br>Np237  | MK-10.6           MK-10.6           MK-10.6           MK-10.6           MK-10.6           John Statistics           (wt basis)           10 D Pul (mol basis)           11/1/2001           Tatle           MW           280.047           230.042           230.042  
  | ENP-20<br>ENP-15, 23, 20<br>ENP-15, 23, 20<br>ENP-15, 23, 20<br>(Np caustic + 1.<br>is) = Pu-238 cat<br>(wt basis) = N<br>(wt basis) = N<br>(wt basis) =
P<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Constitution<br>Co   | 21           22           23           24           252.00           2           252.00  | DJ-21, 030523-00<br>AD-21, 030523-00<br>tic + total Pu // Np in<br>tic and acid // Np in<br>tic and acid
// Np in<br>tic + Pu acid =<br>tic + Pu acid =<br>tic + Pu acid =<br>2.85  | 89.39%<br>1 2 2 Pu-236 t1/2 days 1040.9( Analysis Gr gamma Alipha & Ref=   | Actual<br>0.8761<br>0.8761<br>0.0732<br>0.0733<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013<br>0.0013   | Co-60<br>Bq/mL<br>2.40E+04  
   | 0.00141<br>0.00424<br>0.00005<br>0.00005<br>0.00005<br>Predicted (BC<br>Predicted (BC<br>Predicted (BC<br>2010<br>87.7<br>21.95<br>Bg/mL<br>4.40E+05<br>Beg/mL  | Pu238 t1/2<br>days<br>32032.425<br>Ru-106<br>Bg/mL<br>2.10E+06<br>1.00E+07   |
Actual/Prod<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#D | Cs-134<br>Bq/mL<br>1.90E+05<br>9.60E+04  | Cs-137<br>Bg/mL<br>1.60E+06<br>7.90E+05  | Ce-144<br>Bq/mL<br>1.30E+07  | Eu- 155<br>Bq/mL<br>1.30E+05 | Eu- 154<br>Bg/mL<br>5.10E+04 |
| Pellet Input<br>Total<br>Dojacket Waste<br>Acid Dissol<br>Pu-238/Total Pu<br>Conversion of Nj<br>Fractional loss o<br>Fractional loss o<br>Pu-236 content<br>ppm<br>2.65<br>Reference Infor<br>NpO <sub>2</sub> <sup>227</sup> (oxide)<br>Np237<br>Pu-238  | MK-10.6           MK           Discharge           Date           2           11/1/2001           MW           MW           239.622           239.642           239.642   
  | ENP-20<br>ENP-20<br>ENP-15, 23, 20<br>ENP-15, 23, 20<br>ENP-15, 23, 20<br>(Np caustic + 1, 1<br>is) = Pu-238 cata<br>) = (Guro dfass) = N<br>(wt basis) = N<br>(wt basis) = N<br>Analysis Date<br>6:6/2003<br>Density<br>g/cc<br>11.143<br>20.476<br>13.851<br>13.851  
   | 21<br>21<br>21<br>22<br>21<br>22<br>21<br>22<br>22<br>22<br>22<br>22<br>22<br>2   | DJ-21, 030523-00<br>AD-21, 030523-00<br>itic + total Pu // Np in<br>titic and acid / Np ing<br>+ Np dejacket) =<br>itic + Pu acid) =<br>Pu-236 t1/2<br>years<br>2.85  |
89.39%<br>1 2 1 1 2 1 1 2 1 1 2 1 1 1 2 1 1 1 1  | Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Actual<br>Act  | Co-60<br>Bq/mL<br>2.40E+04<br>Alpha Bq/mL<br>1.60E+05  
  | 0.00143<br>0.0042<br>0.00005<br>0.00005<br>0.000367<br>Predicted (BC<br>Predicted (BC<br>Pu-238<br>tt/2, years<br>87.7<br>Zr-95<br>Bq/mL<br>4.408-M2<br>Beta Bq/mL<br>6.34E+005   | Pu238 t1/2<br>days<br>32032.425<br>Ru-106<br>Bq/mL<br>2.10E+06<br>1.00E+07<br>total activity Bg/mL<br>6.50E+06   |
Actual/Pred<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#DIV/01<br>#D | Cs-134<br>Bq/mL<br>1.90E+05<br>9.60E+04  | Cs-137<br>Bq/mL<br>1.60E+06<br>7.90E+05  | Ce-144<br>Bq/mL<br>1.30E+07  | Eu- 155<br>Bg/mL<br>1.30E+05 | Eu- 154<br>Bg/mL<br>5.10E+04 |
Pellet Input Total Dejacket Waste Acid Dissol Pu-238/Total Pu Conversion of Ni Fractional loss of Fractional loss of Fractional loss of Reference Infor NpQ <sub>237</sub> (oxide) Np237 Pu-238 Pu-238 Pu-238 Pu-238 Pu-238	MK-10.6           MK-10.6           MK-10.6           MK-10.6           MK-10.6           unt (wt basis)           (wt basis)           to IP (mol basis)           ID Ib (mol basis)           III (Jacob)           Date           Date           Date           Date           20           MW           288,047           238,049           238,049           238,049           240,0533	ENP-20 ENP-15, 23, 20 ENP-15, 23, 20 ENP-15, 23, 20 (Np caustic + h is) = Pu-232 caustic +	21           22           23           245           250           260           27           28           29           200           201           202           203           203           203           203           203           203           203           203           203           203           203           203           203           203           203           203	DJ-21, 030523-00 AD-21, 030523-00 itic + total Pu /) Np ir itic and acid / Np ing + Np dejacket) = itic + Pu acid) = Pu-236 t1/2 years 2.85	89.39% 1 2 1 2 1 2 1 2 1 4 1 2 1 4 2 1 4 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1	Actual Act	Co-60 Bq/mL 2.40E+04 Alpha Bq/mL 1.60E+05 1.50E+08	0.00141 0.0042 0.00005 0.00005 0.000367 Predicted (BC Pu-238 t1/2, years t1/2, years 87.7 Zr-95 Bq/mL 4.40E+05 Beta Bq/mL 6.54E+06 5.00E+07	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 2.10E+06 1.00E+07 Iotal activity Bg/mL 6.50E+06 2.00E+08	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 1.90E+05 9.60E+04	Cs-137 Bq/mL 1.60E+06 7.90E+05	Ce-144 Bq/mL 1.30E+07	Eu- 155 Bq/mL 1.30E+05	Eu-154 Bq/mL 5.10E+04
Pellet Input Total Dejacket Waste Acid Dissol Np Residual Am Pu-238/Total Pu Conversion of Nj Fractional loss o Fractional loss o Fractional loss o Reference Infor NpO <sub>3</sub> <sup>27</sup> (oxide) NpO <sub>3</sub> <sup>27</sup> (oxide) Pu-238 Pu-238 Pu-239 Pu-239 Pu-239 Pu-239 Pu-239	IMK-10.6           MK-10.6           MK-10.6           MK-10.6           MK-10.6           MK-10.6           Immediate the state of the st	ENP-20 ENP-20 ENP-15, 23, 20 ENP-15, 23, 20 I (Np caustic + 1. h is) = Pu-238 cat ) = (Sum of fas ) = (Sum of fas ) = (Sum of fas ) = (Wit basis) = N (wit basis) = N	21           22           23           24           252.00           2 <td>DJ-21, 030523-00 AD-21, 030523-00 tic + total Pu // Np in tic and acid // Np in tic and acid // Np in tic + Pu acid = tic + Pu acid = tic + Pu acid = 2.85</td> <td>89.39% 1 2 2 Pu-236 t1/2 days 1040.9( Analysis Gr gamma Alpha &amp; Beta</td> <td>Actual 0.8761 0.8761 0.0276 0.0733 0.0013</td> <td>Co-60 Bq/mL 2.40E+04 Alpha Bg/mL 1.05E+05 1.50E+08</td> <td>0.00141 0.00424 0.00056 0.00056 Predicted (BC Predicted (BC Predicted (BC 20056 87.7 Zr-95 Bg/mL 4.40E+05 Beta Bg/mL 6.34E+0604 5.00E+07 5.00E+07</td> <td>Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 2.10E+06 1.00E+07 1.00E+07 1.00E+07 2.00E+08 2.00E+08 2.00E+08</td> <td>Actual/Prod #DIV/01 #D</td> <td>Cs-134 Bq/mL 1.90E+05 9.60E+04</td> <td>Cs-137 Bq/mL 1.60E+06 7.90E+05</td> <td>Ce-144 Bg/mL 1.30E+07</td> <td>Eu- 155 Bq/mL 1.30E+05</td> <td>Eu- 154 Bg/mL 5.10E+04</td>	DJ-21, 030523-00 AD-21, 030523-00 tic + total Pu // Np in tic and acid // Np in tic and acid // Np in tic + Pu acid = tic + Pu acid = tic + Pu acid = 2.85	89.39% 1 2 2 Pu-236 t1/2 days 1040.9( Analysis Gr gamma Alpha & Beta	Actual 0.8761 0.8761 0.0276 0.0733 0.0013	Co-60 Bq/mL 2.40E+04 Alpha Bg/mL 1.05E+05 1.50E+08	0.00141 0.00424 0.00056 0.00056 Predicted (BC Predicted (BC Predicted (BC 20056 87.7 Zr-95 Bg/mL 4.40E+05 Beta Bg/mL 6.34E+0604 5.00E+07 5.00E+07	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 2.10E+06 1.00E+07 1.00E+07 1.00E+07 2.00E+08 2.00E+08 2.00E+08	Actual/Prod #DIV/01 #D	Cs-134 Bq/mL 1.90E+05 9.60E+04	Cs-137 Bq/mL 1.60E+06 7.90E+05	Ce-144 Bg/mL 1.30E+07	Eu- 155 Bq/mL 1.30E+05	Eu- 154 Bg/mL 5.10E+04
Pellet Input Total Dojacket Waste Acid Dissol Pu-238/Total Pu Conversion of Nj Fractional loss of Fractional loss of Fractional loss of Pu-236 content ppm 2.6; Reference Infor NpD <sub>2</sub> <sup>237</sup> (oxide) Np237 Pu-238 Pu-239 Pu-240 Pu-241 Pu-242 Conversion	MK-10.6           MW           MW           MW           S28.047           239.052           240.0588           242.0587           3.70E+10	ENP-20 ENP-20 ENP-15, 23, 20 ENP-15, 23, 20 ENP-15, 23, 20 (Np caustic + N is) = Pu-238 cat s) = (Guro d16s ) = (Guro d16s ) = Pu-238 cat ) = (Mt basis) = N (wt basis) = N Analysis Date 6/6/2003 Density g/cc 11.143 20.476 19.851 19.851 19.855	21           22           23           23           23           23           23           23           23           23           23           23           23	DJ-21, 030523-00 AD-21, 030523-00 tic + total Pu J/ Np in tic and acid / Np in tic and acid / Np in tic + Dp dejacket) = tic + Pu acid) = Pu-236 t1/2 years 2.85	89.39% 1 2 1 1 2 1 1 2 1 1 2 1 1 1 2 1 1 1 1	Actual Actual Actual 0.8767 0.8781 0.0012 0.0012 Adjusted Pu-236 ppm JJ-21, 030523-001 AD-21, 030523-002 DJ-21, 03052 DJ-2	Co-60 Bq/mL 2.40E+04 Alpha Bg/mL 1.60E+05 1.50E+08 Np-237 ppb (ng/mL)	0.00141 0.0042 0.00005 0.00005 0.00005 Predicted (BC Predicted (BC Pu-238 tt/2, years 87.7 Zr-95 Bg/ml 4.40E+05 Beta Bg/mL 6.34E+05 S.00E+07 Pu-238	Pu238 t1/2 days 32032.425 Ru-106 Bq/mL 2.10E+06 1.00E+07 Itotal activity Bg/mL 6.50E+06 2.00E+08 Pu-239 ppb (ng/mL)	Actual/Pred #DIV/01 #D	Cs-134 Bq/mL 1.90E+05 9.60E+04 Pu-241 ppb (ra/mL)	Cs-137 Bq/mL 1.60E+06 7.90E+05 Pu-242 ppb (ng/mL)	Ce-144 Bq/mL 1.30E+07 Pu-244 ppb (nq/mL)	Eu- 155 Bq/mL 1.30E+05	Eu- 154 Bq/mL 5.10E+04
Pellet Input Total Dejacket Waste Acid Dissol Pu-238/Total Pu Conversion of Nj Fractional loss o Fractional loss o Pu-236 content ppm 2.62 Reference Infor NpO <sub>3</sub> <sup>27</sup> (oxide) Np237 Pu-238 Pu-239 Pu-240 Pu-241 Pu-241 Pu-242 Conversion	IMK-10.6           IMK-10.6 <t< td=""><td>BNP-20 BNP-15, 23, 20 BNP-15, 23, 20 BNP-15, 23, 20 (Np caustic + N is) = Pu-238 cata ( (vt basis) = N ( (vt basi</td><td>21           21</td><td>DJ-21, 030523-00 AD-21, 030523-00 itic + total Pu // Np in tic and acid / Np ing + Np dejacket) = itic + Pu acid) = Pu-236 t1/2 years 2.85</td><td>89.39% 1 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4</td><td>Actual Actual Actual 0.8767 0.0767 0.0702 0.0132 0.012</td><td>Co-60 Bq/mL 2.40E+04 Alpha Bq/mL 2.40E+04 Alpha Bq/mL 2.20E+04 Alpha Bq/mL 2.20E+04</td><td>0.00143 0.0042 0.00005 0.00005 0.000367 Predicted (BC Predicted (BC Pu-238 ttl/2, years 87.7 Zr-95 Bq/mL 4.40E+05 Beta Bq/mL 6.34E+005 Eveta Bq/mL 6.34E+005 Eveta Bq/mL 6.34E+005 Pu-238 ppb (ng/mL) 3.10E+023</td><td>Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 2.10E+06 1.00E+07 total activity Bg/mL 6.650E+06 2.00E+08 Pu-239 ppb (ng/mL) &lt;5.0E+01</td><td>Actual/Pred #DIV/01 #D</td><td>Cs-134 Bg/mL 1.90E+05 9.60E+04 Pu-241 ppb (rg/mL) &lt;5.0E+01</td><td>Cs-137 Bg/mL 1.60E+06 7.90E+05 Pb-242 pp (ng/mL &lt;5.0E+01</td><td>Ce-144 Bg/mL 1.30E+07 45.0E+01 45.0E+01</td><td>Eu- 155 Bg/mL 1.30E+05</td><td>Eu- 154 Bg/mL 5.10E+04</td></t<>	BNP-20 BNP-15, 23, 20 BNP-15, 23, 20 BNP-15, 23, 20 (Np caustic + N is) = Pu-238 cata ( (vt basis) = N ( (vt basi	21           21	DJ-21, 030523-00 AD-21, 030523-00 itic + total Pu // Np in tic and acid / Np ing + Np dejacket) = itic + Pu acid) = Pu-236 t1/2 years 2.85	89.39% 1 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	Actual Actual Actual 0.8767 0.0767 0.0702 0.0132 0.012	Co-60 Bq/mL 2.40E+04 Alpha Bq/mL 2.40E+04 Alpha Bq/mL 2.20E+04 Alpha Bq/mL 2.20E+04	0.00143 0.0042 0.00005 0.00005 0.000367 Predicted (BC Predicted (BC Pu-238 ttl/2, years 87.7 Zr-95 Bq/mL 4.40E+05 Beta Bq/mL 6.34E+005 Eveta Bq/mL 6.34E+005 Eveta Bq/mL 6.34E+005 Pu-238 ppb (ng/mL) 3.10E+023	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 2.10E+06 1.00E+07 total activity Bg/mL 6.650E+06 2.00E+08 Pu-239 ppb (ng/mL) <5.0E+01	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 1.90E+05 9.60E+04 Pu-241 ppb (rg/mL) <5.0E+01	Cs-137 Bg/mL 1.60E+06 7.90E+05 Pb-242 pp (ng/mL <5.0E+01	Ce-144 Bg/mL 1.30E+07 45.0E+01 45.0E+01	Eu- 155 Bg/mL 1.30E+05	Eu- 154 Bg/mL 5.10E+04
Pellet Input Total Dejacket Waste Acid Dissol Np Residual Am Pu-238/Total Pu Conversion of Nj Fractional Ioss o Fractional Ioss o Fractional Ioss o Reference Infor NpO <sub>3</sub> <sup>37</sup> (oxide) NpO <sub>3</sub> <sup>37</sup> (oxide) Pu-238 Pu-	MK-10.6           MK-10.6           MK-10.6           MK-10.6           MK-10.6           Unt (wt basis) =           0 to Ev (mob basis) =           10 to EV (mob basis) =           11/1/2001           mation           MW           288.0467           238.0468           238.0468           238.0468           238.0458           240.0578           240.0578           3.70E+10           5 days/year	ENP-20 ENP-15, 23, 20 ENP-15, 23, 20 ENP-15, 23, 20 I (Np caustic + N is) = Pu-238 caustic	Vp acidly Np input = acidly Np input = astic + Pu-239 causi on product) in cause p caustic (Np acid + u caustic (Pu causi tu caustic (Pu causi -582.00	DJ-21, 030523-00 AD-21, 030523-00 tic + total Pu // Np in dic and acid // Np in r Np dejacket) = tic + Pu acid) = tic + Pu acid) = Pu-236 t1/2 years 2.85	89.39% 1 2 Pu-236 t1/2 days 1040.94 Analysis Gr gamma Alpha & Beta	Actual Act	0.33520           1.00540           0.0145           0.0145           0.0145           0.0145           0.87000           r           1.00540           2.10540           2.10550           3.10550           3.10550           3.10550           3.10550           3.10550           3.10550           3.10550           3.10550           3.1050	0.00141 0.00141 0.00005 0.00005 0.00005 Predicted (BC Predicted (BC Pred	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 2.10E+06 1.00E+07 total activity Bg/mL 6.50E+06 2.00E+08 Pu-239 ppb (ng/mL) -	Actual/Prod #DIV/01 #D	Cs-134 Bg/mL 1.90E+05 9.60E+04 Pu-241 ppb (ng/mL) <5.0E+01 4.60E+02	Cs-137 Bq/mL 1.60E+06 7.90E+05 Pu-242 ppb (ng/mL) <5.0E+01 6.00E+01	Ce-144 Bg/mL 1.30E+07 PU-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bq/mL 1.30E+05	Eu-154 Bg/mL 5.10E+04
Pellet Input Total Dejacket Waste Acid Dissol Np Residual Am Pu-238/Total Pu Conversion of Ny Fractional loss o Fractional loss o Fractional loss o Reference Infor Np237 Pu-238 Reference Infor Np237 Pu-239 Pu-240 Pu-242 Conversion Soft 23 Pu-241 Pu-242	MK-10.6           MK-10.6 <td< td=""><td>ENP-20 ENP-20 ENP-15, 23, 20 ENP-15, 23, 20 (Np caustic + 1. is) = Pu-238 cas s) = (Sum of files s) = (Sum of files s) = (W basis) = N (W basis) = N (W basis) = P Analysis Date 5(6/2003 Density g/cc 11,143 20,476 19,851 11,143 19,851</td><td>time elapsed (t) Time elapsed (t) -582.00</td><td>DJ-21, 030523-00 AD-21, 030523-00 tic + total Pu // Np in tic and acid / Np in tic and acid / Np in the Pejacket1 = tic + Pu acid) = Pu-236 t1/2 years 2.85</td><td>89.39%         1           2        </td><td>Actual Actual 0.8767 0.8787 0.0276 0.0012 Adjusted Pu-236 ppm JJ-21,030523-001 AD-21,030523-002 DJ-21,030523-002 AD-21,03052</td><td>Co-60 Bq/mL 2.20E+04 Alpha Bq/mL 1.50E+08 Np-237 ppb (ng/mL) 2.29E+04 1.76E+08 Pu-236(Pu-238</td><td>0.00141 0.0042 0.00005 0.00005 0.00005 Predicted (BC Predicted (BC Predi</td><td>Pu238 t1/2 days 32032.425 Ru-106 Bq/mL 2.10E+06 1.00E+07 total activity Bq/mL 6.50E+06 2.00E+09 Pu-239 ppb (ng/mL) &lt;5.0E+01 2.82E+04</td><td>Actual/Pred #DIV/01 #D</td><td>Cs-134 Bg/mL 1.90E+05 9.60E+04 Pu-241 ppb (ng/mL) &lt;5.0E+01 4.60E+02</td><td>Cs-137 Bg/mL 1.60E+06 7.90E+05 Pu-242 ppb (ng/mL) &lt;5.0E+01 6.00E+01</td><td>Ce-144 Bq/mL 1.30E+07 Pu-244 ppb (ng/mL) &lt;5.0E+01 &lt;5.0E+01</td><td>Eu-155 Bg/mL 1.30E+05</td><td>Eu- 154 Bg/mL 5.10E+04</td></td<>	ENP-20 ENP-20 ENP-15, 23, 20 ENP-15, 23, 20 (Np caustic + 1. is) = Pu-238 cas s) = (Sum of files s) = (Sum of files s) = (W basis) = N (W basis) = N (W basis) = P Analysis Date 5(6/2003 Density g/cc 11,143 20,476 19,851 11,143 19,851	time elapsed (t) Time elapsed (t) -582.00	DJ-21, 030523-00 AD-21, 030523-00 tic + total Pu // Np in tic and acid / Np in tic and acid / Np in the Pejacket1 = tic + Pu acid) = Pu-236 t1/2 years 2.85	89.39%         1           2	Actual Actual 0.8767 0.8787 0.0276 0.0012 Adjusted Pu-236 ppm JJ-21,030523-001 AD-21,030523-002 DJ-21,030523-002 AD-21,03052	Co-60 Bq/mL 2.20E+04 Alpha Bq/mL 1.50E+08 Np-237 ppb (ng/mL) 2.29E+04 1.76E+08 Pu-236(Pu-238	0.00141 0.0042 0.00005 0.00005 0.00005 Predicted (BC Predicted (BC Predi	Pu238 t1/2 days 32032.425 Ru-106 Bq/mL 2.10E+06 1.00E+07 total activity Bq/mL 6.50E+06 2.00E+09 Pu-239 ppb (ng/mL) <5.0E+01 2.82E+04	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 1.90E+05 9.60E+04 Pu-241 ppb (ng/mL) <5.0E+01 4.60E+02	Cs-137 Bg/mL 1.60E+06 7.90E+05 Pu-242 ppb (ng/mL) <5.0E+01 6.00E+01	Ce-144 Bq/mL 1.30E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu-155 Bg/mL 1.30E+05	Eu- 154 Bg/mL 5.10E+04
Pellet Input Total Dejacket Waste Acid Dissol Pu-238/Total Pu Conversion of Nj Fractional loss o Fractional loss o Fractional loss o Reference Infor NpO <sub>3</sub> <sup>27</sup> (oxide) Np237 Pu-238 Pu-239 Pu-240 Pu-242 Conversion 365.25	MK-10.6 MK-10.6 MK-10.6 MK-10.6 MK-10.6 (wf basis) = 10 FP (m0 basis) = 11 // i2001 mation MW 263.047 233.0482 238.0459 239.0522 240.0553 240.0553 3.70E+10 5. days/year	ENP-20 ENP-15, 23, 20 ENP-15, 23, 20 ENP-15, 23, 20 (Np caustic + h is) = Pu-23 caustic + h is) = Caustic + h (with basis) = P Analysis Data co6/2003 Density g/cc 11.143 20.476 19.851 19.851 19.851 19.851 Eq/C1	Vp acidy Np input = = 21 vp acidy Np input = = 100 m product) in cause p caustic (Np acid 4 u caustic (Pu caust Time elapsed (t) days -582.00	DJ-21, 030523-00 AD-21, 030523-00 itic + total Pu // Np in tic and acid / Np ing + Np dejacket) = itic + Pu acid) = Pu-236 t1/2 years 2.85	89.39%         1           2	Actual 0.8767 0.8787 0.0876 0.073 0.013 0.013 0.0012 Adjusted Pu-236 ppm 0.0005 0.013 0.0012 DJ-21,030523-001 AD-21,030523-002 DJ-21,030523-002 DJ-21,03052 DJ-21,0305 DJ-21,0305 DJ-21,0305 DJ-21,0305 DJ-21,0305 DJ-21,0305 DJ-21,030 DJ-21,0305 DJ-21,0305 DJ-21,030 DJ-21,00	Co-60 Bq/mL Co-60 Bq/mL Co-60 Bq/mL Co-60 Bq/mL Co-60 Bq/mL Co-60 Bq/mL Co-60 Bq/mL Co-60 Bq/mL Co-60 Bq/mL Co-60 Bq/mL Co-60 Bq/mL Co-60 Bq/mL Co-60 Bq/mL Co-60 Bq/mL Co-60 Co-60 Bq/mL Co-60 Co-60 Bq/mL Co-60 Co-60 Bq/mL Co-60 Co-60 Bq/mL Co-60 Co-60 Bq/mL Co-60 Co-60 Bq/mL Co-60 Co-60 Bq/mL Co-60 Co-60 Bq/mL Co-60 Co-60 Bq/mL Co-60 Co-60 Bq/mL Co-60 Co-60 Bq/mL Co-60 Co-60 Bq/mL Co-60 CO-60	0.00141 0.0042 0.00005 0.00005 0.000367 Predicted (BC Predicted (BC Pred	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 2.10E+06 1.00E+07 total activity Bg/mL 6.50E+06 2.00E+08 Pu-239 ppb (ng/mL) <5.0E+01 2.62E+04	Actual/Pred #DIV/01 #D	Cs-134 Bq/mL 1.90E+05 9.60E+04 Pu-241 ppb (ng/mL) <5.0E+01 4.60E+02	Cs-137 Bq/mL 1.60E+06 7.90E+05 Pu-242 ppb (ng/mL) <5.0E+01 6.00E+01	Ce-144 Bg/mL 1.30E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bg/mL 1.30E+05	Eu- 154 Bq/mL 5.10E+04
Pellet Input Total Dejacket Waste Acid Dissol Np Residual Am Pu-238/Total Pu Conversion of Nj Fractional Ioss o Fractional Ioss o Fractional Ioss o Reference Infor NpO <sub>3</sub> <sup>37</sup> (oxide) NpO <sub>3</sub> <sup>37</sup> (oxide) Pu-238 Pu-238 Pu-238 Pu-238 Pu-238 Pu-239 Pu-240 Pu-241 Pu-240 Pu-	MK-10.6           MK-10.6           MK-10.6           MK-10.6           MK-10.6           Jone Provide State           Log Date           Discharge           Date           2           Jinitz           MW           288.046           238.0466           238.0467           238.0467           238.0467           238.0467           238.0467           238.0467           238.0467           238.0467           238.0467           238.0467           238.0467           238.0467           238.0467           238.0467           238.0467           238.0467           238.0467           238.0467           24.0658           24.0587           3.70E+10           5           24.0587	ENP-20 ENP-20 ENP-15, 23, 20 ENP-15, 23, 20 (I) (Dp caustic + N (i) (p caustic + N (i) (b caustic +	Vp acidly Np input = acidly Np input = asitc + Pu-239 causion product) in cause p caustic (Np acid + u caustic (Pu causi Time elapsed (t) days -582.00	DJ-21, 030523-00 AD-21, 030523-00 tic + total Pu // Np in dic and acid // Np in r Np dejacket) = tic + Pu acid) = tic + Pu acid) = Pu-236 t1/2 years 2.85	89.39%         1           2         2           put =         1           ut ) =         1           Pu-236 t1/2         1           days         1           1040.94         1           Analysis         Gr gamma           Alpha & Beta         ICP           Pu-Alpha Scat         TTA extraction	Actual Act	Co-60 Bq/mL 2.40E+04 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	0.00141 0.00141 0.00005 0.00005 0.00005 Predicted (BC Predicted (BC Pred	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 2.10E+06 1.00E+07 total activity Bg/mL 6.50E+06 2.00E+08 Pu-239 ppb (ng/mL) −<50E+04 2.82E+04	Actual/Prod #DIV/01 #D	Cs-134 Bg/mL 1.90E+05 9.60E+04 Pu-241 ppb (ng/mL) <5.0E+01 4.60E+02	Cs-137 Bq/mL 1.60E+06 7.90E+05 Pu-242 ppb (ng/mL) <5.0E+01 6.00E+01	Ce-144 Bg/mL 1.30E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bq/mL 1.30E+05	Eu-154 Bg/mL 5.10E+04
Pellet Input Total Dojacket Waste Acid Dissol Pu-238/Total Pu Conversion of Ny Fractional loss of Fractional loss of Pu-236 content ppm 2.62 Reference Infor Np02 <sup>337</sup> (oxide) Np237 Pu-238 Pu-239 Pu-240 Pu-242 Conversion 365.21	MK-10.6           MK-10.6 <td< td=""><td>ENP-20 ENP-20 ENP-15, 23, 20 ENP-15, 23, 20 (Np caustic + 1. is) = Pu-238 cat s) = (Sum of files s) = (Sum of files s) = (Wit Dasis) = N (Wit Dasis) =</td><td>vp acidly Np input = = = 2 uslic + Pu-239 caus uslic + Pu-239 caus p caustic (Np acid 4 u caustic /(Pu caust days -582 00</td><td>DJ-21, 030523-00 AD-21, 030523-00 tic + total Pu J/Np in tic and acid / Np ing tic and acid / Np ing tic + Pu acid) = tic + Pu acid) = Pu-236 t1/2 years 2.85</td><td>89.39%         1           2        </td><td>Actual Actual Actual 0.8767 0.8781 0.0276 0.0012 Adjusted Pu-236 ppm JJ-21,030523-001 AD-21,030523-002 AD</td><td>Co-60 Bq/mL 2.20E+04 Alpha Bq/mL 1.50E+03 Alpha Bq/mL 1.50E+03 Np-237 ppb (ng/mL) 2.29E+04 1.74E+06 Pu-236/Pu-238 ppm (ug/mL) 2.62</td><td>0.00141 0.0042 0.00005 0.00005 0.00005 0.00005 Predicted (BC Predicted (</td><td>Pu238 t1/2 days 32032.425 Ru-106 Bq/mL 2.10E+06 1.00E+07 total activity Bq/mL 6.650E+06 2.00E+03 Pu-239 ppb (ng/mL) &lt;5.0E+01 2.82E+04</td><td>Actual/Pred #DIV/01 #D</td><td>Cs-134 Bg/mL 1.90E+05 9.60E+04 Pu-241 ppb (ng/mL) &lt;5.0E+01 4.60E+02</td><td>Cs-137 Bg/mL 1.60E+06 7.90E+05 Pu-242 ppb (ng/mL) &lt;5.0E+01 6.00E+01</td><td>Ce-144 Bg/mL 1.30E+07 Pu-244 ppb (ng/mL) &lt;5.0E+01 &lt;5.0E+01</td><td>Eu-155 Bg/mL 1.30E+05</td><td>Eu-154 Bg/mL 5.10E+04</td></td<>	ENP-20 ENP-20 ENP-15, 23, 20 ENP-15, 23, 20 (Np caustic + 1. is) = Pu-238 cat s) = (Sum of files s) = (Sum of files s) = (Wit Dasis) = N (Wit Dasis) =	vp acidly Np input = = = 2 uslic + Pu-239 caus uslic + Pu-239 caus p caustic (Np acid 4 u caustic /(Pu caust days -582 00	DJ-21, 030523-00 AD-21, 030523-00 tic + total Pu J/Np in tic and acid / Np ing tic and acid / Np ing tic + Pu acid) = tic + Pu acid) = Pu-236 t1/2 years 2.85	89.39%         1           2	Actual Actual Actual 0.8767 0.8781 0.0276 0.0012 Adjusted Pu-236 ppm JJ-21,030523-001 AD-21,030523-002 AD	Co-60 Bq/mL 2.20E+04 Alpha Bq/mL 1.50E+03 Alpha Bq/mL 1.50E+03 Np-237 ppb (ng/mL) 2.29E+04 1.74E+06 Pu-236/Pu-238 ppm (ug/mL) 2.62	0.00141 0.0042 0.00005 0.00005 0.00005 0.00005 Predicted (BC Predicted (	Pu238 t1/2 days 32032.425 Ru-106 Bq/mL 2.10E+06 1.00E+07 total activity Bq/mL 6.650E+06 2.00E+03 Pu-239 ppb (ng/mL) <5.0E+01 2.82E+04	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 1.90E+05 9.60E+04 Pu-241 ppb (ng/mL) <5.0E+01 4.60E+02	Cs-137 Bg/mL 1.60E+06 7.90E+05 Pu-242 ppb (ng/mL) <5.0E+01 6.00E+01	Ce-144 Bg/mL 1.30E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu-155 Bg/mL 1.30E+05	Eu-154 Bg/mL 5.10E+04
Pellet Input Total Dejacket Waste Acid Dissol Pu-238/Total Pu Conversion of Nj Fractional loss o Fractional loss o Fractional loss o Fractional loss o Reference Infor NpO <sub>3</sub> <sup>227</sup> (oxide) Np237 Pu-238 Pu-240 Pu-242 Conversion Specific activity ( Specific activity (	IMK-10.6           IMK-10.6 <t< td=""><td>ENP-20 ENP-15, 23, 20 ENP-15, 23, 20 ENP-15, 23, 20 (Np causic + h (s) = Pu-23 cause - h (s) = (Sum of fiss ) = (</td><td>Vp acidy Np input = = 21 Vp acidy Np input = = 122 usitic + Pu-239 caus usitic + Pu-239 caus usitic + Pu-239 caus is p caustic (Np acid 4 u caustic (Np acid 4 u caustic (Np acid 4 u caustic (Np acid 4 -582.00</td><td>DJ-21, 030523-00 AD-21, 030523-00 itic + total Pu // Np in * Np dejacket) = itic + Pu acid/ Np ing * Np dejacket) = itic + Pu acid/ = Pu-236 t1/2 years 2.85</td><td>89.39%         1           2        </td><td>Actual 0.8767 0.8781 0.1276 0.000 Afglusted Pu-236 ppm 3.86 Sample DJ-21,030523-001 AD-21,030523-002 DJ-21,030523-002 DJ-21,030523-002 AD-21,030523-002 AD-21,03052 AD-21,030523-002 AD-21,03052 AD-21,0305 AD-21,0305 AD-21,0305 AD-21,0305 AD-21,030 AD-21,0305 AD-21,030 AD-21,030 AD-21,0305 AD-21</td><td>Co-60 Bq/mL 229E+04 Co-60 Co-60 Bq/mL 22 Co-60 Co-60 Bq/mL 22 Co-60 CO-60 CO-6</td><td>0.00141 0.0042 0.00005 0.00005 0.00005 0.000367 Predicted (BC Predicted (BC Predicted</td><td>Pu238 t1/2 days 32032.425 Ru-106 Bq/mL 2.10E+06 1.00E+07 Itolal activity Bq/mL 5.50E+06 2.00E+08 Pu-239 ppb (ng/mL) &lt;5.0E+01 2.82E+04</td><td>Actual/Pred #DIV/01 #D</td><td>Cs-134 Bg/mL 1.90E+05 9.60E+04 Pu-241 ppb (ng/mL) &lt;5.0E+01 4.60E+02</td><td>Cs-137 Bg/mL 1 60E+06 7.90E+05 Pb-0242 pbb (ng/mL) &lt;5.0E+01 6.00E+01</td><td>Ce-144 Bq/mL 1.30E+07 PU-244 ppb (ng/mL) &lt;5.0E+01 &lt;5.0E+01</td><td>Eu- 155 Bg/mL 1.30E+05</td><td>Eu- 154 Bg/mL 5.10E+04</td></t<>	ENP-20 ENP-15, 23, 20 ENP-15, 23, 20 ENP-15, 23, 20 (Np causic + h (s) = Pu-23 cause - h (s) = (Sum of fiss ) = (	Vp acidy Np input = = 21 Vp acidy Np input = = 122 usitic + Pu-239 caus usitic + Pu-239 caus usitic + Pu-239 caus is p caustic (Np acid 4 u caustic (Np acid 4 u caustic (Np acid 4 u caustic (Np acid 4 -582.00	DJ-21, 030523-00 AD-21, 030523-00 itic + total Pu // Np in * Np dejacket) = itic + Pu acid/ Np ing * Np dejacket) = itic + Pu acid/ = Pu-236 t1/2 years 2.85	89.39%         1           2	Actual 0.8767 0.8781 0.1276 0.000 Afglusted Pu-236 ppm 3.86 Sample DJ-21,030523-001 AD-21,030523-002 DJ-21,030523-002 DJ-21,030523-002 AD-21,030523-002 AD-21,03052 AD-21,030523-002 AD-21,03052 AD-21,0305 AD-21,0305 AD-21,0305 AD-21,0305 AD-21,030 AD-21,0305 AD-21,030 AD-21,030 AD-21,0305 AD-21	Co-60 Bq/mL 229E+04 Co-60 Co-60 Bq/mL 22 Co-60 Co-60 Bq/mL 22 Co-60 CO-60 CO-6	0.00141 0.0042 0.00005 0.00005 0.00005 0.000367 Predicted (BC Predicted	Pu238 t1/2 days 32032.425 Ru-106 Bq/mL 2.10E+06 1.00E+07 Itolal activity Bq/mL 5.50E+06 2.00E+08 Pu-239 ppb (ng/mL) <5.0E+01 2.82E+04	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 1.90E+05 9.60E+04 Pu-241 ppb (ng/mL) <5.0E+01 4.60E+02	Cs-137 Bg/mL 1 60E+06 7.90E+05 Pb-0242 pbb (ng/mL) <5.0E+01 6.00E+01	Ce-144 Bq/mL 1.30E+07 PU-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bg/mL 1.30E+05	Eu- 154 Bg/mL 5.10E+04
Pellet Input Total Dejacket Waste Acid Dissol Np Residual Am Pu-238/Total Pu Conversion of Nj Fractional Ioss o Fractional Ioss o Fractional Ioss o Reference Infor NpO <sub>3</sub> <sup>37</sup> (oxide) NpO <sub>3</sub> <sup>37</sup> (oxide) NpO <sub>3</sub> <sup>37</sup> (oxide) Pu-238 Pu-238 Pu-238 Pu-238 Pu-239 Pu-240 Pu-241 Pu-241 Pu-240 Pu-240 Pu-240 Pu-240 Pu-240 Pu-235 Pu-36 Conversion	MK-10.6           MK-10.6           MK-10.6           MK-10.6           MK-10.6           Out (wt basis) =           0 to Ev (mob basis) =           10 to Ev (mob basis) =           11/1/2001           mation           MW           288.049           238.0496           239.0522           240.0533           240.0533           240.0533           240.0543 <t< td=""><td>ENP-20 ENP-20 ENP-15, 23, 20 ENP-15, 23, 20 ENP-15, 23, 20 I (Np caustic + N is) = Pu-238 cast is) =</td><td>4         21           21         21           21         21           a         23           caustic / Pu-239 caus         caustic / Pu-239 caus           transfer (Pu-caust)         caustic / Pu-caust           Time elapsed (t)         days          582.00        582.00          </td><td>DJ-21, 030523-00 AD-21, 030523-00 itic + total Pu // Np in itic and acid // Np in itic and acid // Np in itic and acid // Np in itic + Pu acid) = itic + Pu acid) = itic + Pu acid) = 2.85 Specific activity Cig</td><td>89.39%  Pu-236 t1/2 days 1040.94 Analysis Gr gamma Alpha &amp; Beta ICP Pu-Alpha Scat</td><td>Actual Actual 0.8761 0.8761 0.00% 0.0132 0.0132 0.0013 0.0132 0.001 0.0132 0.001 0.0132 0.001 0.0132 0.001 0.0132 0.001</td><td>Co-60 Bq/mL 2.40E+04 1.00540 0.01145 0.87000 7 1 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5</td><td>0.00141 0.00141 0.00005 0.00005 0.00005 Predicted (BC Predicted (BC Predicted (BC Predicted (BC Predicted (BC 21.95 Bq/mL 4.40E+05 Bq/mL 4.40E+05 Bq/mL 6.34E+06.00E+07 Pu-238 ppb (ng/mL) 3.10E+05 Relative error % 5.1</td><td>Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 2.10E+06 1.00E+07 total activity Bg/mL 6.50E+06 2.00E+08 Pu-239 ppb (ng/mL) &lt; 3.62E+04 2.82E+04</td><td>Actual/Prod #DIV/01 #D</td><td>Cs-134 Bg/mL 1.90E+05 9.60E+04 Pu-241 ppb (ng/mL) &lt;5.0E+01 4.60E+02</td><td>Cs-137 Bq/mL 1.60E+06 7.90E+05 Pu-242 ppb (ng/mL) &lt;.00E+01 6.00E+01</td><td>Ce-144 Bg/mL 1.30E+07 Pu-244 ppb (ng/mL) &lt;5.0E+01 &lt;5.0E+01</td><td>Eu- 155 Bq/mL 1.30E+05</td><td>Eu-154 Bq/mL 5.10E+04</td></t<>	ENP-20 ENP-20 ENP-15, 23, 20 ENP-15, 23, 20 ENP-15, 23, 20 I (Np caustic + N is) = Pu-238 cast is) =	4         21           21         21           21         21           a         23           caustic / Pu-239 caus         caustic / Pu-239 caus           transfer (Pu-caust)         caustic / Pu-caust           Time elapsed (t)         days          582.00        582.00	DJ-21, 030523-00 AD-21, 030523-00 itic + total Pu // Np in itic and acid // Np in itic and acid // Np in itic and acid // Np in itic + Pu acid) = itic + Pu acid) = itic + Pu acid) = 2.85 Specific activity Cig	89.39%  Pu-236 t1/2 days 1040.94 Analysis Gr gamma Alpha & Beta ICP Pu-Alpha Scat	Actual Actual 0.8761 0.8761 0.00% 0.0132 0.0132 0.0013 0.0132 0.001 0.0132 0.001 0.0132 0.001 0.0132 0.001 0.0132 0.001	Co-60 Bq/mL 2.40E+04 1.00540 0.01145 0.87000 7 1 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	0.00141 0.00141 0.00005 0.00005 0.00005 Predicted (BC Predicted (BC Predicted (BC Predicted (BC Predicted (BC 21.95 Bq/mL 4.40E+05 Bq/mL 4.40E+05 Bq/mL 6.34E+06.00E+07 Pu-238 ppb (ng/mL) 3.10E+05 Relative error % 5.1	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 2.10E+06 1.00E+07 total activity Bg/mL 6.50E+06 2.00E+08 Pu-239 ppb (ng/mL) < 3.62E+04 2.82E+04	Actual/Prod #DIV/01 #D	Cs-134 Bg/mL 1.90E+05 9.60E+04 Pu-241 ppb (ng/mL) <5.0E+01 4.60E+02	Cs-137 Bq/mL 1.60E+06 7.90E+05 Pu-242 ppb (ng/mL) <.00E+01 6.00E+01	Ce-144 Bg/mL 1.30E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bq/mL 1.30E+05	Eu-154 Bq/mL 5.10E+04
Peilet Injut Total Dejacket Waste Acid Dissol Pu-238/Total Pu Conversion of Nj Fractional loss o Fractional loss o Fractional loss o Pu-236 content ppm 2.62 Reference Infor NpQ <sup>237</sup> (oxide) Np237 Pu-238 Pu-239 Pu-240 Pu-240 Pu-241 Conversion Specific activity ( Factor = Co-60 Za C6	MK-10.6           MK-10.6           MK-10.6           MK-10.6           MK-10.6           MK-10.6           (wt basis) =	ENP-20 ENP-20 ENP-15, 23, 20 ENP-15, 23, 20 ENP-15, 23, 20 I (Np caustic + 1. is) = Pu-238 cas s) = (Sum of files s) = (Sum of files s) = (Wit Dasis) = N (Wit Dasis)	21           22           21           21           22           4           21	BJ-21, 030523-00           AD-21, 030523-00           AD-21, 030523-00           itic + total Pu // Np in           titic and acid / Np in           itic and acid / Np in           Pu-236           tic + Pu acid) =           2.85           Specific activity           Ci/g           1130.360	89.39%         1           2	Actual Actual 0.8767 0.8787 0.0276 0.0012 Adjusted Pu-236 ppm DJ-21,030523-002 AD-21,030523-002 AD-21,030523-002 AD-21,030523-002 Pu-236/238 ppm =	Co-60 Bq/mL 2.40E+04 Alpha Bq/mL 2.40E+04 Alpha Bq/mL 1.50E+09 Np-237 ppb (ng/mL) 2.29E+04 1.74E+06 Pu-236/Pu-238 ppm (ug/mL) 2.62 Co-60 Bq/mL	0.00141 0.0042 0.00005 0.00005 0.00005 0.00005 Predicted (BC Predicted (	Pu238 t1/2 days 32032.425 Ru-106 Bq/mL 2.10E+06 1.00E+07 total activity Bq/mL 6.50E+06 2.00E+03 Pu-239 ppb (ng/mL) <5.0E+01 2.82E+04	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 1.90E+05 9.60E+04 Pu-241 ppb (ng/mL) <5.0E+01 4.60E+02	Cs-137 Bg/mL 1.60E+06 7.90E+05 7.90E+05 Pu-242 ppb (ng/mL) <5.0E+01 6.00E+01	Ce-144 Bq/mL 1.30E+07 9b-(ng/mL) <5.0E+01 <5.0E+01	Eu-155 Bq/mL 1.30E+05	Eu-154 Bg/mL 5.10E+04
Peilet Input Total Dejacket Waste Acid Dissol Np Residual Am Pu:230/total Pu Conversion of N Conversion of N Conversion of N Fractional loss o Fractional loss o Fractional loss o Pu-236 content ppm 2.62 Reference Infor NpQ <sup>227</sup> (oxide) NpQ <sup>227</sup> (oxide) NpQ <sup>227</sup> (oxide) Pu-238 Pu-238 Pu-238 Pu-238 Pu-238 Pu-238 Pu-240 Pu-241 Pu-241 Pu-241 Pu-241 Pu-240 Pu-26 Pu-27 Pu-	IMK-10.6           IMK-10.6           IMK-10.6           IMK-10.6           IMK-10.6           IMK-10.6           IMK-10.6           Immediate           Immedi	ENP-20 ENP-15, 23, 20 ENP-15, 23 ENP-15, 23 ENP-15, 23 ENP-15, 23 ENP-15, 23 ENP-15, 23 ENP-15, 23 ENP-15, 24 ENP-15, 25 ENP-15, 25 EN	Macial Market State Stat	DJ-21, 030523-00 AD-21, 030523-00 AD-21, 030523-00 tic + total Pu //Np in tic and acid / Np ing hop degiacket) = Np degiacket) = Pu-236 t1/2 years 2.85 2.85 2.85 2.85 2.85	89.39%           2           aput =           2           aput =           Pu-236 t1/2           days           1040.94           Analysis           Gr gamma           Alpha & Beta           ICP           Pu-Alpha Scar           TTA extraction	Actual           Actual           0.8767           0.8767           0.4777           0.0002           0.0002           0.0002           0.0002           0.0002           0.0002           0.0002           0.0002           0.0002           Adjusted           Pu-236           DJ-21, 03052-002           DJ-21, 030523-001           AD-21, 030523-002           AD-21, 030523-002           AD-21, 030523-002           Pu-236/238 ppm =	Co-60 Bq/mL 2.40E+04 Alpha Bq/mL 2.40E+04 Alpha Bq/mL 1.60E+05 1.50E+08 Pu-236/Pu-238 ppm (ug/mL) 2.62E+04 1.74E+06 Pu-236/Pu-238 ppm (ug/mL) 2.62E+04 State of the state of t	0.00141 0.00424 0.0005 0.00056 0.00056 0.00056 Predicted (BC Predicted (	Pu238 t1/2 days 32032.425 Ru-106 Bq/mL 2.10E+06 1.00E+07 10tal activity Bq/mL 5.50E+01 2.00E+08 Pu-239 ppb (ng/mL) <5.0E+01 2.82E+04 2.82E	Actual/Prod #DIV/01 #D	Cs-134 Bq/mL 1.90E+05 9.60E+04 Pu-241 ppb (ng/mL) 4.60E+02	Cs-137 Bg/mL 1 60E+06 7.90E+05 Pu-242 ppb (ng/mL) <5.0E+01 6.00E+01	Ce-144 Bq/mL 1.30E+07 1.30E+07 5.0E+01 <5.0E+01	Eu- 155 Bq/mL 1.30E+05	Eu- 154 Bg/mL 5.10E+04
Pellet Input Total Dejacket Waste Acid Dissol Np Residual Am Pu-238/Total Pu Conversion of Nj Fractional Ioss o Fractional Ioss o Fractional Ioss o Fractional Ioss o Reference Infor NpO <sub>3</sub> <sup>27</sup> (oxide) NpO <sub>3</sub> <sup>27</sup> (oxide) NpO <sub>3</sub> <sup>27</sup> (oxide) Pu-238 Pu-238 Pu-238 Pu-238 Pu-238 Pu-238 Pu-239 Pu-240 Pu-241 Pu-241 Pu-241 Pu-240 Pu-241 Pu-25 Specific activity 0 Factor = Co-60 Zr-95 Ru-106 Sp-125	IMK-10.6           MK-10.6           MK-10.6           MK-10.6           MK-10.6           Outro (Mt basis) =           0 to Ev (mob basis) =           0 to FV (mob basis) =           0 to FV (mob basis) =           0 to FV (mob basis) =           10 to FV (mob basis) =           11/1/2001           mation           MW           288.0467           238.0468           239.0522           24.0658           24.0587           3.70E+10           5 days/year           Calculation           1.13E+13	ENP-20 ENP-20 ENP-15, 23, 20 ENP-15, 23, 20 ENP-15, 23, 20 I (Np caustic + N is) = Pu-232 cast ) = (Sum of fass ) = Pu-232 cast ) = P	M         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         239 causion product) in cause on product (Na pade) in cause on pro	DJ-21, 030523-00 AD-21, 030523-00 itic + total Pu // Np in tic and acid / Np in tic and acid / Np in tic p Pu acid = ic + Pu acid = ic + Pu acid = 2.85 2.85 2.85 2.85 2.85	89.39%  Pu-236 t1/2  days 1040.94  Analysis Gr gamma  Alpha & Beta  ICP  Pu-Alpha Sca	Actual Act	Co-60 Bg/mL 2.40E+04 1.0540 0.01145 0.	0.00141 0.00141 0.0005 0.0005 0.0005 0.0005 Predicted (BC Predicted (BC P	Pu238 t1/2 days 32032.425 32032.425 32032.425 100E+06 1.00E+07 1.00E+07 1.00E+07 2.00E+08 2.00E+08 2.00E+08 Pu-239 ppb (ng/mL) <.0E+07 2.62E+04	Actual/Prod #DIV/01 #D	Cs-134 Bq/mL 1.90E+05 9.60E+04 Pu-241 ppb (ng/mL) 4.60E+02	Cs-137 Bq/mL 1.60E+06 7.90E+05 Pu-242 ppb (ng/mL) <5.0E+01 6.00E+01	Ce-144 Bq/mL 1.30E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bq/mL 1.30E+05	Eu-154 Bg/mL 5.10E+04
Peilet Input Total Dejacket Waste Acid Dissol Pu-238/Total Pu Conversion of Ny Fractional loss of Fractional loss of Fractional loss of Pu-236 content ppm 2.62 Reference Infor Np237 (oxide) Np237 Pu-239 Pu-239 Pu-239 Pu-240 Pu-239 Pu-240 Pu-242 Conversion 365.21 Specific activity ( Factor = Co-60 Zr-96 Ru-106 SB-125 Cs-134	MK-10.6           MK-10.6           MK-10.6           MK-10.6           MK-10.6           MK-10.6           (wt basis) =	ENP-20 ENP-20 ENP-15, 23, 20 ENP-15, 23 ENP-15, 23 ENP-15, 24 ENP-15, 25 ENP-15, 25 ENP-15	M         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           22         21           23         25           25         29           24         264           25         29           24         2052726           24         205271           21         24           23         20	DJ-21, 030523-00 AD-21, 030523-00 itic + total Pu // Np in tic and acid / Np in; + Np dejacket) = ic + Pu acid) = Pu-236 t1/2 years 2.85 Specific activity Ci/g 1130.360 2.1469.000 3.3066.000 1.294.000	89.39%         1           2	Actual           0.8767           0.8767           0.8781           0.1276           0.0012           Adjusted           Pu-236           DJ-21, 030523-001           AD-21, 030523-002           DJ-21, 030523-002           PU-236/238 ppm =           Relative Error =	Co-60 Bq/mL 2.20E+04 Alpha Bq/mL 2.40E+04 Alpha Bq/mL 1.50E+05 Np-237 ppb (ng/mL) 2.29E+04 1.74E+06 Pu-236/Pu-238 ppm (ug/mL) 2.26E+04 1.50E+05 2.29E+04 1.74E+06 Pu-236/Pu-238 ppm (ug/mL) 2.26E+04 1.50E+05 2.29E+04 1.50E+05 2.29E+04 1.50E+05 2.29E+04 1.50E+05 2.29E+04 1.50E+05 2.29E+04 1.50E+05 2.29E+04 1.50E+05 2.29E+04 1.50E+05 2.29E+04 1.50E+05 2.29E+04 1.50E+05 2.29E+04 1.50E+05 2.29	0.00141 0.0042 0.00026 0.00006 0.00006 0.00006 Predicted (BC Pu-238 tt/2, years tt/2, years tt/2, years tt/2, years tt/2, years Bq/mL 4.40E+05 Beta Bq/mL 6.34E+06 5.00E+07 Pu-238 tt A_40E+05 Beta Bq/mL 2.26E+05 Relative error \$ 5.1 Counts X Pu- 0 Counts X Pu- Counts X Pu-	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 2.10E+06 1.00E+07 1.00E+07 1.00E+07 1.00E+07 2.10E+01 2.00E+01 2.00E+01 2.82E+04 2.82E+04 2.38E+040000000000000000000000000000	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 1.90E+05 9.60E+04 Pu-241 ppb (ng/mL) <5.0E+01 4.60E+02	Cs-137 Bg/mL 1.60E+06 7.90E+05 7.90E+05 Pu-242 ppb (ng/mL) <5.0E+01 6.00E+01	Ce-144 Bg/mL 1.30E+07 9b(ng/mL) <5.0E+01 <5.0E+01	Eu-155 Bg/mL 1.30E+05	Eu-154 Bg/mL 5.10E+04
Peilet Input Total Dejacket Waste Acid Dissol Np Residual Am Pu-230/total Pu Conversion of Ni Fractional loss o Fractional loss o Fractional loss o Fractional loss o Pu-236 content ppm 2.6/ Reference Infor NpO2 <sup>327</sup> (oxide) Np237 Pu-238 Pu-238 Pu-238 Pu-238 Pu-238 Pu-238 Pu-240 Pu-240 Pu-241 Pu-242 Conversion 365.2/ Specific activity ( Factor = Co-60 Zr-95 Ru-106 SB-125 Cs-134 Cs-134	IMK-10.6           MK-10.6           MK-10.6           MK-10.6           MK-10.6           Outrick (Massis) =           0 to Pu (mol bassis) =           0 to Pu (mol bassis) =           0 to Pu (mol bassis) =           10 to Pu (mol bassis) =           10 to Pu (mol bassis) =           10 to Pu (mol bassis) =           11/1/2001           mation           MW           288.046           238.0466           239.047           238.0496           238.0496           238.0496           238.0496           238.0496           238.0496           238.0496           238.0496           238.0496           238.0496           238.0496           24.0.658           24.0.587           3.70E+10           1.13E+13	ENP-20 ENP-15, 23, 20 ENP-15, 20	M         M           M         g/mol           M	DJ-21. 030523-00 AD-21. 030523-00 IdD-21. 030523-00 Itic + total Pu // Np in tic and acid / Np inn tic + Pu acid) = tic + Pu acid) = <b>Pu-236 t1/2</b> years 2.85 2.85 2.85 2.85 2.85 2.85 2.85 2.85	89.39%           2           aput =           put !=           ut !>           Pu-236 t1/2           days           1040.91           Analysis           Gr gamma           Alpha & Beta           ICP           Pu-Alpha Scat           TTA extraction	Actual           Actual           0.8767           0.8767           0.1277           0.1277           0.0002           0.0002           0.0002           0.0002           0.0002           0.0002           0.0002           0.0002           0.0002           Adjusted           Pu-236           DJ-21, 030523-001           AD-21, 030523-002           DJ-21, 030523-002           AD-21, 030523-002	Co-60 Bq/mL Co-60 Bq/mL Co-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60	0.00141 0.00424 0.0005 0.00056 0.00056 0.00056 Predicted (BC Predicted (	Pu238         t1/2           days         32032.425           Ru-106         Bg/mL           B_10E         2.10E+06           1.00E+07         2.00E+06           2.00E+06         2.00E+06           Pu-239         ppb (ng/mL)           <0.60E+01	Actual/Prod #DIV/01 #D	Cs-134 Bq/mL 1.90E+05 9.60E+04 Pu-241 ppb(ng/mL) 4.60E+02	Cs-137 Bg/mL 1.60E+06 7.90E+05 Pu-242 ppb(ng/mL) <5.0E+01 6.00E+01	Ce-144 Bq/mL 1.30E+07 1.30E+07 45.0E+01 <5.0E+01	Eu- 155 Bg/mL 1.30E+05	Eu- 154 Bg/mL 5.10E+04
Pellet Input Total Dejacket Waste Acid Dissol Np Residual Am Pu-238/Total Pu Conversion of Nj Fractional loss o Fractional loss o Fractional loss o Fractional loss o Reference Infor NpO <sub>3</sub> <sup>27</sup> (oxide) NpO <sub>3</sub> <sup>27</sup> (oxide) Np	IMK-10.6           MK-10.6           MK-10.6           MK-10.6           IMK-10.6           Outro (Mt basis) =           0 to FU (mol basis) =           10 to FU (mol basis) =           10 to FU (mol basis) =           10 to FU (mol basis) =           11/1/2001           mation           MW           288.0467           238.0468           239.052           238.0467           238.0467           238.0467           238.0467           238.0467           238.0467           238.0467           238.0467           238.0467           24.0 658           24.0 587           3.70E+10           1.13E+13           1.13E+13	ENP-20 ENP-20 ENP-15, 23, 20 ENP-15, 23, 20 ENP-15, 23, 20 I (Np caustic + N is) = Pu-232 cast ) = (Sum of fas s) = (Sum of fas) = (Sum	Mp         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         232           22         232           1         232           1         242           4         242           4         2582.00           1         243           4         -582.00           1         2582.00           1         2582.00           1         2582.00           1         259.03           1         259.03           1         259.03           1         259.03           1         259.03           1         259.03           1         259.03           1         259.03           1         29.90           1         29.90           1         29.03 </td <td>DJ-21, 030523-00 AD-21, 030523-00 AD-21, 030523-00 tic + total Pu // Np in tic and acid / Np in tic and acid / Np in tic + Pu acid) = tic + Pu acid) = tic + Pu acid) = tic + Pu acid) = 2.85 2.85 2.85 2.85 2.85 2.85 2.85 2.85</td> <td>89.39%         1           2        </td> <td>Actual 0.8761 0.8761 0.4776 0.0072 0.0073 0.0012 Adjusted Pu-236 ppm 3.86 Sample DJ-21,030523-001 AD-21,030523-002 DJ-21,030523-002 DJ-21,030523-002 AD-21,030523-002 AD-21,030523-002 AD-21,030523-002 Pu-236/238 ppm = Relative Error =</td> <td>Co-60 Bq/mL 2.40E+04 2.40E+04 2.40E+04 2.40E+04 1.74E+06 1.60E+05 1.60E+05 1.74E+06 2.29E+04 2.29E+04 2.29E+04 2.29E+04 2.29E+04 2.29E+04 2.29E+04 2.29E+04 2.29E+04 2.562 (Full Spectru 2.X (5.5</td> <td>0.00141 0.00141 0.0005 0.0005 0.0005 0.0005 0.0005 Predicted (BC Predicted (BC Predicte</td> <td>Pu238         t1/2           days         32032.425           32032.425         32032.425           Ru-106         Bq/mL           2.10E+06         1.00E+07           101al activity Bg/mL         6.50E+01           2.00E+08         2.00E+08           ppb (ng/mL)         &lt;5.0E+01</td> <5.0E+01	DJ-21, 030523-00 AD-21, 030523-00 AD-21, 030523-00 tic + total Pu // Np in tic and acid / Np in tic and acid / Np in tic + Pu acid) = tic + Pu acid) = tic + Pu acid) = tic + Pu acid) = 2.85 2.85 2.85 2.85 2.85 2.85 2.85 2.85	89.39%         1           2	Actual 0.8761 0.8761 0.4776 0.0072 0.0073 0.0012 Adjusted Pu-236 ppm 3.86 Sample DJ-21,030523-001 AD-21,030523-002 DJ-21,030523-002 DJ-21,030523-002 AD-21,030523-002 AD-21,030523-002 AD-21,030523-002 Pu-236/238 ppm = Relative Error =	Co-60 Bq/mL 2.40E+04 2.40E+04 2.40E+04 2.40E+04 1.74E+06 1.60E+05 1.60E+05 1.74E+06 2.29E+04 2.29E+04 2.29E+04 2.29E+04 2.29E+04 2.29E+04 2.29E+04 2.29E+04 2.29E+04 2.562 (Full Spectru 2.X (5.5	0.00141 0.00141 0.0005 0.0005 0.0005 0.0005 0.0005 Predicted (BC Predicted (BC Predicte	Pu238         t1/2           days         32032.425           32032.425         32032.425           Ru-106         Bq/mL           2.10E+06         1.00E+07           101al activity Bg/mL         6.50E+01           2.00E+08         2.00E+08           ppb (ng/mL)         <5.0E+01	Actual/Prod #DIV/01 #D	Cs-134 Bq/mL 1.90E+05 9.60E+04 Pu-241 ppb (ng/mL) <5.0E+01 4.60E+02	Cs-137 Bq/mL 1.60E+06 7.90E+05 Pu-242 ppb (ng/mL) <5.0E+01 6.00E+01	Ce-144 Bg/mL 1.30E+07 90-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bq/mL 1.30E+05	Eu- 154 Bg/mL 5.10E+04
Peilet Input Total Dejacket Waste Acid Dissol Pu-238/Total Pu Conversion of Ny Fractional loss o Fractional loss o Fractional loss o Fractional loss o Fractional loss o Reference Infor Np02 <sup>337</sup> (oxide) Np237 Pu-238 Pu-239 Pu-239 Pu-240 Pu-239 Pu-240 Pu-242 Conversion 365.21 Specific activity ( Factor = Co-60 Zr-96 Ru-106 SB-125 Ce-144 Eu-155 Pu-238	IMK-10.6           NK-10.6           NK-10.6           MK-10.6           MK-10.6           With the set of the	ENP-20 ENP-20 ENP-15, 23, 20 ENP-15, 23 ENP-15, 23 ENP-15, 23 ENP-15, 23 ENP-15, 24 ENP-15, 25 ENP-15, 25	M         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         21           21         23           228.000         1           39.001         -582.00           39.001         -582.00           39.001         -582.00           39.001         -582.00           39.001         -582.00           39.001         -582.00           39.001         -582.00           39.001         -582.00           39.001         -582.00           39.001         -582.00           39.001         -582.00           30.001         -582.00           30.001         -582.00           30.001         -582.00           30.001         -59.00           30.0000         -59.00	DJ-21, 030523-00 AD-21, 030523-00 itic + total Pu // Np in tic and acid / Np in; + Np dejacket) = tic + Pu acid) = tic + Pu acid) = 2.85 2.85 2.85 2.85 2.85 2.85 2.85 2.85	89.39%         1           2	Actual           0.8767           0.8767           0.4781           0.1276           0.0012           Adjusted           Pu-236           DJ-21, 030523-001           AD-21, 030523-002           DJ-21, 030523-002           AD-21, 030523-002           PU-236/238 ppm =           Relative Error =	Co-60 Bq/mL 2.20E+04 Alpha Bq/mL 2.20E+04 Alpha Bq/mL 1.50E+03 Np-237 ppb (ng/mL) 2.29E+04 1.74E+06 Pu-236Pu-238 ppm (ug/mL) 2.26E (5.80 MeV Area (Full Spectru 2.2X(5)]	0.00141 0.0042 0.00005 0.00005 0.00005 0.00005 Predicted (BC Pu-238 tt/2, years tt/2, years tt/2, years tt/2, years tt/2, years 87.7 27-95 Bg/mL 4.40E+05 Beta Bg/mL 6.34E+05 5.00E+07 Pu-238 tt/2, years 5.10E+02 2.20E+05 Relative error % 5.1 Counts X Pu- 0 Counts X Pu- 20 MeV Area Counts 80 Area Counts	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 2.10E+06 1.00E+07 total activity Bg/mL 6.50E+06 2.00E+03 Pu2.39 ppb (ng/mL) <5.0E+01 2.82E+04 2.82E+04 2.38_u2X236) X 1E6 2.238_u2X236) X 1E6 2.38_u2X236) X 1E6 2.38_u2X26) X 1E6 2.38_u2X26) X 1E6 2.38_u2X26) X 1E6 2.38_u2X60) X 1E	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 1.90E+05 9.60E+04 Pu-241 ppb (ng/mL) <5.0E+01 4.60E+02	Cs-137 Bq/mL 1.60E+06 7.90E+05 Pu-242 ppb (ng/mL) <5.0E+01 6.00E+01	Ce-144 Bg/mL 1.30E+07 9b(ng/mL) <5.0E+01 <5.0E+01	Eu-155 Bg/mL 1.30E+05	Eu- 154 Bg/mL 5.10E+04
Peilet Input Total Dejacket Waste Acid Dissol Np Residual Am Pu-238/Total Pu- Conversion of Ni Fractional loss o Fractional loss o Fractional loss o Fractional loss o Pu-236 content ppm Tractional loss o Fractional loss o Reference Infor NpO2 <sup>327</sup> (oxide) NpO2 <sup>327</sup> (oxide) NpO2 <sup>327</sup> (oxide) NpO2 <sup>327</sup> (oxide) NpO2 <sup>327</sup> (oxide) NpO2 <sup>327</sup> (oxide) Specific activity ( Factor = Co-80 Zr-96 Ru-106 SB-125 Cs-134 Cs-137 Ce-144 Eu-155 Pu-238	IMK-10.6           MK-10.6           IMK-10.6           IMK-10.6           IMK-10.6           IMK-10.6           IMK-10.6           IMK-10.6           Immediate           Immediat	ENP-20 ENP-15, 23, 20 ENP-15, 23 ENP-15, 23 ENP-15, 23 ENP-15, 23 ENP-15, 23 ENP-15, 23 ENP-15, 23 ENP-15, 23 ENP-15, 24 ENP-15, 25 ENP-15, 25 ENP-15	M M M M M M M M M M M M M M	DJ-21. 030623-00 AD-21. 030623-00 AD-21. 030523-00 tic + total Pu J Np in tic and acid / Np inp tic and acid / Np inp tic + Pu acid) = c + Pu acid) = 2.85 2.85 2.85 2.85 2.85 2.85 2.85 2.85	89.39%           2           aput =           ut )=           Pu-236 t1/2           days           1040.91           Analysis           Gr gamma           Alpha & Beta           ICP           Pu-Alpha Scat           ICP	Actual           Actual           0.8767           0.8767           0.8767           0.8767           0.8767           0.8767           0.8767           0.8767           0.8767           0.8767           0.9772           0.0002           Adjusted           Pu-236           DJ-21, 030523-001           AD-21, 030523-002           DJ-21, 030523-002           DJ-21, 030523-002           AD-21, 030523-002 <td>Co-60 Bq/mL Co-60 Bq/mL Co-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60</td> <td>0.00141 0.00424 0.0005 0.00056 0.00056 0.00056 Predicted (BC Predicted (BC Predicted (BC Predicted (BC Predicted (BC Break Bag/mL 4.40E+05 Bag/mL 4.40E+05 Bag/mL 4.40E+05 Bag/mL 4.40E+05 Bag/mL 4.40E+05 Bag/mL 6.34E+06 5.00E+07 Pru-238 7.7 Pru-238 1.40E+05 S.00E+07 Pru-238 S.10E+05 S.00E+07 S.10E+05</td> <td>Pu238         t1/2           days         32032.425           32032.425         32032.425           Ru-106         Bg/mL           6.50E+06         1.00E+07           1014         activity Bg/mL           6.50E+06         2.00E+08           PU-239         ppb (ng/mL)           &lt; 0.6E+01</td> 2.82E+04           236,X236) X 1E6         -238 <sub>1/2</sub> X238)           ounts) <sup>2</sup> ts	Co-60 Bq/mL Co-60 Bq/mL Co-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60 CO-60	0.00141 0.00424 0.0005 0.00056 0.00056 0.00056 Predicted (BC Predicted (BC Predicted (BC Predicted (BC Predicted (BC Break Bag/mL 4.40E+05 Bag/mL 4.40E+05 Bag/mL 4.40E+05 Bag/mL 4.40E+05 Bag/mL 4.40E+05 Bag/mL 6.34E+06 5.00E+07 Pru-238 7.7 Pru-238 1.40E+05 S.00E+07 Pru-238 S.10E+05 S.00E+07 S.10E+05	Pu238         t1/2           days         32032.425           32032.425         32032.425           Ru-106         Bg/mL           6.50E+06         1.00E+07           1014         activity Bg/mL           6.50E+06         2.00E+08           PU-239         ppb (ng/mL)           < 0.6E+01	Actual/Prod #DIV/01 #D	Cs-134 Bq/mL 1.90E+05 9.60E+04 Pu-241 ppb(ng/mL) 4.60E+02	Cs-137 Bg/mL 1.60E+06 7.90E+05 Pu-242 ppb (ng/mL) 6.00E+01	Ce-144 Bq/mL 1.30E+07 1.30E+07 <5.0E+01 <5.0E+01	Eu- 155 Bg/mL 1.30E+05	Eu- 154 Bg/mL 5.10E+04



-23 276760152 8993916 271174456 u-154

			r	MK 10.1	D   10	Innut			T						
				Pellet Number =	BNP-2 BNP-14	0.3355			-						
				Pellet Number =	BNP-7	0.3356	0.00424	a moloc							
			L	Total Np =	1.0002		0.00424	g-moles	1						
Add 2.2	2M NaNO₃ to dis	solver	L						Output	Caustic Disso	lver Waste				
Vol (mL) =	= 200		l			*		1		Sample # DJ3 Bq/mL	DJ-19, 0305 Ci/mL	08-002 g	g-mol	ppm (Pu-23	8 basis)
Meter	caustic into dis	solver	r 🗍			Caustic Dissolution	l.		Ru-106 Cs-134	3.60E+06 4 40E+05	9.7297E-05	5 1.47E-05 5 4.60E-06	1.39E-07 3.43E-08	105	
10M NaOH	(rate 1mL.min)		4	· •	Dig	gest for 4 hour at gentle	reflux	► ►	Cs-137	3.00E+06	8.1081E-05	5 4.66E-04	3.40E-06	3328	
vor (mc)	- 00					16iiip - 104 0			Np-237	1.18E+04		5.90E-03	2.49E-05		
2M NaOF	Caustic Washes ⊣	8						1	Pu-238 Pu-239	1.80E+02 <5.0e1		9.00E-05 0	3.78E-07 0		
Vol (mL) =	= 240.0000					L			Vol(mL) =	500.0000					
						Acid Dissolution		1							
		Acid A 8.0M HNO <sub>3</sub>	Addition			AD-19 Digest using gentle refl	ux	_	Back Flushes 8M HNO3- 0.02M N	laF					
		0.02M NaF				for 3 -4 hours.	ac.	<b>`</b> †	Vol (mL) =	50					
		Vol (mL) =	150			Temperature - 100-103						-			
									Filter Back F Three washes with	8M HNO3- 0.0	<b>Washes</b> 2M NaF				
						Filter	1		Vol (mL) =	300		1			
						2um SS									
							1								
			ſ	F	Product Output	and Back Flushes		1		Fission Prod Acid Dissolu	ucts in Prod	luct Output t			
					Acid Disso Sample # =	AD-19, 030508-003			Element	Sample = Bg/mL	AD-19, 0305 Ci/mL	08-003 g	a-mol	ppm (Pu-23	8 basis)
				Element	ppb (ng/mL)	g 0.8900	g-mol		Co-60 Zr-95	4.00E+04	1.08E-06	6 04E-07	6 3660E-09	0	,
				Pu-238	2.80E+05	0.1400	5.88E-04		Ru-106	1.80E+07	4.86E-04	4 7.36E-05	6.9472E-07	526	
				Pu-239 Pu-240	4.40E+04 5.35E+03	0.0220	9.20E-05 1.11E-05		SB-125 Cs-134	1.10E+05 1.90E+05	2.97E-06 5.14E-06	5 1.42E-06 5 1.98E-06	1.1356E-08 1.4818E-08	10 14	
				Pu-241 Pu-242	7.80E+02 1.10E+02	0.0004	1.62E-06 2.27E-07		Cs-137 Ce-144	1.20E+06 2.30E+07	3.24E-05 6.22E-04	5 1.86E-04 9.77E-05	1.3615E-06 6.7855E-07	1331 698	
				Total Pu	3.30E+05	0.1651	6.93E-04		Eu- 155	2.00E+05	5.41E-06	5.81E-06	3.7517E-08	42	
			ŀ	voi (inc)	500	1		4	Eu-134	1.002104	1.032-00	0.002-00	2.52132-00	20	
	Number	Number	Number	Sample Code	% Density	Vol % NpOX	Pellet Mass Np g	g-mole Np	Pu-236 ppm	Pu-236 ppm					
Pellet Input Pellet Input	MK-10.1 MK-10.1	BNP-2 BNP-14	19 19		90.53% 89.54%	10.01% 10.00%	0.33550	0.00142	2.01	2.96					
Pellet Input Total	MK-10.1	BNP-7	19		89.60%	0.10%	0.33560	0.00142	2						
Dejacket Waste Acid Dissol	MK-10.1 MK-10.1	BNP-2, 14, 7 BNP-2, 14, 7	19 19	DJ-19, 030508-002			0.00590	0.00002							
	1					I.			1	1]					
No Residual Amo	ount (wt basis) =	(Np caustic + N	In acid)/ Nn input =			Actual		Predicted (BC	GS)	Actual/Pred		1			
Pu-238/Total Pu	(wt basis) =	(hp cadolo - h	=	ia Litatal Du V Na iaaud		0.8480				#DIV/0!					
Conversion of Np	to FP (mol bas	is) = (Sum of fissi	ion product) in caust	tic and acid / Np input )	-	0.0015				#DIV/0!					
Fractional loss of Fractional loss of	f Np in Liq Waste f Pu in Liq Waste	e (wt basis) = Np e (wt basis) = Pi	o caustic/ (Np acid + u caustic /(Pu caust	<ul> <li>Np dejacket) =</li> <li>ic + Pu acid) =</li> </ul>		0.0066									
							_								
Pu-236 content	t Discharge		Time elapsed (t)	Pu-236 t1/2	Pu-236 t1/2	Adjusted		Pu-238	Pu238 t1/2	Adjusted					
ppm 2.01	Date 1 11/1/2001	Analysis Date 6/6/2003	days -582.00	years 2.85	days 1040.96	Pu-236 ppm 2.96	-	t1/2, years 87.7	days 32032.425	Pu-238, g 0.1419					
							•								
Reference Inform	mation MW	Density			Analysis	Sample	Co-60 Bg/ml	Zr-95 Bg/ml	Ru-106 Bo/ml	SB-125 Ba/ml	Cs-134 Ba/ml	Cs-137 Ba/ml	Ce-144 Ba/ml	Eu- 155 Ba/ml	Eu- 154 Ba/ml
NoO 237 (		g/cc			Gr gamma	DJ-19, 030508-002	4.005.01	0.005.00	3.60E+06	1.105.005	4.40E+05	5 3.00E+06	0.000-07	2.005.05	7.005.01
Np237	269.047	11.143 20.476			L	MD-19, 030508-003	4.00E+04	9.60E+05	1.80E+07	1.10E+05	1.90E+05	1.20E+06	2.30E+07	2.00E+05	7.00E+04
Pu-238 Pu-239	238.0496 239.0522	19.851 19.851			Alpha & Beta	DJ-19, 030508-002	Alpha Bq/mL 5.90E+04	Beta Bq/mL 1.19E+07	total activity Bq/mL 1.20E+07						
Pu-240 Pu241	240.0538 241.0568	19.851 19.851				AD-19, 030508-003	1.70E+08	1.10E+08	2.80E+08	1					
Pu-242	242.0587	19.851			ICP		Np-237	Pu-238	Pu-239	Pu-240	Pu-241	Pu-242	Pu-244		
365.25	5 days/year	валог				DJ-19, 030508-002	1.18E+04	1.80E+02	2 <5.0e1	<5.0e1	<5.0e	1 <5.0e1	<5.0e1		
					[	AD-19, 030508-003	1.78E+06	2.80E+05	4.40E+04	5.35E+U3	7.80E+02	2 1.10E+02	<5.0E1		
					Pu-Alpha Scan TTA extraction		Pu-236/Pu-238 ppm (ug/mL)	Relative error %	-						
h	-				L	AD-19, 030508-003	2.01	6.2	1						
Specific activity C Factor =	Calculation 1.13E+13	T1/2	м	Specific activity						1.20E+07					
Co-60		S 166328640	g/mol	Ci/g	ł	Pu-236/238 ppm =	(5.80 MeV Area (Full Spectrum	a Counts X Pu-	236 <sub>11/2</sub> X 236) X 1E6						
Zr-95	1	EE21220	04.0000407	21/60.00	ł		(i ui opectru	oounts A PU	200[1/2 x 200]						
		5551520	94.9060427	21403.00	+										
Ru-106 SB-125		32278176	105.9073269 124 0052479	3306.00		Relative Error =	<u>2 X (5.</u>	80 MeV Area Cours	ounts) <sup>1/2</sup>						
Ru-106 SB-125 Cs-134		32278176 87042172.32 65160132.48	94.9080427 105.9073269 124.9052478 133.9067134	3306.00 1048.00 1294.00		Relative Error =	<u>2 X (5.</u>	80 MeV Area C 5.80 Area Cour	ts						
Ru-106 SB-125 Cs-134 Cs-137 Ce-144		32278176 87042172.32 65160132.48 948937032 24614755 2	94.9080427 105.9073269 124.9052478 133.9067134 136.9070835 143.9136427	3306.00 1048.00 1294.00 87.00 3182.80		Relative Error =	<u>2 X (5.</u>	80 MeV Area C 5.80 Area Cour	iounts) <sup>1/2</sup> its						
Ru-106 SB-125 Cs-134 Cs-137 Ce-144 Eu- 155		3331328 32278176 87042172.32 65160132.48 948937032 24614755.2 150248889.4	94.9080427 105.9073269 124.9052478 133.9067134 136.9070835 143.9136427 154.9228894	3306.00 1048.00 1294.00 87.00 3182.80 465.00	* * * * *	Relative Error =	<u>2 X (5.</u> 5	80 MeV Area C 5.80 Area Cour	iounts) <sup>1/2</sup>						
Ru-106 SB-125 Cs-134 Cs-137 Ce-144 Eu-155 Pu-238 Pu-236		3031326 32278176 87042172.32 65160132.48 948937032 24614755.2 15024889.4 2767601520 89030160	94.9080427 105.9073269 124.9052478 133.9067134 136.9070835 143.9136427 154.9228894 238.0495534 236.0460481	3306.00 1048.00 1294.00 87.00 3182.80 465.00 17.12 530.00	* * * * * *	Relative Error =	<u>2 X (5.</u> 5	80 MeV Area C 5.80 Area Cour	iounts) <sup>1/2</sup> its						



				MK-20.5	DJ-24	Input			]						
				Pellet Number =	BNP-45	0.6703			-						
				Pellet Number = Pellet Number =	BNP-51 BNP-55	0.6703			-						
				Total Np <sup>237</sup> =	2.0104	1g =	0.00848	g-moles	-						
									-						
Add 2	2M NoNO to di	colver	T						Output	Countin Dino	hvor Wooto			T	
Vol (ml.) =	= 200	ssoiver		Т		Ļ			Output	ample # DJ3	DJ-24, 03082	0-033			
			•			*		1		Bq/mL	Ci/mL	g	g-mol	ppm (Pu-23	8 basis)
			-			Caustic Dissolution	n		Ru-106	1.50E+06	4.0541E-05	6.13E-06	5.79E-08	29	
Meter	caustic into dis	ssolver		<u>*</u>	Di-	DJ-24			Cs-134	2.50E+05	6.7568E-06	2.61E-06	1.95E-08	12	
Vol (ml.) =	(rate mil.min) = 60			Ť	Digi	Temp = 104 C	ereilux		CS=137	2.10E+00	5.0/5/E-U5	3.20E-04	2.36E-00 a-mole	1517	
			•						Np-237	5.26E+03		2.63E-03	1.11E-05		
	Caustic Washe	s	1						Pu-238	3.80E+01		1.90E-05	7.98E-08		
2M NaOH	4							-	Pu-239	9		0	0		
Vol (mL) =	= 240.0000		1			L			Vol(mL) =	500.0000				L	
						Acid Dissolution		1							
		Acid	Addition	T		AD-24			Back Flushes						
		8.0M HNO <sub>3</sub>				Digest using gentle re	flux		8M HNO3- 0.02M N	aF					
		0.02M NaF		•		for 3 -4 hours.		◄ ▲	Vol (mL) =	50					
		0.04 M AI(NO <sub>3</sub> ) <sub>3</sub>			1	Temperature = 100-1	09C								
		Vol (mL) =	150	9											
					L			1	Filter Back Fl	ushes / Acid	Washes				
						Ļ		L	Vol (ml.) =	300	IZIVI Nar				
						Filter	1								
						2um SS									
						L	I								
						Ļ			r	Fission Proc	ucts in Produ	ict Output		T	
					Product Outpu	t and Back Flushes		1		Acid Dissolu	tion Product	or output			
					Acid Disso	olution Product				Sample =	AD-23, 03082	0-034		1	
				Florest	Sample # =	AD-23, 030820-034	a m-1	1	Element	Bq/mL	Ci/mL	g	g-mol	ppm (Pu-23	8 basis)
				Element Np-237	3 43E+0F	g 1 7150	g-mol 7 23E-03	1	C0-60 Zr-95	0.00E+00 3.80E+05	0.00E+00 1.03E-05	2.39F-07	2.5202F-09	0	
				Pu-238	4.30E+05	0.2150	9.03E-04	1	Ru-106	1.70E+07	4.59E-04	6.95E-05	6.5613E-07	323	
				Pu-239	5.59E+04	0.0280	1.17E-04		SB-125	4.20E+05	1.14E-05	5.42E-06	4.3359E-08	25	
				Pu-240	5.24E+03	0.0026	1.09E-05		Cs-134	2.60E+05	7.03E-06	2.72E-06	2.0277E-08	13	
				Pu-242	9.00E+01	0.0000	1.86E-07		Ce-144	2.00E+07	5.41E-04	8.49E-05	5.9005E-00	395	
				Total Pu	4.92E+05	0.2461	1.03E-03	1	Eu- 155	2.30E+05	6.22E-06	6.68E-06	4.3145E-08	31	
				Vol (mL)	500				Eu-154	6.70E+04	1.81E-06	3.43E-06	2.2281E-08	16	
	Target	Pellet	Dissolution	Dissolution		Pellet	Pellet Mass Np	Pellet	<b>D</b> 000	Adjusted					
Pellet Input	Number MK-20.5	Number BNP-45	Number 24	Sample Code	% Density	20.00%	g 0.67030	g-mole Np 0.00283	Pu-236 ppm	2 236 ppm 4 58					
Pellet Input	MK-20.5	BNP-51	24		89.08%	20.00%	0.67030	0.00283	3	1.00					
Pellet Input	MK-20.5	BNP-55	24		88 36%	40.000/	0 66090	0.00000							
			2		00.007	19.99%	0.00900	0.00283	3						
Total Dejacket Waste	MK-20.5	BND-45 51 55	24	D L-24_030820-03	3	19.99%	2.01040	0.00283	3						
Total Dejacket Waste Acid Dissol	MK-20.5 MK-20.5	BNP-45, 51,55 BNP-45, 51,55	24	DJ-24, 030820-03 AD-23, 030820-03	3	19.99%	2.01040 0.00263 1.71500	0.00283 0.00848 0.00001 0.00723	3 3 1 3						
Total Dejacket Waste Acid Dissol	MK-20.5 MK-20.5	BNP-45, 51,55 BNP-45, 51,55	24	DJ-24, 030820-03 AD-23, 030820-03	3	19.99%	2.01040 0.00263 1.71500	0.00283 0.00848 0.00001 0.00723	3 3 1 3						
Total Dejacket Waste Acid Dissol	MK-20.5 MK-20.5	BNP-45, 51,55 BNP-45, 51,55	24	DJ-24, 030820-03 AD-23, 030820-03	3	Actual	2.01040 0.00263 1.71500	0.00283 0.00848 0.00001 0.00723	3	Actual/Prod					
Total Dejacket Waste Acid Dissol	MK-20.5 MK-20.5 ount (wt basis) =	BNP-45, 51,55 BNP-45, 51,55	24 24 1p acid)/ Np input =	DJ-24, 030820-03: AD-23, 030820-03	3	Actual 0.8544	2.01040 0.00263 1.71500	0.00283 0.00848 0.00001 0.00723 Predicted (BC	3 3 3 3 3 3 3 3 3 3 5	Actual/Pred #DIV/0!					
Total Dejacket Waste Acid Dissol Np Residual Ame Pu-238/Total Pu	MK-20.5 MK-20.5 ount (wt basis) = (wt basis) =	BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N	24 24 24 24 24	DJ-24, 030820-033 AD-23, 030820-03	3	Actual 0.8544 0.8736	2.01040 0.00263 1.71500	0.00283 0.00848 0.00001 0.00723 Predicted (BC	3 3 3 3 3 3 3 3 3 5 5)	Actual/Pred #DIV/0! #DIV/0!					
Total Dejacket Waste Acid Dissol Np Residual Am Pu-238/Total Pu Conversion of N	MK-20.5 MK-20.5 ount (wt basis) = (wt basis) = p to Pu (mol bas to FP (mol bas	BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N sis) = PU-238 cau	Lp acid)/ Np input = = 	DJ-24, 030820-03 AD-23, 030820-03 tic + total Pu )/ Np in	3 3 4	Actual 0.8544 0.8736 0.1218 0.000	2.01040 0.00263 1.71500	0.00283 0.00848 0.00001 0.00723 Predicted (BC	3 3 3 3 3 3 3 3 3 5 5)	Actual/Pred #DIV/0! #DIV/0! #DIV/0!					
Total Dejacket Waste Acid Dissol Np Residual Am Pu-238/Total Pu Conversion of Ny Fractional loss o	MK-20.5 MK-20.5 (wt basis) = p to Pu (mol bas p to FP (mol bas f Np in Liq Waste	BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N sis) = Pu-238 cau is) = (Sum of fiss a (wt basis) = N	Ap acid)/ Np input = = usitc + Pu-239 caus ion product) in caus p caustic/ (Np acid -	DJ-24, 030820-03 AD-23, 030820-03 tic + total Pu )/ Np in tic and acid / Np in + Np dejacket) =	nput =	Actual 0.8544 0.8736 0.1218 0.0008 0.0015	2.01040 0.00263 1.71500	0.00283 0.00848 0.00001 0.00723	3 3 3 3 3 3 3 8)	Actual/Pred #DIV/0! #DIV/0! #DIV/0!					
Total Dejacket Waste Acid Dissol Np Residual Am Pu-238/Total Pu Conversion of Ny Fractional loss of Fractional loss of	MK-20.5 MK-20.5 (wt basis) = p to Pu (mol bas p to FP (mol bas f Np in Liq Waste f Pu in Liq Waste	BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N sis) = Pu-238 cau is) = (Sum of fiss = (wt basis) = N e (wt basis) = P	Ap acid)/ Np input = = usitc + Pu-239 caus ion product) in caus p caustic /(Np acid - u caustic /(Pu caus	DJ-24, 030820-03 AD-23, 030820-03 tic + total Pu )/ Np in tic and acid / Np in + Np dejacket) = tic + Pu acid) =	nput =	Actual 0.8544 0.8736 0.1218 0.0000 0.0011	0.00880 2.01040 0.00263 1.71500	0.00283 0.00848 0.00001 0.00723	3 3 3 3 3 5)	Actual/Pred #DIV/0! #DIV/0! #DIV/0!					
Total Dejacket Waste Acid Dissol Np Residual Arm Pu-238/Total Pu Conversion of Nj Conversion of Nj Fractional loss of Fractional loss of	MK-20.5 MK-20.5 (wt basis) = (wt basis) = p to Pu (mol bas p to FP (mol bas p to FP (mol bas f Pu in Liq Waste	BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N is) = Pu-238 cau is) = (Sum of fiss a (wt basis) = N a (wt basis) = P	Ip acid)/ Np input = = sisite + Pu-239 caus ion product) in caus p caustic/ (Np acid u caustic /(Pu caus	DJ-24, 030820-03 AD-23, 030820-03 tic + total Pu )/ Np in titic and acid / Np iny + Np dejacket) = tic + Pu acid) =	nput =	Actual 0.8544 0.873 0.1218 0.0008 0.0015 0.0001	2.01040 0.00263 1.71500	0.00243 0.00848 0.00001 0.00723 Predicted (BC	3 3 3 3 3 5)	Actual/Pred #DIV/0! #DIV/0! #DIV/0!					
Total Dejacket Waste Acid Dissol Np Residual Am Pu-238/Total Pu Conversion of Nj Fractional loss o Fractional loss o	MK-20.5 MK-20.5 (wt basis) = (wt basis) = p to Pu (mol bas p to FP (mol bas f Np in Liq Waste f Pu in Liq Waste	BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N is) = Pu-238 cau is) = (Sum of fiss a (wt basis) = N a (wt basis) = P	24 24 24 29 29 20 20 20 20 20 20 20 20 20 20 20 20 20	DJ-24, 030820-03 AD-23, 030820-03 tic + total Pu )/ Np in tic and acid / Np in + Np dejacket) = tic + Pu acid) =	nput =	Actual 0.8544 0.873 0.1218 0.0008 0.0008 0.0001 0.0001	0.00500 2.01040 0.00263 1.71500	0.00243 0.00848 0.00001 0.00723	3 3 3 3 3 5)	Actual/Pred #DIV/0! #DIV/0! #DIV/0!					
Total Dejacket Waste Acid Dissol Pu-238/Total Pu Conversion of Ny Fractional loss o Fractional loss o	MK-20.5 MK-20.5 (wt basis) = (wt basis) = p to Pu (mol bas p to FP (mol bas f Np in Liq Waste f Pu in Liq Waste f Pu in Liq Waste t Discharge	BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N isis) = Pu-238 cau is) = (Sum of fiss = (wt basis) = Nj e (wt basis) = P	24 24 24 24 24 24 24 24 24 24 24 24 24 2	DJ-24, 030820-03 AD-23, 030820-03 tic + total Pu )/ Np in tic and acid / Np in Np dejacket) = tic + Pu acid) = Pu-236 t1/2	nput =	Actual Actual 0.8544 0.8736 0.0218 0.0001 0.0001 Adjusted	2.01040 0.00263 1.71500	0.00243 0.00848 0.00001 0.000723 Predicted (BC	335) 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	Actual/Pred #DIV/0! #DIV/0! #DIV/0! Adjusted					
Total Dejacket Waste Acid Dissol Np Residual Am Pu-238/Total Pu Conversion of Nj Fractional loss o Fractional loss o Pu-236 content ppm	MK-20.5 MK-20.5 MK-20.5 (wt basis) = p to Pu (mol bas p to FP (mol bas f Np in Lig Waste f Pu in Lig Waste t Discharge Date	BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N isis) = Pu-238 cau is) = (Sum of fiss = (wt basis) = N a (wt basis) = N a (wt basis) = P	Ap acid// Np input = sitc + Pu-239 caus ion product) in caus o caustic / (Pu caus Time elasped (t) days	DJ-24, 030820-03 AD-23, 030820-03 tic + total Pu J/ Np in tic and acid / Np inp Np dejacket) = tic + Pu acid) = Pu-236 tt/2 years	nput =	Actual 0.8544 0.873 0.0005 0.00	0.00500	0.00243 0.00848 0.00001 0.00723 Predicted (BC	33) 33) Pu238 t1/2 days	Actual/Pred #DIV/0! #DIV/0! #DIV/0! #DIV/0! Adjusted Pu-238,g					
Total Dejacket Waste Acid Dissol Ng Residual Am Pu-238/Total Pu Conversion of Nj Fractional loss o Fractional loss o Pu-236 content ppm 2.85	MK-20.5 MK-20.5 (MK-20.5 (wt basis) = (wt basis) = p to FV (mol bas f Np in Liq Waste f Pu in Liq Waste t Discharge Date 9 11/1/2001	BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N is) = Pu-238 cau (s) = (Sum of fiss a (wt basis) = Ni a (wt basis) = Ni a (wt basis) = P Analysis Date 9/23/2003	4p acid)/ Np input = = = sitc + Pu-239 caus ion product) in caus p caustic/ (Np acid u caustic/ (Np acid u caustic/ (Pu caus Time elasped (t) days -691.0C	DJ-24, 030820-03 AD-23, 030820-03 bitc + total Pu )/ Np in titic and acid / Np ing + Np dejacket) = titc + Pu acid) = Pu-236 t1/2 years 2.85	nput = put = put )= Pu-236 t1/2 days 1040.96	Actual 0.8544 0.8544 0.875 0.1216 0.0001 0.0001 0.0001 0.0001 Pu-236 ppm 4.58 0.458 0.58 0.58 0.58 0.58 0.58 0.58 0.58 0.	2.01040 0.00263 1.71500	0.00243 0.00848 0.00001 0.00723 Predicted (BC	335) Pu238 t1/2 days 7 32032.425	Actual/Pred #DIV/0! #DIV/0! #DIV/0! Adjusted Pu-238, g 0.2183					
Total Dejacket Waste Acid Dissol Np Residual Am Pu-238/Total Pu Conversion of Ny Conversion of Ny Conversion of Sy Fractional loss o Fractional loss o Pu-236 content ppm 2.86	MK-20.5 MK-20.5 (wt basis) = (wt basis) = p to FP (mol bas f Np in Liq Waster f Pu in Liq Waster t Discharge Date 9 11/1/2001	BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N isis) = Pu-238 cau s) = (Sum of fiss a (wt basis) = Nj a (wt basis) = Nj a (wt basis) = P Analysis Date 9/23/2003	Ap acid)/ Np input = 24 24 25 acid)/ Np input = 25 acids/ Np acid u caustic (Pu caus caustic (Pu caus (Pu caustic (Pu caus Time elasped (t) days -691.00	DJ-24, 030820-03; AD-23, 030820-03; AD-23, 030820-03 tic + total Pu J/ Np ii tic and acid / Np in tic and acid / Np in tic + Pu dejacket Np dejacket Pu-236 tt/2 years 2,85	nput =	Actual 0.8544 0.854 0.7216 0.0001 0.0001 0.0001 0.0001 Pu-236 ppm 4.58	2.01040 0.00263 1.71500	0.00243 0.00848 0.00001 0.00723 Predicted (BC	Pu238 t1/2 days 32032.425	Actual/Pred #DIV/0! #DIV/0! #DIV/0! #DIV/0! Adjusted Pu-238, g 0.2183					
Total Dejacket Waste Acid Dissol Np Residual Am Pu-238/Total Pu- Conversion of N Conversion of N Conversion of N Pu-236 content ppm 2.85 Reference Infor	MK-20.5 MK-20.5 MK-20.5 (wt basis) = to Pu (mol bas p to FP (mol bas p to FP (mol bas p to FP (mol bas f Pu in Liq Waste f Pu in Liq Waste t Discharge Date 9 11/1/2001 mation	BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N iis) = Pu-238 ca. iis) = (Sum of fiss = (wt basis) = N = (wt basis) = N a (wt basis) = P Analysis Date 9/23/2003	Ap acid// Np input = 24 24 25 25 25 26 26 26 26 26 26 26 26 26 26 26 26 26	DJ-24, 030820-03 AD-23, 030820-03 tic + total Pu J/ Np in tic and acid / Np in tic and acid / Np in tic + Np dejacket) = tic + Pu acid) = Pu-236 t1/2 years 2.85	Build and a second seco	Actual 0.8544 0.8754 0.1218 0.0008 0.0018 0.0001 0.0001 Adjusted Pu-236 ppm 4.58 Sample	2 01040 2 01040 0 00263 1.71500	0.00243 0.0004 0.0001 0.00723 Predicted (BC Pu-238 t1/2, years 87.7 27-95 Pr	Pu238 t1/2 days 32032.425 Ru-101	Actual/Pred #DIV/0! #DIV/0! #DIV/0! #DIV/0! Adjusted Pu-238, g 0.2183 SB-125 Bo(~)	Cs-134 Be(-1	Cs-137	Ce-144 Boʻr-1	Eu- 155 Bairt	Eu-154 Bai-i
Total Content Waste Acid Dissol Np Residual Am Pu-238/Total Pu Conversion of Ny Conversion of Ny Conversion of Ny Conversion of Ny Fractional loss o Fractional loss o Pu-236 content ppm 2.85 Reference infor	MK-20.5 MK-20.5 MK-20.5 ount (wt basis) = p to Pu (mol bas p to PP (mol bas p to PP (mol bas p to FP (mol bas) p to FP (mol bas p to FP (mol bas) p to FP (mol b	BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N isi) = Pu-238 cau (s) = (Sum of fiss ) = (Sum of fiss ) = (Wt basis) = N o (wt basis) = N o (wt	4p acid)/ Np input = 2 suitc + Pu-239 caus ion product) in caus p caustic / (Np acid u caustic / (Pu caus Time elasped (t) days -691.00	DJ-24, 030820-03 AD-23, 030820-03 AD-23, 030820-03 titic + total Pu )/ Np in titic and acid / Np ing titic and acid / Np ing titic and acid / Np ing titic + total Pu )/ Np i titic + total Pu )/ Np	Pu-236         11/2           days         1040.90           Analysis         Gr gamma	Actual 0.8544 0.8736 0.1216 0.0001 0.000 0.0001 0.000 0.	2.01040 0.00263 1.71500 Co-60 Bg/mL	0.00243 0.00044 0.00001 0.00723 Prodicted (B0 Prodicted (B	3 3 3 3 3 3 3 3 3 3 3 3 3 3	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 2,50F+ML	Cs-137 Bg/mL 2,10F+L0F	Ce-144 Bg/mL	Eu- 155 Bq/mL	Eu- 154 Bq/mL
Total Dojacket Waste Acid Dissol Np Residual Am Pu-238/Total Pu Conversion of Ny Conversion of Ny Conversion of Ny Conversion of Ny Fractional loss of Fractional loss of Fractional cost Pu-236 content ppm 2.86 Reference Infor	NK:20.5           MK:20.5           MK:20.5           Ount (wt basis) - i (wt basis) = i to EP (mol bas to EP (mol bas))           t         Discharge Date Date MW         Discharge Date State MW	BRP-45, 51,55 BNP-45, 51,55 = (Np caustic + N is) = Pu-236 cat s) = (Sum of fiss s)	Ap acid)/ Np input = 2 24 24 25 25 26 29 20 20 20 20 20 20 20 20 20 20 20 20 20	DJ-24, 030820-03 AD-23, 030820-03 AD-23, 030820-03 Ditic and acid / Np inj titic and acid / Np inj + Np dejacket Dit + Pu acid) = Pu-236 tt/2 years 2,85	but =     b	Actual 0.8544 0.854 0.000 0.0001 0.0002 0.000 0.0002 0.000 0.0002 0.000 0.0002 0.000 0.0002 0.000 0.0002 0.000 0.0002 0.0000 0.0000 0	Co-60 Bg/mL	0.00243 0.0044 0.00001 0.00723 Predicted (BC Pu-238 t1/2, years 87.7 Zr-95 Bq/mL 3.80E+05	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 1.50E+06 1.70E+07	Actual/Pred #DIV/0! #DIV/0! #DIV/0! #DIV/0! Adjusted Pu-238,g 0.2183 SB-125 Bg/mL 4.20E+05	Cs-134 Bg/mL 2.50E+05 2.60E+05	Cs-137 Bq/mL 2.10E+06 2.30E+06	Ce-144 Bq/mL 2.00E+07	Eu-155 Bg/mL 2.30E+051	Eu- 154 Bq/mL 6.70E+04
Total Dejacket Waste Acid Dissol Np Residual Am Pu-238/Total Pu Conversion of Ni Conversion	MK-20.5 MK-	BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + h. is) = Pu-238 cations = (with basis) = Nu - 238 = (with basis) = N Analysis Date = Maalysis Date = Maalysis Date = 11,143 = 20,27 = 11,143 = 20,47 = 11,143 = 11,143	Ap acid)/ Np input = = site + Pu-239 causion ion product) in caus or caustic / (Pu caus u caustic / (Pu caus u caustic / (Pu caus Time elasped (t) days -691.00	DJ-24, 030820-03 AD-23, 030820-03 tic + total Pu )/ Np in tic and acid / Np in tic and acid / Np in tic AD acid / Np in tic + Pu acid) = Pu-236 t1/2 years 2.85	Pu-236 t1/2 days           Pu-236 t1/2 days           Gr gamma	Actual 0.8544 0.8754 0.000 0.001 0.000 0.0001 0.000 0	2 01040 2 01040 0 00263 1.71500 0 00063 0 00063 0 00060 0 000000 0 00000000	0.00243 0.00243 0.0001 0.00723 0.00723 Predicted (BC Pu-238 t1/2, years t1/2, years 87.7 Zr-95 Bq/mL 3.80E+05	Pu238 t1/2 days 32032.425 RU-106 Bq/mL 1.50E+06 1.70E+07	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 2.50E+05 2.60E+05	Cs-137 Bg/mL 2.10E+06 2.30E+06	Ce-144 Bg/mL 2.00E+07	Eu- 155 Bq/mL 2.30E+05	Eu- 154 Bq/mL 6.70E+04
Total	MK-20.5 MK-20.5 MK-20.5 (wt basis) = (wt basis) = (wt basis) = (b PU (mot basis) = (b	BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N is) = Pu-23 cat s) = (Sum of fiss (s) (s wt basis) = N (wt basis) = N (wt basis)	4p acid)/ Np input = asitc + Pu-239 caus ion product) in caus p caustic / (Np acid u caustic /(Pu caus Time elasped (t) days -691.0C	DJ-24, 030820-03 AD-23, 030820-03 AD-23, 030820-03 bitc + total Pu // Np in titc and acid / Np min titc + total Pu // Np in titc	Pu-236 t1/2           days           f           Pu-236 t1/2           days           1040.9E           Analysis           Gr gamma           Alpha & Beta	Actual 0.8544 0.8544 0.2786 0.1286 0.0001 0.0001 0.0001 Pu-236 ppm 4.58 Sample DJ-24,030820-033 AD-23,030820-034 DJ-24,030820 DJ-24,030820 DJ-24,030820 DJ-24,030820 DJ-24,030820 DJ-24,030820 DJ-24,030820 DJ-24,030820 DJ-24,030820 DJ-24,030820 DJ-24,030820 DJ-24,030820 DJ-24,030820 DJ-24,030820 DJ-24,0308 DJ-24,030820 DJ-24,0308 DJ-24,030820 DJ-24,0	Co-60 Bg/mL	0.00243 0.00243 0.00021 0.00723 Predicted (BC Pu-238 t1/2, years 87.7 Zr-95 Bq/mL 3.80E+05 Beta Bq/mL	Pu238         t1/2           days         32032.425           Ru-106         Bq/mL           1.50E+06         1.70E+07           total activity Bg/mL         5 activity Bg/mL	Actual/Prod #DIV/0! #DIV/0! #DIV/0! Adjusted Pu-238, g 0.2183 SB-125 Bg/mL 4.20E+05	Cs-134 Bg/mL 2.50E+05 2.60E+05	Cs-137 Bq/mL 2.10E+06 2.30E+06	Ce-144 Bg/mL 2.00E+07	Eu- 155 Bg/mL 2.30E+05	Eu- 154 Bq/mL 6.70E+04
Total Dojacket Waste Acid Dissol Np Residual Am Pu-238/Total Pu Conversion of Nj Conversion	MK-20.5           MK           Discharge           Date           Date           Date           MW           269.047           233.0468           233.0462           230.9532           240.0538	BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N is) = Pu-238 cat s) = (Sum of fiss (wtbasis) = N (wtbasis) = N (wtbasis) = P Analysis Date 9/23/2003 Density g/cc 11,143 20,476 19,851 19,854	Ap acid)/ Np input = 24 24 24 25 25 25 26 20 20 20 20 20 20 20 20 20 20 20 20 20	DJ-24, 030820-03 AD-23, 030820-03 AD-23, 030820-03 tic + total Pu J/ Np in tic and acid / Np in tic and acid / Np in tic + Np dejacket ic + Pu acid) = Pu-236 tt/2 years 2.85	Analysis         Analysis           Alpha & Beta         Alpha & Beta	Actual 0.8544 0.8754 0.121 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0002 0.000 0.0001 0.0002 0.000 0.0002 0.000 0.0002 0.000 0.0002 0.000 0.00	201040 201040 0.00283 1.71500 Co-60 Bg/mL Alpha Bg/mL 1.90E+04 2.60E+n8	0.00243 0.00243 0.0001 0.00723 Predicted (BC Pu-238 t1/2, years 87.7 Zr-95 Bq/mL 3.80E+05 Bq/mL 5.78E+06 J.20E+07	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 1.50E+06 1.70E+07 total activity Bg/mL 5.80E+06 3.80E+0R	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 2.50E+05 2.60E+05	Cs-137 Bg/mL 2.10E+06 2.30E+06	Ce-144 Bg/mL 2.00E+07	Eu-155 Bg/mL 2.30E+05	Eu- 154 Bq/mL 6.70E+04
Total Dejacket Waste Acid Dissol Acid Dissol Np Residual Am Pu-238/Total Pu Conversion of Ny Conversion of Ny Conversion of Ny Fractional loss of Fractional loss of Fractional loss of Pu-236 content ppm 2 2 86 Reference Infor NpQ. <sup>337</sup> (oxide) NpQ. <sup>337</sup> (oxide) Np237 Pu-238 Pu-239 Pu-240 Pu241	MK-20.5 MK-	BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + h. isi) = Pu-23 caustic - h. isi) = Sur-23 caustic - h. isi) = Sur-23 caustic - h. isi = Sur-23 caustic - h. isi = Sur-23 caustic - h. sur-23 caustic - h. g/cc 11.143 20.476 19.851	Ap acid)/ Np input = 2 24 24 25 25 25 25 25 25 25 25 25 25 25 25 25	DJ-24, 030820-03 AD-23, 030820-03 AD-23, 030820-03 tic + total Pu )/ Np ii tic and acid / Np in tic and acid / Np in tic + Np dejacket tic + Pu acid) = Pu-236 t1/2 years 2.85	B	Actual 0.8544 0.8754 0.7216 0.0001 0.000 0.0001 0.000	201040 201040 0.00263 1.71500 Co-60 Bg/mL Alpha Bq/mL 1.90E+04 2.60E+08	0.00243 0.00243 0.0004 0.0001 0.00723 Predicted (BC 2.0001 2.0001 2.0001 2.0001 2.000 2.000 2.000 2.000 2.000 2.00 2.	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 1.50E+06 1.70E+07 Iotal activity Bg/mL 5.80E+06 3.80E+08	Actual/Prod #DIV/01 #D	Cs-134 Bg/mL 2.50E+05 2.60E+05	Cs-137 Bg/mL 2.10E+06 2.30E+06	Ce-144 Bg/mL 2.00E+07	Eu- 155 Bq/mL 2.30E+05	Eu- 154 Bq/mL 6.70E+04
Total Total Conversion of Na Residual Am Pu-238/Total Pu Conversion of Na	MK-20.5 MK-	BNP-45, 51,55 BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N is) = Pu-236 cat is) = (Suno fiss) ( (wt basis) = P ( (wt basis) = P 9/23/2003 Density g/cc 11,143 20,474 19,851 19,851 19,851 19,851	4 A A A A A A A A A A A A A A A A A A A	DJ-24, 030820-03 AD-23, 030820-03 AD-23, 030820-03 bitc + total Pu // Np in titc and acid / Np mini- titc and acid / Np mini- titc + Np dejacket in + Pu acid) = Pu-236 t1/2 years 2,85	Pu-236 t1/2           days           1040 9E           Analysis           Gr gamma           Alpha & Beta           ICP	Actual 0.8544 0.8726 0.128 0.0006 0.0001 0.0002 0.0002 0.0002 0.0002 0.0002 0.0002 0.0002 0.0002 0.0002 0.0002 0.0002 0.0002 0.0002 0.0002 0.0002 0.0002 0.0002 0.000 0.0002 0.0002 0.000 0.0002 0.000 0.0002 0.0000 0.000 0.0000 0.0000 0.0000	Co-60 Bg/mL 1.90540 Co-60 Bg/mL 1.905404 2.605408 Np-237 mp (correl)	0.00243 0.00243 0.00021 0.00723 Predicted (BC Pu-238 t1/2, years 87.7 Zr-95 Bq/mL 3.80E+05 Beta Bq/mL 5.78E+06 1.20E+08 Pu-238 pu-238	Pu238         t1/2           days         32032.425           Ru-106         Bq/mL           1.50E+05         1.70E+07           total activity Bg/mL         3.80E+08           9         3.80E+08           Pu239         mb decrim 1	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 2.50E+05 2.60E+05	Cs-137 Bq/mL 2.10E+06 2.30E+06 Pu-242	Ce-144 Bg/mL 2.00E+07 Pu-244 pb (cs/cs/)	Eu- 155 Bq/mL 2.30E+05	Eu- 154 Bq/mL 6.70E+04
Total Technological Conversion of Np Residual America Acid Dissol Acid Dissol Acid Dissol Pu-238/Total Pu-238/Total Pu-238/Total Pu-238/Total Pu-238 Content Pu-236 Content Pu-236 Content Pu-236 Content Pu-236 Content Pu-238 Reference Infor Np0, 237 (oxide) Np0, 237 Pu-238 Pu-240 Pu-241 Pu-241 Pu-241 Pu-241 Pu-241 Pu-241 Pu-248 Pu	MK-20.5           MK-20.5           MK-20.5           MK-20.5           MK-20.5           Do FD (mol bass) = to Do FP (mol bass) = to Do FP (mol bass) = to Do FP (mol bass) = to Discharge Date 2 Discharge Date 2 Discharge 2 D	BRP-45, 51,55 BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N is) = Pu-238 cat s) = (Sum of fiss s) = (S	4p acid)/ Np input = siste + Pu-239 caus ion product) in caus p caustic/ (Np acid- u caustic /(Pu caus Time elasped (t) days -691.00	DJ-24, 030820-03 AD-23, 030820-03 AD-23, 030820-03 Ditic and acid / Np ing titic acid	Analysis         Gr gamma           Alpha & Beta         ICP	Actual 0.8544 0.8752 0.121 0.0000 0.001 0.000 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.000	Co-60 Bq/mL 1.90E+06 Bq/mL 1.90E+04 2.60E+08 NP-237 ppb (ng/mL) 5.26E+03	0.00243 0.00243 0.0001 0.00723 Predicted (BC Pu-238 t1/2, years 87.7 Zr-95 Bq/mL 3.80E+05 Beta Bq/mL 5.78E+06 1.20E+06 Pu-238 ppb (ng/mL) 3.80E+015	Pu238 t1/2 daya 32032.425 Ru-106 Bg/mL 1.50E+06 5.40E+06 5.40E+06 3.30E+06 3.30E+06 9.30E+06 9.30E+06 9.30E+00 9.00E+00	Actual/Pred #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #201 80 80 4.201 #02 80 #01 #02 #02 #02 #02 #02 #02 #02 #02 #02 #02	Cs-134 Bq/mL 2.50E+05 2.60E+05 Pu-241 ppb (ng/mL) <5.0E+05	Cs-137 Bq/mL 2.10E+06 2.30E+06 Pu-242 ppb (ng/mL) <5.0E+0	Ce-144 Bq/mL 2.00E+07 Pu-244 ppb (ng/mL) <5.0E+0	Eu- 155 Bq/mL 2.30E+05	Eu- 154 Bg/mL 6.70E+04
Total Dojacket Waste Acid Dissol Acid Dissol Pu-238/Total Pu Conversion of Nu Conversion of Nu Conversion of Nu Conversion of Nu Conversion of Nu Pu-236 content ppm 2.86 Reference Infor 2.86 Reference Infor Pu-238 Pu-386 Pu-38	MK-20.5           Discharge           Date           Date           Date           MW           283.0469           210.053           240.0533           3.70E+10.5           5.dys/year	BRP-45, 51,55 BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N is) = Pu-236 cat )s) = (Sum of fiss )s)	Lp acid)/ Np input = 24 24 24 25 25 26 26 27 27 27 27 27 27 27 27 27 27 27 27 27	DJ-24, 030820-03 AD-23, 030820-03 AD-23, 030820-03 tic + total Pu J/ Np in tic and acid / Np ing + Np dejacket Np dejacket Pu-236 tt/2 years 2,85	Image: second	Actual 0.8544 0.8754 0.721 0.000 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.000 0.0	201040 201040 0.00263 1.71500 Co-60 Bg/mL Alpha Bg/mL 1.906+04 2.606+08 2.606+08 Np-237 ppb (ng/mL) 5.266+03 3.438+06	0.00243 0.00243 0.0001 0.00723 Predicted (BC Pu-238 t1/2, years 87.7 Zr-95 Bq/mL 3.80E+05 Bg/mL 5.78E+06 1.20E+08 Pu-238 ppb (ng/mL) 3.80E+01 4.30E+02	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 1.50E+06 5.80E+06 5.80E+06 3.80E+08 9.00E+00 9.00E+00 9.00E+00 9.00E+00 5.50E+04	Actual/Pred #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0! Adjusted Pu-28, g 0.2183 SB-125 Bg/mL 4.20E+05 Bg/mL 9pb (ng/mL) <5.0E+0 5.24E+05	Cs-134 Bg/mL 2.50E+05 2.60E+05 9.80E+02 9.80E+02	Cs-137 Bg/mL 2.10E+06 2.30E+06 9.00E+01 9.00E+01	Ce-144 Bg/mL 2.00E+07 <5.0E+0 <5.0E+0	Eu- 155 Bg/mL 2.30E+05	Eu- 154 Bq/mL 6.70E+04
Total Total Conversion of Np Residual Am Pu-238/Total Pu Conversion of Np Conversion Co	MK-20.5 MK-20.	BNP-45, 51,55 BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N is) = PU-238 cat is) = [Sum of fissed (wt basis) = N (wt basis) = N (wt basis) = N (wt basis) = P Analysis Date 9/23/2003 Density g/cc 11,143 20,474 19,851 19,851 19,851 19,851 19,851	Ap acid)/ Np input = asite + Pu-239 cause ion product) in cause coustie/ (Np acid u caustie / (Pu cause Time elasped (t) days -691.00	DJ-24, 030820-03 AD-23, 030820-03 AD-23, 030820-03 Bitc + total Pu // Np in tic and acid // Np in tic and acid // Np in tic + Np dejacket ic + Pu acid) = Pu-236 t1/2 years 2,85	Pu-236 t1/2           days           1040 96           Analysis           Gr gamma           Alpha & Beta           ICP           ILLAInha Score	Actual 0.8544 0.8754 0.1216 0.0006 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0002 0.000 0	Co-60 Bq/mL 2.01043 1.71500 Co-60 Bq/mL 1.90E+04 2.60E+08 NP-237 ppb (ng/mL) 5.26E+03 3.43E+06 PpL236(PL-079	0.00243 0.00243 0.00024 0.00072 0.00723 Predicted (BC Pu-238 t1/2, years 87.7 Zr-95 Bg/mL 3.80E+05 1.20E+08 1.2	Pu238         t1/2           days	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 2.50E+05 2.60E+05 9.00E+05 9.80E+02	Cs-137 Bq/mL 2.10E+06 2.30E+06 Pu-242 ppb (ng/mL) <5.0E+0 9.00E+01	Ce-144 Bg/mL 2.00E+07 Pu-244 ppb (ng/mL) <5.0E+0 <5.0E+01	Eu- 155 Bq/mL 2.30E+05	Eu- 154 Bq/mL 6.70E+04
Total Total Acid Dissol Dejacket Waste Acid Dissol Pu-238/Total Pu- Conversion of Ny Conversion of Ny Conversion of Practional loss of Fractional loss of Fractional loss of Pu-236 content ppm Pu-236 content ppm 2.85 Reference Infor NpQs <sup>237</sup> (oxide) NpQs <sup>237</sup> (oxide) Pu-238 Pu-238 Pu-238 Pu-238 Pu-238 Pu-240 Pu-241 Pu-245 Pu-25 Pu-25 Pu-25 Pu-25 Pu-25 Pu-25 Pu-25	MK-20.5 MK-20.5 MK-20.5 MK-20.5 (wt Dasis) = 10 o FP (mol Dass 10 o FP (mol Dass 10 o FP (mol Dass 10 o FP (mol Dass 10 o FP (mol Dass 11 // 2001 MW 269.047 233.0469 238.0469 238.0459 238.0457 238.0457 238.0457 238.0457 238.0457 238.0457 238.0457 238.0457 238.0457 238.0457 238.0457 238.0457 240.055 240.055 3.70E+10 5.days/year	BRP-45, 51,55 BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N is) = Pu-238 cat (s) = (Sum of fiss (s) = (Sum of fiss) (s) = (Sum of	4p acid)/ Np input = 24 24 25 acid)/ Np input = 25 acids (Np acid) 25 acids (Np acid) 26 acids (Np acid) 27 acids (Np acid) 27 acids (Np acid) 28 acids (Np acid) 29 acids (Np acid) 20	DJ-24, 030820-03 AD-23, 030820-03 AD-23, 030820-03 Ditic and acid / Np ing titic acid acid acid / Np ing titic acid acid acid acid acid acid acid ac	Pu-236 t1/2           days           Gr gamma           Analysis           Gr gamma           ICP           Pu-Alpha Scattaction	Actual 0.8544 0.8736 0.121 0.0002 0.001 0.0002 0.001 0.0002 0.001 0.0002 0.001 0.0002 0.001 0.0002 0.001 0.0002 0.001 0.0002 0.001 0.000 0.	Co-60 Bq/mL Alpha Bq/mL 1.90E+00 Bq/mL 1.90E+00 5.26E+03 3.43E+06 Pu-236/Pu-238	0.00243 0.00243 0.0001 0.00723 Predicted (BC Pu-238 t1/2, years t1/2, years 87.7 Zr-95 Bq/mL 3.80E+05 Beta Bq/mL 5.75E+06 1.20E+005 Pu-238 ppb (ng/mL) 3.80E+01 1.20E+005 Pu-238 ppb (ng/mL) 3.80E+015 Pu-238 ppb (ng/mL) 3.80E+015 Pu-238 Pu-23	Pu238         t1/2           daya         32032.425           Ru-106         Bq/mL           Bq/mL         1.50E+06           5.00E+06         3.00E+08           9         1.70E+07           total activity Bq/mL         5.50E+04           9         9.00E+00           5.55E+04         7	Actual/Pred #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0! 0.2183 SB-125 Bg/mL 4.20E+05 4.20E+05 9.240 ppb (ng/mL) <.0E+05	Cs-134 Bg/mL 2.50E+05 2.60E+05 9.80E+02 <5.0E+02	Cs-137 Bg/mL 2.10E+06 2.30E+06 Pu-242 ppb (ng/mL) <5.0E+0 9.00E+01	Ce-144 Bg/mL 2.00E+07 Pu-244 ppb (ng/mL) <5.0E+01	Eu- 155 Bg/mL 2.30E+05	Eu- 154 Bq/mL 6.70E+04
Total Dojacket Waste Acid Dissol Acid Dissol Residual Am Pu-238/Total Pu Conversion of Ni Conversion of Ni Conversion of Ni Conversion of Ni Conversion of Ni Pu-236 content ppm 2.86 Reference Infor 2.86 Reference Infor Pu-238 Pu-38 Pu-3	MK-20.5 MK-	BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + h. isi) = Pu-23 cation s) = (Surp of fission = N (wt basis) = N (wt basis) = N (wt basis) = N Analysis Date 9/23/2003 Density g/cc 11.143 20.476 19.851 19.851 19.855 19.85	Lp acid)/ Np input = 24 24 25 25 25 26 26 27 27 27 27 27 27 27 27 27 27 27 27 27	DJ-24, 030820-03 AD-23, 030820-03 AD-23, 030820-03 tic + total Pu J' Np in tic and acid / Np ing + Np dejacket Np dejacket Pu-236 tt//2 years 2.85	Image: second	Actual Actual 0.8544 0.8754 0.7216 0.0001 0.0001 0.0001 Pu-236 ppm Pu-236 ppm DJ-24,030820-033 AD-23,030820-034 AD-30,030820 AD-30,030820 AD-30,030820 AD-	201040 201040 0.00263 1.71500 Co-60 Bg/mL 1.90E+04 2.60E+08 2.60E+08 2.60E+08 2.60E+08 3.43E+06 Pu-236/Pu-238 ppm (ug/mL) 5.26E+03 3.43E+06 Pu-236/Pu-238 ppm (ug/mL) 2.89	0.00243 0.00243 0.0001 0.00723 Predicted (BC Pu-238 t1/2, years 87.7 Zr-95 Bg/mL 3.80E+05 1.20E+08 pb (ng/mL) 3.80E+01 1.20E+08 pb (ng/mL) 3.80E+01 Relative error % 6.3.3	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 1.50E+06 5.80E+06 5.80E+06 9.05E+04 9.00E+00 5.59E+04	Actual/Pred #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0! 0.2183 SB-125 Bg/mL 4.20E+05 Bg/mL 4.20E+05 5.24E+03	Cs-134 Bg/mL 2.50E+05 2.60E+05 9.80E+02 9.80E+02	Cs-137 Bq/mL 2.10E+06 2.30E+06 Pu-242 ppb (ng/mL) <5.0E+0 9.00E+01	Ce-144 Bg/mL 2.00E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bq/mL 2.30E+05	Eu- 154 Bq/mL 6.70E+04
Total Conversion of Ny Residual Am Pu-238/Total Pu Conversion of Ny Conversion (Conversion (	MK-20.5 MK-	BNP-45, 51,55 BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N is) = PU-28 cat is) = (Sun of fisse) = N ( (wt basis) = N ( (wt	Ap acid)/ Np input = asite + Pu-239 cause ion product) in cause or caustic / (Np acid u caustic / (Pu caus Time elasped (t) days -691.00	DJ-24, 030820-03 AD-23, 030820-03 AD-23, 030820-03 Bitc + total Pu // Np in tic and acid // Np in tic and acid // Np in tic + Np dejacket N pd dejacket bit + Pu acid) = Pu-236 t1/2 years 2,85	Pu-236 t1/2 days 1040 9E Analysis Gr gamma Alpha & Beta	Actual 0.8544 0.8754 0.1216 0.0006 0.0001 Adjusted Pu-236 ppm J-24.030820-034 A58 DJ-24.030820-034 DJ-24.030820-034 DJ-24.030820-034 DJ-24.030820-034 DJ-24.030820-034 DJ-24.030820-034	Co-60 Bq/mL 1.90E+00 Co-60 Bq/mL 1.90E+04 2.60E+08 Ppb (ng/mL) 5.26E+03 3.43E+06 Pu-236/Pu-238 ppm (ug/mL) 2.89	0.00243           0.00844           0.0001           0.0073           Predicted (BC           112, years           87.7           Zr-95           Bg/mL           3.80E+05           Pb: 0;gmL           3.80E+05           Pp: 0;gmL           3.80E+05           Relative error           %           6.3	Pu238         t1/2           days         32032.425           Ru-106         Bq/mL           1.50E+06         1.70E+07           total activity Bg/mL         5.80E+08           9         0.80E+08           9.00E+00         5.58E+04           1         5.58E+04	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 2.50E+05 2.60E+05 9.80E+02 9.80E+02	Cs-137 Bq/mL 2.10E+06 2.30E+06 2.30E+06 9.00E+01 9.00E+01	Ce-144 Bg/mL 2.00E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bq/mL 2.30E+05	Eu- 154 Bq/mL 6.70E+04
Total Total American	MK-20.5           MW           2           Date           MW           288.048           238.0496           239.0522           240.0533           240.053           240.054           24.0567           3.70E+10           5 days/year           113F+13	BRP-45, 51,55 BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N is) = Pu-238 cat )s) = (Sum of fiss (s) = (Sum of fiss (s) = (Sum of fiss (s) = (Sum of fiss (s) = (Sum of fiss) (s) = (Sum o	4p acid)/ Np input = sistic + Pu-239 causi ion product) in caus p caustic / (Np acid- u caustic / (Pu caus Time elasped (t) days -691.00	DJ-24, 030820-03 AD-23, 030820-03 AD-23, 030820-03 tic + total Pu J/ Np in tic and acid / Np ing tic + Np dejacket Pu-236 t1/2 years 2 2 85 2 2 85	Pu-236 t1/2           days           analysis           Gr gamma           Alpha & Beta           ICP           Pu-Alpha Scar	Actual Actual 0.8544 0.8736 0.0016 0.0001 0.0002 0.000 0.0002 0.000 0.0002 0.000 0.0002 0.000 0.0002 0.000 0.0002 0.000 0.0002 0.000 0	Co-60 Bg/mL 1.90E+00 Alpha Bg/mL 1.90E+04 2.60E+08 Np-237 ppb (ng/mL) 5.26E+03 3.43E+06 Pu-236/Pu-238 ppm (ug/mL) 2.89	0.00243 0.00243 0.0001 0.00723 Predicted (BC Pu-238 t1/2, years t1/2, years 87.7 Zr-95 Bq/mL 3.80E+05 Beta Bq/mL 3.80E+05 Beta Bq/mL 3.80E+05 Relative error \$6.3	Pu238         t1/2           days         32032.425           Ru-106         Bq/mL           Bq/mL         1.50E+06           5.00E+06         3.00E+06           3.300E+08         3.00E+08           Pu-239         ppb (ng/mL)           9.559E+04         3.559E+04	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 2.50E+05 2.60E+05 9.80E+02 9.80E+02	Cs-137 Bg/mL 2.10E+06 2.30E+06 9.00E+01 9.00E+01	Ce-144 Bg/mL 2.00E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bg/mL 2.30E+05	Eu- 154 Bq/mL 6.70E+04
Total         Total           Total         Total           Dejacket Waste         Add Dissol           Np. Residual Am         Total Pul238           Pu-236 content         ppm           2.86         Reference Infor           NpQ37 (oxide)         Np237           Pu-238 Pul240         Pul238 Pul240           Pul240         Pul240           Pul240         Specific actitivity (Factor =           Specific actitivity (Factor =         Specific actitivity (Factor =	MK-20.5 MK-20.5 MK-20.5 MK-20.5 MK-20.5 MK-20.5 MK-20.5 ME DE PL ME	BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N is) = Pu-23 caustic 2 (wt basis) = Nu -23 2 (wt basis) = Nu Analysis Date 9/23/2003 Density g/cc 11.143 2 0.475 19.851 19.851 19.855	Apacid)/ Np input = 24 24 24 24 25 25 25 26 20 20 20 20 20 20 20 20 20 20 20 20 20	DJ-24, 030820-03 AD-23, 030820-03 AD-23, 030820-03 Dittic and acid / Np int tic and acid / Np int tic and acid / Np int tic AD acid / N	Image: second	Actual 0.8544 0.873 0.1218 0.000 0.001 0.0	201040 201040 0.02283 1.71500 Co-60 Bg/mL 1.90E+04 2.60E+08 5.26E+03 3.43E+06 Pu-237 ppb (ng/mL) 5.26E+03 3.43E+06 Pu-236/Pu-238 ppm (ug/mL) 2.89	0.00243 0.00243 0.0001 0.00723 Predicted (BC Pu-238 t1/2, years 87.7 Zr-95 Bg/mL 3.80E+05 Bg/mL 3.80E+05 Pu-238 ppb (ng/mL) 3.80E+07 Pu-238 ppb (ng/mL) 3.80E+07 Relative error % 6.3	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 1.50E+06 5.80E+06 9.05E+06 9.05E+04 9.00E+00 5.59E+04	Actual/Pred #DIV/0! #DIV/0! #DIV/0! #DIV/0! Adjusted Pu-288,g 0.2183 SB-125 Bg/mL 4.20E+05 5.80E+06	Cs-134 Bg/mL 2.50E+05 2.60E+05 9.00(m/mL) <5.0E+02 9.80E+02	Cs-137 Bq/mL 2.10E+06 2.30E+06 Pu-242 ppb (ng/mL) 9.00E+01	Ce-144 Bg/mL 2.00E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bq/mL 2.30E+05	Eu- 154 Bq/mL 6.70E+04
Total Total Conversion of Na Pu-236/Total Pu Conversion of Na Conversion of Na Conversion of Na Conversion of Na Conversion of Na Conversion of Na Conversion of Na Pu-236 content ppm 2.85 Reference Infor Reference Infor NpO <sub>3</sub> <sup>37</sup> (oxide) NpO <sub>3</sub> <sup>37</sup> (oxide) Np	MK-20.5 MK-20.5 MK-20.5 MK-20.5 (M Pui (Mol basis) = 1 (M Pui (Mol basis) = 0 P Pi (Mol basis) = 0 P Pi (Li Q Masis) P U In Li Q Masis P	BNP-45, 51,55 BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N is) = PU-28 cat is) = (Surro f163 (wt basis) = N (wt basis) = N (wt basis) = P Analysis Date 9/23/2003 Density g/cc 11,43 20,474 19,851 19,8	Ap acid)/ Np input = asitc + Pu-239 caus ion product) in caus caustic /(Pu-239 caus caustic /(Pu caus Time elasped (t) days -691 0C	DJ-24, 030820-03 AD-23, 030820-03 AD-23, 030820-03 bits and acid / Np in tits and acid /	Pu-236 t1/2 days 1040 9E Analysis Gr gamma Alpha & Beta ICP	Actual 0.8544 0.8736 0.1216 0.0006 0.0001 Adjusted Pu-236 ppm J-24.030820-033 AD-23.030820-034 DJ-24.030820-033 AD-23.030820-034 DJ-24.030820-034 AD-23.030820-034 AD-23.030820004 AD-23.03082004 AD-23.0308004 AD	Co-60 Bq/mL 4.201043 1.71500 Co-60 Bq/mL 4.260E+08 Pu-236/Pu-238 pm (ug/mL) 5.26E+03 3.43E+06 Pu-236/Pu-238 pm (ug/mL) 2.89 (5.80 MeV Area	0.00243           0.00844           0.0001           0.0073           Predicted (BC           Predicted (BC           Predicted (BC           27-95           Bq/mL           3.80E+05           Deta Bq/mL           5.78E+06           1.20E+08           Ppb (ng/mL)           3.80E+05           Relative error %           6.3           1 Counts X Pu <sup>+</sup>	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 5.80E+06 3.300E+00 3.300E+00 5.59E+04 5.59E+04 5.59E+04 236,X2361X1E6	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 2.50E+05 2.60E+05 2.60E+05 9.80E+02 9.80E+02	Cs-137 Bq/mL 2.10E+06 2.30E+06 2.30E+06 9.00E+01 9.00E+01	Ce-144 Bq/mL 2.00E+07 2.00E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bq/mL 2.30E+05	Eu- 154 Bq/mL 6.70E+04
Total         Total           Total         Total           Dejacket Waste         Acid Dissol           Np Residual Am         Pu-238/Total Pu-238/Total Pu-239/Total Pu-239/Total Pu-239           Pu-236 content         ppm           Pu-236 content         ppm           Pu-236 content         ppm           Pu-236 content         ppm           Pu-237 (oxide)         NpQs 237 (oxide)           Np2237 pu-238         pu-240           Pu-239         pu-241           Pu-241         Specific actitivity (Factor           Specific actitivity (Factor         Co-960           Zr-95         Co-90	MK-20.5           MK-20.5           MK-20.5           MK-20.5           MK-20.5           Observation           Main of the second	BRP-45, 51,55 BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N is) = Pu-238 cat )s) = (Sum of fiss )s) = (Sum of fiss )s) = (Sum of fiss (witbasis) = P (witbasis) = P (witba	Ap acid)/ Np input = 2 site + Pu-239 cause ion product) in cause p caustic / (Np acid- u caustic / (Pu cause Time elasped (t) days -691.00	DJ-24, 030820-03 AD-23, 030820-03 AD-23, 030820-03 bit of an acid / Np ing tit of and acid / Np ing the Ap dejacket Pu-236 t1/2 years 2 2 85 2 2 85 2 2 85 2 1130 360 2 1130 360 2 1130 360 2 1130 360	Aipha & Beta	Actual Actual 0.8544 0.8736 0.001 0.00020-033 0.00020-034 DJ-24, 030820-034 DJ-23, 030820-034 DJ-23, 030820-034 DJ-23, 030820-034 DJ-23, 030820-034 DJ-23, 030820-034 DJ-24, 030820-034 DJ-23, 030820-034 DJ-23, 030820-034 DJ-23, 030820-034 DJ-23, 030820-034 DJ-23, 030820-034 DJ-24, 030820-034 DJ-23, 030820-034 DJ-24, 030820-034 DJ-23, 030820-034 DJ-24, 030820-034 DJ-24, 030820-034 DJ-23, 030820-034 DJ-24, 030820 DJ-24, 030820 DJ-24	Co-60 Bq/mL Alpha Bq/mL 1.90E+00 5.26E+0237 ppb (ng/mL) 5.26E+0237 ppm (ng/mL) 5.26E+0237 ppm (ng/mL) 5.26E+0237 ppm (ng/mL) 5.26E+0238 ppm (ng/mL) 5.26E+0288 ppm (ng/mL) 5.26E+02888 (ng/mL) 5.26E+02888 (ng/mL) 5.26E+02888 (ng/mL) 5.26E+02888 (ng/mL) 5.26E+02888 (ng/mL) 5.26E+02888 (ng/mL) 5.26E+028888 (ng/mL) 5.26E+0288888 (ng/mL) 5.26E+02888888 (ng/mL) 5.26E+0288888888 (ng/mL) 5.26E+02888888888888888888888888888888888888	0.00243 0.00243 0.00026 0.00072 Predicted (BC Pu-238 t1/2, years t	Pu238         t1/2           daya         32032.425           Ru-106         Bg/mL           Bg/mL         1.50E+06           5.40E+06         1.70E+07           total activity Bg/mL         5.80E+06           5.30E+06         3.30E+06           9.239         ppb (ng/mL)           9.00E+00         5.59E+04           2         236x X236) X 1E6           2236x X236) X 126         2236x X236)	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 2.50E+05 2.60E+05 <0.00E+05 <0.00E+02	Cs-137 Bg/mL 2.10E+06 2.30E+06 Pu-242 ppb (ng/mL) <5.0E+0 9.00E+01	Ce-144 Bg/mL 2.00E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bg/mL 2.30E+05	Eu- 154 Bq/mL 6.70E+04
Total         Total           Total         Total           Dejacket Waste         Acid Dissol           Np. Residual Am         Total Pu-2387 Total Pu-237 Total Pu-Conversion of Ny           Fractional loss o         Fractional loss o           Pu-236 content         ppm	MK-20.5 MK-	BNP-45, 51,55 BNP-45, 51,55 BNP-45, 51,55 • (Np caustic + N is) = Pu-238 cat is 9 (Wt basis) = N •	M g/mol 24 24 24 24 24 24 24 25 26 26 27 27 28 29 29 29 29 29 29 29 29 29 29	DJ-24, 030820-03 AD-23, 030820-03 AD-23, 030820-03 title and acid /Np inj + Np dejacket) = title and acid /Np inj + Np dejacket) = title + tu acid) = Pu-236 t1/2 years 2,85 Pu-236 t1/2 years 1,103.05 (1130.35 (21469.00) 3,356.000 2,356.000	Pu-236 t1/2 days 1040.96 Analysis Gr gamma Alpha & Beta ICP	Actual 0.8544 0.873 0.1218 0.0001 0.000 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.000 0.0001 0.000 0	201040 201040 0.02283 1.71500 Co-60 Bg/mL 1.90E+04 2.60E+08 S.26E+03 3.43E+06 Pu-236/Pu-238 ppm (ug/mL) 2.89 (5.80 MeV Area (Full Spectru	0.00243 0.00243 0.00243 0.00243 0.0001 0.00723 Predicted (BC Pu-238 t1/2, years 87.7 Zr-95 Bg/mL 3.80E+05 Bg/mL 3.80E+05 Relative error % 6.3 Relative error % 6.3 Counts X Pu- 0.0024 0.0024 0.002	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 1.50E+06 5.80E+06 9.00E+00 9.00E+00 9.00E+00 9.00E+00 5.559E+04 238_u-x 226).X 1E6 1238_u-2 X 236)	Actual/Pred #DIV/0! #DIV/0! #DIV/0! #DIV/0! Adjusted Pu-288,g 0.2183 SB-125 Bg/mL 4.20E+05 5.80E+06	Cs-134 Bg/mL 2 50E+05 2 60E+05 2 60E+05 2 60E+05 9.80E+02	Cs-137 Bq/mL 2.10E+06 2.30E+06 2.30E+06 9.00E+01 9.00E+01	Ce-144 Bg/mL 2.00E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bg/mL 2.30E+05	Eu- 154 Bq/mL 6.70E+04
Total Total Conversion of Ny Residual Am Pu-238/Total Pu Conversion of Ny Conversion of Ny Pu-236 content ppm 2.85 Reference Infor NyO, 377 (oxide) NyD, 377 (oxide)	MK-20.5 MK-20.5 MK-20.5 (wf Dasis) - (wf	BNP-45, 51,55 BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N is) = Pu-236 cat is) = (Surior fiss) (wt basis) = N (wt basis) = N (wt basis) = N (wt basis) = N (wt basis) = N Particle 2 Density g/cc 19,851 10,852 10,852 10,855 10,8	M         4           42         24           24         24           asite + Pu-239 cause ion product) in cause ion product) in cause cause ion product) in cause cause ion product in cause ion product	DJ-24, 030820-03 AD-23, 030820-03 AD-23, 030820-03 bits and acid / Np in tic acid / Np i	Pu-236 t1/2 days for gamma Alpha & Beta	Actual 0.8544 0.8736 0.1216 0.0006 0.0001 0.000	Co-60 Bq/mL Co-60 Co-60 Bq/mL Alpha Bq/mL Co-60 Co-60 Bq/mL Co-60 CO-60	0.00243 0.00243 0.00243 0.00263 0.00243 0.00072 Predicted (BC Pu-238 tf/2, years tf/2, years 87.7 27-95 Bq/mL 3.80E+05 Beta Bq/mL 3.80E+05 Beta Bq/mL 3.80E+05 Relative error % 6.3 1.20E+06 Pu-238 pb (ng/n2 Automation of the second of the se	Pu238         t1/2           days         32032.425           Ru-106         Bg/mL           1.50E+06         5           1.70E+07         1.70E+07           Iotal activity Bg/mL         5.80E+06           Pu239         ppb (ng/mL)           0.5.59E+04         235x 2361 X 1E6           2235x 2361 X 125         r-238 <sub>112</sub> X 238)           county <sup>2</sup> the second s	Actual/Pred #DIV/0! #D	Cs-134 Bg/mL 2.50E+05 2.60E+05 pb (rg/mL) <5.0E+0 9.80E+02	Cs-137 Bq/mL 2.10E+06 2.30E+06 2.30E+06 2.30E+00 9.00E+01 9.00E+01	Ce-144 Bq/mL 2.00E+07 2.00E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bq/mL 2.30E+05	Eu-154 Bg/mL 6.70E+04
Total         Total           Dejacket Waste         Acid Dissol           Np Residual Am         Pu-238/Total Pu-239/Total Pu-239/Total Pu-239/Total Pu-239/Total Pu-236           Pu-236 content         ppm           Pu-237 (oxide)         NpQs 237 (oxide)           Np2237 pu-238         pu-240           Pu-239         Pu-240           Pu-241         pu-242           Conversion         365.21           Specific actitivity (Factor         Co-80           Zr-95         Ru-106           SB-125         Cs-134           Cs-137         Cs-137	MK-20.5           MK-20.5           MK-20.5           MK-20.5           MK-20.5           MK-20.5           MK-20.5           MK-20.5           MK-20.5           MW           Do FP (mol bass)           Pu in Liq Wast           Plante           Date           Date </th <th>BRP-45, 51,55 BNP-45, 51,55 BNP-45, 51,55 (hp caustic + h is) = Pu-238 cat (s) = (Sum of fiss (s) = (Sum of fiss (s) = (Sum of fiss (witbasis) = P Analysis Date 9/23/2003 Density g/cc 11,143 19,851 19,855 19,855 19,855 19,855 19,855 19,855 19,855 19,855 19,855 19,855 19,855 1</th> <th>A 24 42 24 424</th> <th>DJ-24, 030820-03           AD-23, 030820-03           AD-23, 030820-03           AD-23, 030820-03           AD-23, 030820-03           Iic + total Pu J' Np in tic and acid / Np intic and acid / Np dejacket pi intic and acid / Np dejacket pi intic acid acid acid acid acid acid acid ac</th> <th>Alpha &amp; Beta</th> <th>Actual Actual 0.8544 0.8726 0.121 0.0002 0.001 0.0002 0.001 0.0002 0.001 0.0002 0.001 0.0002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.002 0.001 0.002 0.003 0.002 0.004 0.002 0.008 0.004 0.008 0.004 0.008 0.004 0.004 0.008 0.004 0.004 0.008 0.004 0.008 0.004 0.008 0.004 0.008 0.004 0.004 0.008 0.004 0.00</th> <th>Co-60 Bq/mL Alpha Bq/mL 1.90E+00 5.26E+03 3.43E+06 Pu-236/Pu-238 ppm (ug/mL) Fu-236/Pu-238 ppm (ug/mL) 6.26E+03 2.89 (5.80 MeV Area (Full Spectru 2.X (5.5)</th> <th>0.00243     0.00243     0.00243     0.00243     0.0001     0.00723     Predicted (BC     Pu-238     t1/2, years     t1/2, years     t1/2, years     87.7     Zr-95     Bq/mL     3.80E+05     Bq/mL     3.80E+05     Bq/mL     3.80E+05     Relative error     %     6.3     a Counts X Pu-     m Cou</th> <th>Pu238         t1/2           daya         32032.425           Ru-106         Bg/mL           Bg/mL         1.50E+06           5.40E+06         3.00E+06           9.2029         ppb (ng/mL)           9.3.00E+06         3.30E+06           9.3.00E+06         3.30E+06           9.3.00E+06         3.30E+06           2.3.5.59E+04         3.5.59E+04           2         2236.11/X 226) X 1E6         -2238.12/X 238)           counts)<sup>22</sup>         tts</th> <th>Actual/Pred #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #2010 80 58-125 Bg/mL 4.20E+05 4.20E+05 5.24E+03 5.80E+06</th> <th>Cs-134 Bg/mL 2.50E+05 2.60E+05 &lt;0.0E+05 &lt;0.0E+02 9.80E+02</th> <th>Cs-137 Bg/mL 2.10E+06 2.30E+06 Pu-242 ppb (ng/mL) &lt;5.0E+0 9.00E+01</th> <th>Ce-144 Bg/mL 2.00E+07 2.00E+07 9u-244 ppb (ng/mL) &lt;5.0E+01</th> <th>Eu- 155 Bg/mL 2.30E+05</th> <th>Eu- 154 Bq/mL 6.70E+04</th>	BRP-45, 51,55 BNP-45, 51,55 BNP-45, 51,55 (hp caustic + h is) = Pu-238 cat (s) = (Sum of fiss (s) = (Sum of fiss (s) = (Sum of fiss (witbasis) = P Analysis Date 9/23/2003 Density g/cc 11,143 19,851 19,855 19,855 19,855 19,855 19,855 19,855 19,855 19,855 19,855 19,855 19,855 1	A 24 42 24 424	DJ-24, 030820-03           AD-23, 030820-03           AD-23, 030820-03           AD-23, 030820-03           AD-23, 030820-03           Iic + total Pu J' Np in tic and acid / Np intic and acid / Np dejacket pi intic and acid / Np dejacket pi intic acid acid acid acid acid acid acid ac	Alpha & Beta	Actual Actual 0.8544 0.8726 0.121 0.0002 0.001 0.0002 0.001 0.0002 0.001 0.0002 0.001 0.0002 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0.002 0.002 0.001 0.002 0.003 0.002 0.004 0.002 0.008 0.004 0.008 0.004 0.008 0.004 0.004 0.008 0.004 0.004 0.008 0.004 0.008 0.004 0.008 0.004 0.008 0.004 0.004 0.008 0.004 0.00	Co-60 Bq/mL Alpha Bq/mL 1.90E+00 5.26E+03 3.43E+06 Pu-236/Pu-238 ppm (ug/mL) Fu-236/Pu-238 ppm (ug/mL) 6.26E+03 2.89 (5.80 MeV Area (Full Spectru 2.X (5.5)	0.00243     0.00243     0.00243     0.00243     0.0001     0.00723     Predicted (BC     Pu-238     t1/2, years     t1/2, years     t1/2, years     87.7     Zr-95     Bq/mL     3.80E+05     Bq/mL     3.80E+05     Bq/mL     3.80E+05     Relative error     %     6.3     a Counts X Pu-     m Cou	Pu238         t1/2           daya         32032.425           Ru-106         Bg/mL           Bg/mL         1.50E+06           5.40E+06         3.00E+06           9.2029         ppb (ng/mL)           9.3.00E+06         3.30E+06           9.3.00E+06         3.30E+06           9.3.00E+06         3.30E+06           2.3.5.59E+04         3.5.59E+04           2         2236.11/X 226) X 1E6         -2238.12/X 238)           counts) <sup>22</sup> tts	Actual/Pred #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #2010 80 58-125 Bg/mL 4.20E+05 4.20E+05 5.24E+03 5.80E+06	Cs-134 Bg/mL 2.50E+05 2.60E+05 <0.0E+05 <0.0E+02 9.80E+02	Cs-137 Bg/mL 2.10E+06 2.30E+06 Pu-242 ppb (ng/mL) <5.0E+0 9.00E+01	Ce-144 Bg/mL 2.00E+07 2.00E+07 9u-244 ppb (ng/mL) <5.0E+01	Eu- 155 Bg/mL 2.30E+05	Eu- 154 Bq/mL 6.70E+04
Total         Total           Total         Total           Dejacket Waste         Add Dissol           Np. Residual Am         Total Pu-2387 Total Pu-2387 Total Pu-2367 Total Pu-2367           Pu-236 content         ppm	MK-20.5 MK-	BNP-45, 51,55 BNP-45, 51,55 BNP-45, 51,55 (Np caustic + N is) = Pu-238 cat is ) = (Sung 168 is) = (Sung 168 i	M gmail = 194 M M M M M M M M M M M M M	DJ-24, 030820-03 AD-23, 030820-03 AD-23, 030820-03 Lic + total Pu J/ Np i tic and acid / Np iny Np dejacket) = tic + Pu acid) = Pu-236 t1/2 years 2 2 85 Pu-236 t1/2 years 2 1130-360 (2 1469.000 3 306.000 3 1048.000 1 1294.000 3 1048.000 3 1048.000	Pu-236 t1/2 days 1040 95 1040 95 Gr gamma Alpha & Beta ICP	Actual 0.8544 0.6732 0.1216 0.0001 0.000 0.0001 0.000 0.00	Co-60 Bq/mL Co-60 Bq/mL Alpha Bq/mL 1.90E+04 2.60E+08 Np-237 ppb (ng/mL) 5.26E+03 3.4.3E+06 Pu-236/Pu-238 ppm (ug/mL) 2.89 (5.80 MeV Area (Full Spectru 2.X(5)	0.00243     0.00243     0.00243     0.00243     0.0001     0.00723     Predicted (BC     Pu-238     t1/2, years     87.7     Zr-95     Bg/mL     3.80E+05     Bg/mL     3.80E+05     Relative error     %     6.3     Counts X Pu-3     80 MeV Area C     80 Area Count	Pu238 t1/2 days 32032.425 32032.425 32032.425 1.50E+06 5.0E+06 5.50E+06 9.0E+00 9.00E+00 9.00E+00 5.559E+04 238x2261.X 1E6 1.238x2261.X 1E6 1.238x2281.X 1E6 1.238x2881.X 1E6 1.238x881.X 1E6	Actual/Pred #DIV/0! #DIV/0! #DIV/0! #DIV/0! 0.2183 SB-125 Bg/mL 4.20E+05 5.80E+06 5.80E+06	Cs-134 Bg/mL 2.50E+05 2.60E+05 2.60E+05 9.80E+02 9.80E+02	Cs-137 Bq/mL 2.10E+66 2.30E+06 Pu-242 ppb(ng/mL) <5.0E+0 9.00E+01	Ce-144 Bg/mL 2.00E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bg/mL 2.30E+05	Eu- 154 Bg/mL 6.70E+04
Total         Total           Total         Total           Dejacket Waste         Acid Dissol           Np.Residual Am         Pu-238/Total Pu           Conversion of Nj         Conversion of Nj           Fractional loss o         Fractional loss o           Pu-236 content         ppm           2.85         Reference Infor           NpO, 327 (oxide)         Np237           Pu-238         Pu-238           Pu-239         Pu-240           Pu-240         Pu241           Pu-240         S65.25           Specific acitivity (Factor =         Co-60           Conversion         365.25           Specific acitivity (Factor =         Co-60           Conversion         S65.37           Cos-134         Cos-134           Cos-134         Cos-134           Cos-134         Cos-134           Cos-134         Cos-134           Cos-134         Cos-134	MK-20.5 MK-20.5 MK-20.5 MK-20.5 (of Dasis) = 0 (of Dasis) = 0 (of Dasis) = 0 P (mol bass lo FP (mol bass P un Liq Wast <b>Discharge</b> Date 11/1/2001 <b>MW</b> 289.047 239.042 239.049 239.042 239.049 239.042 239.049 239.042 239.049 239.042 239.049 239.042 239.049 239.049 239.042 239.049 240.0588 242.0587 5 days/year Calculation 1.13E+13	BNP-45, 51,55 BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N is) = Pu-236 cat is) = (Suno riss ( wt basis) = P Analysis Date 9/23/2003 Density g/cc 19,851 19,851 19,855 10,957	Ap acid)/ Np input = = satc + Pu-239 cause ion product) in cause p caustic / (Pu cause Time elasped (t) days -691 0C -691 0C -6	DJ-24, 030820-03 AD-23, 030820-03 AD-23, 030820-03 bit of and acid / Np int tic acid / Np int tic acid / Np int tic acid / Np int tic acid / Np int years 2, 85 Pu-236 t1/2 years 2, 85 Pu-236 t1/2 Pu-236 t1/2 years 2, 85 Pu-236 t1/2 Pu-236 t1/2 Pu-246 t1/2 Pu-246 t1/2 Pu-246 t1/2 Pu-246 t1/2 Pu-246 t1/2 Pu-246 t1/2 Pu-246 t1/2 Pu-246 t1/2 Pu-246 t	Pu-236 t1/2 days for gamma Alpha & Beta ICP	Actual 0.8544 0.8736 0.1216 0.0006 0.0001 Acjusted Pu-236 ppm DJ-24,030820-033 AD-23,030820-034 DJ-24,030820-034 AD-23,030820-034 AD-23,030820-034 AD-23,030820-034 AD-23,030820-034 AD-23,030820-034 Pu-236/238 ppm = Relative Error =	Co-60 Bq/mL 1.90E+04 2.60E+03 1.71500 Co-60 Bq/mL 1.90E+04 2.60E+03 3.43E+06 Pu-236/Pu-238 Pu-236/Pu-238 Pu-236/Pu-238 (5.80 MeV Area (Full Spectru (Full Spectru 2 X (5.1)	0.00243 0.00243 0.00073 0.0073 Predicted (BC Pu-238 t1/2, years t1/2, years 87.7 27-95 Bq/mL 3.80E+05 Beta Bq/mL 3.80E+05 Relation Pu-238 pp6 (ng/mL) 3.80E+05 Relation Relati	Pu238         t1/2           days         3           7         32032.425           Ru-106         Bq/mL           Bq/mL         1.50E+06           5         1.70E+07           Iotal activity Bq/mL         5.60E+06           9         9.00E+00           9.00E+00         5.59E+04           2         235x 226) X 1E6           +238 <sub>1/2</sub> X 236)         X 1E6           0:0015) <sup>22</sup> its	Actual/Pred #DIV/0! #D	Cs-134 Bg/mL 2.50E+05 2.60E+05 2.60E+05 <5.0E+0 9.80E+02	Cs-137 Bg/mL 2.10E+06 2.30E+06 2.30E+06 9.00E+01 9.00E+01	Ce-144 Bq/mL 2.00E+07 2.00E+07 <5.0E+01 <5.0E+01	Eu-155 Bg/mL 2.30E+05	Eu-154 Bg/mL 6.70E+04
Total         Total           Dejacket Waste         Acid Dissol           Np Residual Am         Pu-238/Total Pu-238/Total Pu-238           Pu-236 content         Pu-236 content           ppm         Conversion of Ni           Pu-236 content         Ppm           Pu-236 content         Ppm           Pu-236 content         Ppm           Pu-237         Pu-238           Pu-238         Pu-239           Pu-239         Pu-240           Pu-239         Pu-241           Pu-241         Conversion           Specific activity (Factor         365.21           Specific activity (Sactor)         Sc-134           Cs-137         Ce-144           Eu-155         Pu-238	MK-20.5           MW           Do FP (mol bass)           Pu in Liq Wast           Plate           9           11/1/2001           MW           269.047           238.0496           230.0522           240.0583           24.0587           3.70E+10           5 days/year           Calculation           1.13E+13	BRP-45, 51,55 BNP-45, 51,55 BNP-45, 51,55 = (Np caustic + N is) = Pu-238 cat s) = (Sum of fiss s) = (Sum of fiss s) = (Sum of fiss s) = (Sum of fiss (witbasis) = P Analysis Date 9/23/2003 Density g/cc 11,143 19,851 19,855 19,855 19,855 19,855 19,855 19,855 19,855 19,855	M	DJ-24, 030820-03           AD-23, 030820-03           AD-23, 030820-03           AD-23, 030820-03           AD-23, 030820-03           Itic and acid / Np intic and acid / Np dejacket           Itic acid / Pu acid) =           Itic acid / Pu acid) =           Itic acid / Np dejacket	Alpha & Beta	Actual Actual 0.8544 0.8726 0.127 0.0001 0.0002 0.001 0.0001 0.0002 0.001 0.0002 0.001 0.0002 0.001 0.0002 0.001 0.001 0.001 0.002 0.001 0.001 0.001 0.001 0.001 0.001 0.002 0.001 0.002 0.001 0.002 0.001 0	Co-60 Bq/mL Alpha Bq/mL 1.90E+00 5.26E+03 3.43E+06 Pu-237 ppb (ng/mL) 5.26E+03 3.43E+06 Pu-236/Pu-238 ppm (ug/mL) Pu-236/Pu-238 ppm (ug/mL) 2.89 (5.80 MeV Area (Full Spectru 2.X (5.5)	0.00243 0.00243 0.00024 0.00024 0.00001 0.00723 Predicted (BC Pu-238 t1/2, years t1/2, yea	Pu238         t1/2           daya         32032.425           Ru-106         Bg/mL           1.50E+06         3.002+06           5.40E+06         3.00E+06           9.00E+00         3.00E+06           9.00E+00         5.59E+04           1         236.11X 236) X 1E6           2236.11X 236) X 1E6         1238.12X 238)           counts) <sup>27</sup> / <sub>1</sub> tts	Actual/Pred #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 Pu-238, g 0.2183 SB-125 Bg/mL 4.20E+05 4.20E+05 5.24E+03 5.80E+06	Cs-134 Bg/mL 2.50E+05 2.60E+05 <0.0E+05 <0.0E+02 9.80E+02	Cs-137 Bg/mL 2.10E+06 2.30E+06 Pu-242 ppb(ng/mL) <5.0E+0 9.00E+01	Ce-144 Bg/mL 2.00E+07 2.00E+07 9u-244 ppb (ng/mL) <5.0E+01	Eu-155 Bg/mL 2.30E+05	Eu- 154 Bq/mL 6.70E+04
Total         Total           Total         Total           Dejacket Waste         Acid Dissol           Np Residual Am         Dejacket Waste           Pu-2387 Total Pu         Conversion of Nj           Conversion of Nj         Conversion of Nj           Conversion of Nj         Conversion of Nj           Pu-236 content         ppm           2.86         Reference Infor           NpQ. <sup>377</sup> (oxide)         Np237           Pu-239         Pu-242           Conversion         365.21           Specific acitivity (Factor =         Co-60           Zr-95         Ru-106           SB-125         Cos-134           Cos-137         Ce-144           Eu-155         Pu-238           Pu-238         Pu-238	MK-20.5 MK-	BNP-45, 51,55 BNP-45, 51,55 BNP-45, 51,55 (Np caustic + N iii) = Pu-238 cat iii) = Pu-238 (wt basis) = Ni (wt basis) =	M gmol gmol mmo	DJ-24, 030820-03 AD-23, 030820-03 AD-23, 030820-03 tic + total Pu // Np i tic and acid / Np im r Np dejacket) = c + Pu acid) = Pu-236 t1/2 years 2 2.85 Pu-236 t1/2 Pu-236 t1/2 Pu-23	Pu-236 t1/2 days 1040.96 Analysis Gr gamma Alpha & Beta ICP	Actual 0.8544 0.6753 0.1216 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0002 0.000 0	Co-60 Bq/mL Co-60 Bq/mL Alpha Bq/mL 1.90E+04 2.60E+08 Ppb (ng/mL) 5.26E+03 3.43E+06 Pu-236/Pu-238 ppm (ug/mL) 2.89 (5.80 MeV Ares (Full Spectru 2.X (5.3)	0.00243 0.00243 0.00263 0.00263 0.00273 Predicted (BC Pu-238 t1/2, years t1/2, years 87.7 Zr-95 Bg/mL 3.80E+05 1.20E+08 1.20E+08 Pu-238 ppb (ng/mL) 3.80E+01 1.20E+08 Pu-238 ppb (ng/mL) 3.80E+01 2.78E+06 1.20E+08 Pu-238 pp (ng/mL) 3.80E+01 2.78E+06 2.78E+0	Pu238 t1/2 days 32032.425 32032.425 32032.425 1.50E+06 5.0E+06 5.50E+06 9.0E+00 9.0E+00 9.0E+00 5.559E+04 238x 226).X 1E6 1.238x 2260x 226	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 2.50E+05 2.60E+05 9.80E+02 9.80E+02	Cs-137 Bg/mL 2.10E+06 2.30E+06 Pu-242 ppb(ng/mL) <5.0E+0 9.00E+01	Ce-144 Bg/mL 2.00E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bg/mL 2.30E+05	Eu- 154 Bg/mL 6.70E+04



				MK-20.2	DJ-22	Input	-		I						
				Pellet Number =	BNP-43 BNP-52	0.670	6 7								
				Pellet Number =	BNP-49	0.670	3								
				Total Np <sup>237</sup> =	2.0106	ig =	0.00848	3 g-moles	1						
Add 2.2	2M NaNO <sub>1</sub> to dis	solver	1						Output	Caustic Disso	lver Waste			T	
Vol (mL) =	200			T		•		-		Sample # DJ3	DJ-22, 030604	4-003			
						Countin Dissolutio			Du 106	Bq/mL	Ci/mL	g	g-mol	ppm (Pu-23	8 basis)
Meter	caustic into dis	solver	1.	Į.		DJ-22	on		Cs-134	2.90E+06 3.80E+05	1.027E-05	3.97E-06	2.96E-08	40	
10M NaOH	(rate 1mL.min)			¥ '	Di	gest for 4 hour at gent	tle reflux	•	Cs-137	2.90E+06	7.8378E-05	4.50E-04	3.29E-06	1743	
Vol (mL) =	60		l			Temp = 104 C				ppb (ng/mL)		g	g-mole		
	Caustic Washe		1						Np-237 Pu-238	2.25E+04 3.90E+02		1.13E-02 1.95E-04	4.75E-05 8.19E-07	-	
2M NaOH				-					Pu-239	80		0.00E+00	0.00E+00		
Vol (mL) =	240.0000								Vol(mL) =	500.0000				1	
						×		-							
		Aoid	Addition	1		Acid Dissolution	n		Deels Elsebas						
		8.0M HNO <sub>3</sub>	Addition			Digest using gentle n	eflux		8M HNO3- 0.02M N	NaF					
		0.02M NaF		•		for 3 -4 hours.		<b>▲</b> ►	Vol (mL) =	50					
		0.04 M AI(NO <sub>3</sub> ) <sub>3</sub>				Temperature = 100-1	109C								
		Vol (mL) =	150	D											
						1		1	Filter Back F	lushes / Acid	Washes				
						4			Vol (ml.) =	300 HNO3- 0.0	2M NaF				
						Filter	7								
						2um SS									
						L	_								
						¥				Fission Prod	ucts in Produ	ct Output		T	
					Product Outpu	t and Back Flushes		1		Acid Dissolu	tion Product				
					Acid Diss	olution Product		1		Sample =	AD-22, 03060	4-004			
				Element	Sample # =	aD-22, 030604-004	g-mol	1	Liement Co-60	вq/mL 3.10F+04	6,38F-07	g 3.71F-07	g-moi 6.1836F-09	ppm (Pu-23	o Dasis)
				Np-237	3.56E+06	i 1.780	0 7.51E-03	8	Zr-95	9.00E+05	2.43E-05	5.66E-07	5.9689E-09	2	
				Pu-238	5.17E+05	0.258	5 1.09E-03	8	Ru-106	2.40E+07	6.49E-04	9.81E-05	9.263E-07	380	
				Pu-239 Pu-240	6.50E+04	0.034	2 1.43E-04 3 1.35E-05		SB-125 Cs-134	4.90E+05 3.00E+05	1.32E-05 8.11E-06	5.32E-06	2 3397E-08	24	
				Pu-241	1.22E+03	0.000	6 2.53E-06	5	Cs-137	2.50E+06	6.76E-05	3.88E-04	2.8364E-06	1502	
				Pu-242	1.40E+02	0.000	1 2.89E-07		Ce-144	2.90E+07	7.84E-04	1.23E-04	8.5557E-07	476	
				Vol (ml.)	5.93E+0	0.296	6 1.25E-03	5	EU- 155 Fu-154	2.20E+05 8.20E+04	5.95E-06 2.22E-06	6.39E-06	4.1269E-08 2.7269E-08	25	
														•	
			1	1	1	1	1	1	1	<u> </u>					
	Target	Pellet	Dissolution	Dissolution		Pellet	Pellet Mass No	Pellet		Adjusted					
	Number	Number	Number	Sample Code	% Density	Vol % NpOX	g	g-mole Np	Pu-236 ppm	Pu-236 ppm					
Pellet Input	MK-20.2	BNP-43	22	2	87.78%	20.019	% 0.67060	0.00283	2.38	3.58					
Pellet Input	MK-20.2	RND-52	22		88 83%	10 000	0.66070	0.00283							
Pellet Input Pellet Input	MK-20.2 MK-20.2	BNP-52 BNP-49	22	2	88.83% 89.17%	19.999	% 0.66970 % 0.67030	0.00283	5						
Pellet Input Pellet Input Total	MK-20.2 MK-20.2	BNP-52 BNP-49	22	2	88.83% 89.17%	20.00%	% 0.66970 % 0.67030 2.01060	0 0.00283 0 0.00283 0 0.00848	8						
Pellet Input Pellet Input Total Dejacket Waste Acid Dissol	MK-20.2 MK-20.2 MK-20.2 MK-20.2	BNP-52 BNP-49 BNP-15, 23, 20 BNP-15, 23, 20	22 22 22 22 22 22	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	88.83% 89.17%	20.009	% 0.66970 % 0.67030 2.01060 0.01125 1 78000	0.00283 0.00283 0.00848 0.00085 0.00005	5 5 5						
Pellet Input Pellet Input Total Dejacket Waste Acid Dissol	MK-20.2 MK-20.2 MK-20.2 MK-20.2	BNP-52 BNP-49 BNP-15, 23, 20 BNP-15, 23, 20	22 22 22 22 22 22	DJ-22, 030604-003 AD-22, 030604-004	88.83% 89.17%	9 19.99 9 20.00 9	% 0.66970 % 0.67030 2.01060 0.01125 1.78000	0.00283 0.00283 0.00848 0.00005 0.000751	2 2 2 2						
Pellet Input Pellet Input Total Dejacket Waste Acid Dissol	MK-20.2 MK-20.2 MK-20.2 MK-20.2	BNP-52 BNP-49 BNP-15, 23, 20 BNP-15, 23, 20	22 22 22 22 22 22	DJ-22, 030604-003 AD-22, 030604-004	88.83% 89.17%	Actual	% 0.66970 % 0.67030 2.01060 0.01125 1.78000	0.00283 0.00283 0.00848 0.00005 0.00751		Actual/Prod					
Pellet Input Pellet Input Total Dejacket Waste Acid Dissol	MK-20.2 MK-20.2 MK-20.2 MK-20.2 MK-20.2	BNP-52 BNP-49 BNP-15, 23, 20 BNP-15, 23, 20	22 22 22 22 22 22 22 22	DJ-22, 030604-003 AD-22, 030604-004	88.83% 89.17%	Actual 0.890	% 0.66970 % 0.67030 2.01060 0.01125 1.78000	0.00283 0.00283 0.00848 0.00005 0.000551 Predicted (BC	35)	Actual/Pred #DIV/0!					
Pellet Input Pellet Input Total Dejacket Waste Acid Dissol Np Residual Amo Pu-238/Total Pu	MK-20.2 MK-20.2 MK-20.2 MK-20.2 MK-20.2 (wt basis) = (wt basis) =	BNP-52 BNP-49 BNP-15, 23, 20 BNP-15, 23, 20 e (Np caustic + N	22 22 22 22 22 22 22 22 22 22 22 22 22	DJ-22, 030604-003 AD-22, 030604-004	88.83%	Actual 0.890 0.871	% 0.66970 % 0.67030 2.01060 0.01122 1.78000	0.00283 0.00283 0.00846 0.00005 0.000751 Predicted (BC	SS)	Actual/Pred #DIV/0! #DIV/0!	]				
Pellet Input Pellet Input Total Dejacket Waste Acid Dissol Np Residual Amor Pu-238/Total Pu Conversion of Np	MK-20.2 MK-20.2 MK-20.2 MK-20.2 MK-20.2 (wt basis) = (wt basis) = to PP (mol basis) to FP (mol basis)	BNP-52 BNP-49 BNP-15, 23, 20 BNP-15, 23, 20 • (Np caustic + N is) = Pu-238 cau s) = (Sum of fiss	22 22 22 22 22 22 22 22 22 22 22 22 22	DJ-22, 030604-003 AD-22, 030604-004 tic + total Pu )' Np input	88.83% 89.17%	Actual 0.890 0.871 0.146 0.001	% 0.66970 % 0.67030 2.01060 0.01125 1.78000 9 7 9 0	0.00283 0.00283 0.00848 0.00005 0.000751	38)	Actual/Pred #DIV/0! #DIV/0! #DIV/0!					
Pellet Input Pellet Input Total Dejacket Waste Acid Dissol Np Residual Amor Pu-238/Total Pu Conversion of Np Fractional loss of	MK-20.2 MK-20.2 MK-20.2 MK-20.2 MK-20.2 MK-20.2 (wt basis) = (wt basis) = to Pu (mol basis Np in Liq Waste	BNP-52 BNP-49 BNP-15, 23, 20 BNP-15, 23, 20 (Np caustic + N is) = Pu-238 cau s) = (Sum of fiss s) = (Sum of fiss (wt basis) = Nj	22 22 22 22 22 22 22 22 22 22 22 22 22	DJ-22, 030604-003 AD-22, 030604-004 tic + total Pu // Np input * Np dejacket) =	88.83% 89.17% it = )=	Actual 0.890 0.871 0.164 0.001	% 0.66970 % 0.67030 2.01060 0.01125 1.78000 9 7 9 9 0 3	0.00283 0.00283 0.00845 0.00805 0.00005 0.00751	38)	Actual/Pred #DIV/0! #DIV/0! #DIV/0!					
Pellet Input Pellet Input Total Dejacket Waste Acid Dissol Np Residual Amo Pu-238/Total Pu Conversion of Np Conversion of Np Fractional loss of Fractional loss of	MK-20.2 MK-20.2 MK-20.2 MK-20.2 MK-20.2 (wt basis) = (wt basis) = to Pu (mol basis) to FP (mol basis) Np in Liq Waste Pu in Liq Waste	BNP-52 BNP-49 BNP-15, 23, 20 BNP-15, 23, 20 e (Np caustic + N is) = Pu-238 caus s) = (Sum of fiss e (wt basis) = Nj e (wt basis) = P	222 22 22 22 22 22 22 22 22 22 22 22 22	DJ-22, 030604-003 AD-22, 030604-004 tic + total Pu )/ Np input tic and acid / Np input tic and acid / Np input tic and acid / Np input tic + Np dejackt1 = tic + Pu acid) =	88.83% 89.17%	Actual 0.890 0.871 0.146 0.000 0.000	% 0.66970 % 0.67030 2.01060 0.01125 1.78000 9 7 9 0 3 7	0.00283 0.00283 0.00846 0.00005 0.000751 Predicted (BC	35)	Actual/Pred #DIV/0! #DIV/0! #DIV/0!					
Pellet Input Total Dejacket Waste Acid Dissol Np Residual Amo Pu-238/Total Pu Conversion of Np Conversion of Np Conversion of Sp	MK-20.2 MK-20.2 MK-20.2 MK-20.2 MK-20.2 (wt basis) = (wt basis) = to Pu (mol basis) Np in Liq Waste Pu in Liq Waste	BNP-52 BNP-49 BNP-15, 23, 20 BNP-15, 23, 20 (Np caustic + N is) = Pu-238 cau s) = (Sum of fiss (wt basis) = NP (wt basis) = P	22 22 22 22 22 22 22 22 22 22 22 22 22	DJ-22, 030604-003 AD-22, 030604-004 tic + total Pu // Np input tic and acid // Np input + Np dejacket) = tic + Pu acid) =	88.83% 89.17%	Actual 0.890 0.81 0.890 0.871 0.146 0.006 0.006 0.000 0.006 0.000	% 0.66970 % 0.67030 2.01060 0.01122 1.78000 9 9 7 9 0 3 3 7	0.00283 0.00283 0.00846 0.00005 0.000751 Predicted (BC	38)	Actual/Pred #DIV/01 #DIV/01 #DIV/01					
Peilet Input Total Dejacket Waste Acid Dejacket Waste Acid Dejacket Waste Np Residual Armo Pu-238/Total Pu Conversion of Np Fractional loss of Fractional loss of	MK-20.2 MK-20.2 MK-20.2 MK-20.2 (wt basis) = to Pu (mol bas to FP (mol bas)	BNP-52 BNP-49 BNP-15, 23, 20 BNP-15, 23, 20 (Np caustic + N is) = Pu-238 cat s) = (Sum of fiss (wt basis) = N (wt basis) = P	222 222 222 222 222 222 222 222 222 22	DJ-22, 030604-003 AD-22, 030604-004 tic + total Pu / Np input tic and acid / Np input + Np dejacket) = tic + Pu acid) =	88.83% 89.17%	Actual 0.890 0.890 0.890 0.871 0.146 0.000 0.000	% 0.66977 6 0.67030 2.01060 0.01125 1.78000 9 9 7 9 0 3 7	0 0.0283 0 0.0084 0 0.0084 0 0.0000 0 0.00751 Predicted (BC	35)	Actual/Pred #DIV/01 #DIV/01 #DIV/01					
Peilet Input Total Dejacket Waste Acid Dissol Np Residual Amo Pu-2397 ctal Pu Conversion of Np Conversion of Np Conversion of Np Conversion of Np Conversion of Np Conversion of Np Pu-236 content	MK-20.2 MK-20.2 MK-20.2 MK-20.2 (wt basis) = (wt basis) = to Pu (mol basi Np in Liq Waste Pu in Liq Waste Discharge Date	BNP-52 BNP-49 BNP-15, 23, 20 BNP-15, 23, 20 (Np caustic + N is) = Pu-238 cat s) = (Sum of fiss ((M basis) = Ny ((M basis) = P) (M basis) = P	222 222 222 222 222 222 225 225 225 225	DJ-22, 030604-003 [AD-22, 030604-004 AD-22, 030604-004 Ad-22, 030604-004 Ad-22, 030604-004 Ad-22, 030604-003 Ad-22, 030604-004 Ad-22, 030604-004 Ad-22, 030604-004 Ad-22, 030604-004 Ad-22, 030604-004 Ad-22, 030604-003 Ad-22, 030604-004 Ad-22, 030604-003 Ad-22, 030604-003 Ad-23, 03060	88.83% 89.17% 	Actual 0899 Actual 0890 0.871 0.146 0.001 0.001 0.000 Adjusted Pu-236 ppm	% 0.66977 % 0.67030 2.01060 0.01122 1.78000 9 7 9 0 3 7	0 0.00283 0 0.00283 0 0.00845 0 0.00000 0 0.00751 Predicted (BC	94238 11/2 days	Actual/Pred #DIV/01 #DIV/01 #DIV/01 #DIV/01					
Peilet Input Total Dejacket Waste Acid Dissol Np Residual Amo Pu-238/Total Pu Conversion of Np Conversion of Np Conversion of Sp Fractional loss of Fractional loss of Pu-236 content ppm 2.38	MK-20.2 MK-20.2 MK-20.2 MK-20.2 (wt basis) = (wt basis) = to Pu (mol basi Np in Liq Waste Pu in Liq Waste Discharge Discharge Date	BNP-52 BNP-49 BNP-45, 23, 20 BNP-15, 23, 20 (Np caustic + N is) = Pu-238 cat s) = (Sur of fiss (wt basis) = Ny to (wt basis) = Ny to (wt basis) = P Analysis Date 7/7/2003	222 222 222 222 222 222 222 222 222 22	DJ-22, 030604-003 AD-22, 030604-003 AD-22, 030604-004 tic + total Pu // Np inpu tic and acid / Np inpu The J digacket = ic + Pu acid) = Pu-236 Pu-236 1/2 years 2.86	88.83% 89.17% it = )= Pu-236 t1/2 days i 1040.96	Actual Actual 0.890 0.871 0.146 0.001 0.066 0.000 Adjusted Pu-236 ppm 9-236 ppm	% 0.66977 % 0.67030 2.01060 0.01125 1.78000 9 7 9 9 0 3 7 7	0 0.00283 0 0.00283 0 0.00845 0 0.00000 0 0.00751 Predicted (BC	Pu238 11/2 days 32032.425	Actual/Pred #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01					
Peilet Input Total Deljacket Waste Acid Dissol Np Residual Amo Pu-238/Total Pu- Conversion of Np Conversion	MK-20.2 MK-20.2 MK-20.2 MK-20.2 MK-20.2 (wt basis) = (wt basis) = (wt basis) = to FP (mol basis) to FP (mol basi	BNP-52 BNP-49 BNP-49 BNP-15, 23, 20 • (Np caustic + N is) = Pu-238 cat s) = (Sum of fiss • (wt basis) = N • (wt basis) = P Analysis Date 7/7/2003	222 222 222 222 222 222 222 222 222 22	DJ-22, 030604-003           AD-22, 030604-003           AD-22, 030604-004           iic + total Pu / Np inpution and acid / Np inpution acid acid / Np input	88.83% 89.17% it = )≡ Pu-236 11/2 days 1040.96	Actual Actual 0.890 0.871 0.164 0.001 0.000 0.000 Adjusted Pu-236 ppm 3.5	% 0.66977 6 0.67030 2.01066 0.01122 1.78000 9 9 9 0 3 3 7	0.002832 0.00283 0.00045 0.00005 0.0005 0.000751 Predicted (BC	Pu238 t1/2 days 32032.425	Actual/Pred #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01					
Peilet Input Peilet Input Total Dejacket Waste Acid Dissol Np Residual Armo Pu-238/Total Pu Conversion of Np Fractional loss of Fractional loss of Pu-236 content ppm 2.38 Reference Inforr	MK-20.2 MK-20.	BNP-52 BNP-49 BNP-15, 23, 20 BNP-15, 23, 20 • (Np caustic + N is) = Pu-238 caustic + N is) = Pu-238 caustic + N is) = (Sum of fass) • (Wt basis) = N • (Wt basis) = N • (Wt basis) = P Analysis Date 7///2003	222 222 22 22 22 22 22 22 22 22 22 22 2	DJ-22, 030604-003 [AD-22, 030604-004 tic + total Pu / Np input tic and acid / Np input + Np dejacket) = tic + Pu acid) = Pu-236 t1/2 years 2.86	88.83% 89.17% at = )= Pu-236 t1/2 days 1040.94 Analysis	19.993 20.003 Actual 0.890 0.871 0.146 0.001 0.006 0.000 Pu-236 ppm 3.5 3.5	% 0.66973 % 0.67030 2.01066 0.01125 1.78000 9 9 9 9 9 0 3 7 7 7 8 8 Co-60	0.002820 0.002820 0.00029 0.000751 0.000751 0.000751 Predicted (BC	Pu238 t1/2 days 32032.425 Ru-106	Actual/Pred #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01	Cs-134	Cs-137	Ce-144	Eu- 155	Eu- 154
Peilet Input Total Dejacket Waste Acid Dissol Np Residual Amo Pu-2397 ctal Pu Conversion of Np Conversion of	MK-20.2 MK-2 MK-20.	BNP-52 BNP-49 BNP-15, 23, 20 BNP-15, 23, 20 (Np caustic + N is) = Pu-28 cat, s) = (Sum of fiss s) = (Sum of fiss s) = (Gun of fiss) = (Gun of fiss s) = (Gun of fiss) = (Gun of fi	222 222 22 22 22 22 22 22 22 22 22 22 2	DJ-22, 030604-003 AD-22, 030604-004 AD-22, 030604-004 tic + total Pu / Np input bic and acid / Np input Np dejacket Tic + Pu acid) = Pu-236 t1/2 years 2.85	88.83% 89.17% ====================================	19.993           20.003           Actual           0.800           0.146           0.001           0.146           0.001           0.001           0.001           0.001           0.001           0.001           0.001           0.001           0.001           0.002           Adjusted           Pu-236           ppm           3.5           Sample           0.142, 02000.000	% 0.66977 % 0.67030 2.01060 0.01122 1.78000 9 9 7 9 0 3 7 7 8 8 8 Co-60 Bq/mL	0.002832           0.002832           0.0024           0.0044           0.0044           0.0045           0.00751           Predicted (BC           Predicted (BC           112, years           87.7           Zr-95           Bq/mL	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL	Actual/Pred #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01	Cs-134 Bg/mL 3 ppr - pr	Cs-137 Bg/mL	Ce-144 Bg/mL	Eu-155 Bg/mL	Eu-154 Bg/mL
Peliet Input Peliet Input Total Dejacket Waste Acid Dissol Np Residual Amo Pu-238/Total Pu Conversion of Np Conversion of Np	MK-20.2 MK-	BNP-52 BNP-49 BNP-15, 23, 20 BNP-15, 23, 20 BNP-15, 23, 20 P(Np caustic + N is) = Pu-238 cat s) = (Sum of fiss s) = (Sum of fiss s) = (Sum of fiss s) = (Sum of fiss y) (wt basis) = P Analysis Date 7/7/2003 Density g/cc 11,143	222 222 222 222 222 222 222 222 225 225	DJ-22, 030604-003 AD-22, 030604-004 AD-22, 030604-004 tic + total Pu // Np inpu tic and acid / Np inpu tic and aci	88.83% 89.17% it = = = Pu-236 t1/2 days 1040.94 Analysis Gr gamma	19.993           20.003           20.003           Actual           0.890           0.871           0.171           0.181           0.001           0.001           0.001           0.001           0.001           0.002           Adjusted           Pu-236           ppm           3.5           Sample           DJ-22, 030604-003           AD-22, 030604-004	% 0.66977 % 0.67030 2.01060 0.01125 1.78000 9 7 9 0 3 7 7 9 0 3 7 7 9 0 3 7 7 9 0 3 7 7 9 0 3 3 7 7 3 3 7 3 3 7 3 5 6 8 8 8 8 8 8 8 8 8 8 8 8 8	0.002830 0.002830 0.0005 0.0005 0.000751 Predicted (BC Pu-238 t1/2, years 87.7 Zr-95 Bg/mL 9.00E4n6	Pu238 11/2 days 32032.425 Ru-106 Bg/mL 2.90E+00 2.40E+07	Actual/Pred #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01 #DIV/01	Cs-134 Bq/mL 3.80E+05 3.00E+05	Cs-137 Bq/mL 2.90E+06 2.50E+06	Ce-144 Bg/mL 2.90E+07	Eu- 155 Bg/mL 2 20E+051	Eu- 154 Bg/mL 8.20E+044
Peilet Input Peilet Input Total Dejacket Waste Acid Dissol Np Residual Armo Pu-2387/total Pu Conversion of Np Fractional loss of Fractional loss of Pu-236 content ppm 2.38 Reference Inforr NpQ <sub>2</sub> <sup>237</sup> (oxide) Np23 <sup>237</sup> (oxide)	MK-20.2 MK-20.	BNP-52 BNP-52 BNP-55, 23, 20 BNP-15, 23, 20 (Np caustic + N- is) = Pu-238 cate ) = (Wn D fissi ( (wt basis) = N (wt basis) = N (wt basis) = P Analysis Date 7/7/2003	222 222 22 22 22 22 22 22 22 22 22 22 2	DJ-22, 030604-003 AD-22, 030604-004 AD-22, 030604-004 tic + total Pu / Np input tic and acid / Np input + Np dejacket] = tic + Pu acid) = Pu-236 t1/2 years 2.86	88.83% 89.17% ■ = = = = = = = = = = = = = = = = = =	19.993         20.003           20.003         20.003           Actual         0.800           0.871         0.146           0.006         0.000           Adjusted         Pu-236           Pu-236         ppm           3.5         Sample           DJ-22, 030604-003         AD-22, 030604-003	% 0.68972 % 0.67032 2.01066 0.01125 1.78000 9 9 9 9 9 0 3 7 7 9 9 0 3 3 7 7 7 9 0 0 3 3 - - - - - - - - - - - - -	0.002830           0.002830           0.002840           0.00444           0.00044           0.000751           Predicted (BC           Pu-238           t1/2, years           e7.7           Zr-95           Bq/mL           9.00E+05	Pu238 t1/2 days 32032 425 Ru-106 Bq/mL 2 90E+07 2 40E+07	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 3.80E+05 3.00E+05	Cs-137 Bg/mL 2.90E+06 2.50E+06	Ce-144 Bg/mL 2.90E+07	Eu- 155 Bg/mL 2.20E+05	Eu- 154 Bg/mL 8.20E+04
Peilet Input Peilet Input Total Dejacket Waste Acid Dissol Np Residual Armo Pu-238/Total Pu Conversion of Np Conversion of Np Conversion of Np Conversion of Np Conversion of Np Pu-236 content pm 2.38 Reference Inforr NpQ. <sup>337</sup> (oxide) Np237 Np238 Np28 Np28 Np28 Np28 Np28	MK-20.2 MK-	BNP-45 BNP-45 BNP-15, 23, 20 BNP-15, 23, 20 (Np caustic + N. (s) = PU-238 cato ) = (Suro 1638) = N (wt basis) = N (wt basis) =	222 222 22 22 22 22 22 22 22 22 22 22 2	DJ-22, 030604-003 [AD-22, 030604-004 tic + total Pu y Np input tic and acid / Np input + Np dejacket) = tic + Pu acid) = Pu-236 t1/2 years 2.85	88.83% 89.17% It = = Pu-236 t1/2 days 1040.94 Analysis Gr gamma Alpha & Beta	19.993           20.003           20.003           Actual           0.890           0.871           0.146           0.006           0.0	% 0.66973 6 0.6733 2.01066 0.01122 1.78000 9 9 7 9 9 0 3 7 7 9 9 0 3 7 7 8 8 Co-60 Bq/mL 3.10E+04 Alpha Bg/mL	0.002832           0.002832           0.00284           0.0044           0.0044           0.00751           Predicted (BC           Pu-238           t12_, years           87.7           ZT-95           Bq/mL           9_00E+05           Beta Bq/mL	Pu238 t1/2 days 32032.425 Ru-106 Bq/mL 2.90E-00 2.40E+07 total activity Bq/mL	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 3.80E+05 3.00E+05	Cs-137 Bg/mL 2.90E+06 2.50E+06	Ce-144 Bg/mL 2.90E+07	Eu- 155 Bg/mL 2 20E+05	Eu- 154 Bg/mL 8.20E+04
Peilet Input Total Delact Input Total Acid Dissol Np Residual Amo Pu-238/Total Pu- Conversion of Np Conversion of Np Conversi	MK-20.2 MK-20.	BNP-52 BNP-45 BNP-15, 23, 20 BNP-15, 23, 20 BNP-15, 23, 20 (vp caustic + N is) = Pu-238 cat. s) = (Sum of fiss s) = (Sum	222 222 22 22 22 22 22 22 22 22 22 22 2	DJ-22, 030604-003 AD-22, 030604-004 AD-22, 030604-004 Ad-22, 030604-004 Ad-22, 030604-004 Ad-22, 030604-003 Ad-22, 030604-004 Ad-22, 030604-004 Ad-24, 030604	88.83% 89.17% It =	19.993           20.003           20.003           Actual           0.807           0.146           0.001           0.001           0.001           0.001           0.002           Pu-236           ppm           3.5           Sample           D.J-22, 030604-003           AD-22, 030604-004           AD-22, 030604-003	% 0.66977 % 0.67030 2.01060 0.01122 1.78000 9 9 0 3 7 7 9 9 0 3 3 7 7 8 8 Co-60 Bg/mL 3.10E+04 Alpha Bg/mL 2.00E+05 2.00F+05 2.00F+05	0.002830           0.002830           0.0044           0.0044           0.0045           0.0040           0.00475           Predicted (BC           Pu-238           t1/2, years           87.7           Zr-95           Baymult           9.00E+005           9.00E+005           1.40F-med           1.40F-med           1.40F-med	Pu238 11/2 days 32032.425 Ru-106 Bg/mL 2.90E+06 2.40E+07 total activityBg/mL 9.80E+00 4.30E+05	Actual/Pred #DIV/01	Cs-134 Bq/mL 3.80E+05 3.00E+05	Cs-137 Bq/mL 2.90E+06 2.50E+06	Ce-144 Bq/mL 2:90E+07	Eu- 155 Bg/mL 2.20E+05	Eu- 154 Bg/mL 8.20E+04
Peilet Input Peilet Input Total Dejacket Waste Acid Dissol Np. Residual Armo Pu-238/Total Pu Conversion of Np. Fractional loss of Pu-236 content ppm 	MK-20.2 MK-20.2 MK-20.2 MK-20.2 MK-20.2 (wt basis) = (wt basis) = (wt basis) = to Pu (mol basis) (wt basis) = to Pu (mol basis) Pu in Liq Waste Pu in Liq Waste Discharge Dato 11/1/2001 MW 238.045 239.0452 234.0458 241.0558	BNP-52 BNP-45 BNP-45 BNP-15, 23, 20 BNP-15, 23, 20 (Np caustic + N- is) = Pu-238 cat. ) = Pu-238 cat. ) = Gwon offsas ( (vt basis) = N, (vt ba	222 222 22 22 22 22 22 22 22 22 22 22 2	DJ-22, 030604-003 AD-22, 030604-004 AD-22, 030604-004 itic + total Pu / V Np input itic and acid / Np input + Np dejacket] = itic + Pu acid) = Pu-236 t1/2 years 2.85	88.83% 89.17% 11 = 12 days 1040.90 Analysis Gr gamma Alpha & Beta	19.993           20.003           Actual           0.809           0.817           0.146           0.007           0.008           0.00	% 0.68970 % 0.67030 2.01066 0.01125 1.78000 9 7 9 0 3 7 7 9 9 0 3 3 7 7 9 9 0 3 3 3 3 1.78000 9 9 9 9 9 9 9 9 9 9 9 9 9	0.002830 0.002830 0.000449 0.000449 0.000751 Predicted (BC Pu-238 t1/2, years t1/2, years t1/2, years t1/2, years t1/2, years g, for to 6 g, for to 6	Pu238         11/2           days         32032.425           Ru-106         Bq/mL           2.90E+00         2.40E+07           total activity Bq/mL         9.80E+06           4.30E+06         4.30E+05	Actual/Pred #DIV/01 #D	Cs-134 Bq/mL 3.80E+05 3.00E+05	Cs-137 Bq/mL 2.90E+06 2.50E+06	Ce-144 Bg/mL 2.90E+07	Eu- 155 Bq/mL 2.20E+05	Eu- 154 Bq/mL 8.20E+04
Peliet Input Peliet Input Total Dejacket Waste Acid Dissol Np Residual Armo Pu-238/Total Pu Conversion of Np Conversion of Np Conversion of Np Conversion of Np Conversion of Np Conversion of Np Reference Inforr NpO, <sup>327</sup> (oxide) Np23 Pu-238 Pu-239 Pu-240 Pu-241 Pu-2	MK-20.2 MK-	BNP-45 BNP-45 BNP-45, 23, 20 BNP-15, 23, 20 (Np caustic + h. (Np caustic + h. ) = (Pu-238 caustic + h. ) = (Pu-238 caustic + h. ) = (Nu fasis) = N (wt basis) = N (wt basis) = N Analysis Date 7/7/2003 Density g/cc 11.43 19.851 19.851 19.855 10.855 10.	222 222 22 22 22 22 22 22 22 22 22 22 2	DJ-22, 030604-003 [AD-22, 030604-004 itic + total Pu J V Ip input itic and acid / Np input + Np dejacket) = itic + Pu acid) = Pu-236 t1/2 years 2.86	88.83% 89.17% 	19.993           20.003           Actual           0.800           0.817           0.146           0.000           0.000           Adjusted           Pu-236 ppm           DJ-22, 030604-003           AD-22, 030604-004           DJ-22, 030604-004	% 0.66970 % 0.67030 2.01066 0.01122 1.78000 9 9 7 9 9 0 3 3 7 7 9 9 0 3 3 7 7 9 9 0 3 3 7 7 9 9 0 0 3 3 3 3 3 3 3 3 3 3 3 3 3	0.002832           0.002832           0.00284           0.00444           0.00445           0.000751           Predicted (BC           Pu-238           Both Edg/mL           9.00E+02           9.00E+02 </td <td>Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 2.90E-06 10tal activity Bg/mL 9.80E406 4.30E+06 4.30E+06 PU-239 mb 4-sci =11</td> <td>Actual/Pred #01/v01 #00/v01 #0</td> <td>Cs-134 Bg/mL 3.80E+05 3.00E+05</td> <td>Cs-137 Bg/mL 2.90E+06 2.50E+06</td> <td>Ce-144 Bg/mL 2.90E+07 Pu-244</td> <td>Eu- 155 Bg/mL 2 20E+05</td> <td>Eu- 154 Bq/mL 8.20E+04</td>	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 2.90E-06 10tal activity Bg/mL 9.80E406 4.30E+06 4.30E+06 PU-239 mb 4-sci =11	Actual/Pred #01/v01 #00/v01 #0	Cs-134 Bg/mL 3.80E+05 3.00E+05	Cs-137 Bg/mL 2.90E+06 2.50E+06	Ce-144 Bg/mL 2.90E+07 Pu-244	Eu- 155 Bg/mL 2 20E+05	Eu- 154 Bq/mL 8.20E+04
Peilet Input Total Delact Input Total Dejacket Waste Acid Dissol Pu-238/rotal Pu Conversion of Np Conversion of Np Conversion Pu-236 Conversion Sec.25 Conversion Sec.25	MK-20.2 MK-20.	BNP-52 BNP-45 BNP-45 BNP-15, 23, 20 BNP-15, 23, 20 BNP-15, 23, 20 (vp caustic + N. (s) = PU-23 cat (vr Lassis) = N (vr Lassis)	222 222 22 22 22 22 22 22 22 22 22 22 2	DJ-22, 030604-003 AD-22, 030604-004 AD-22, 030604-004 itic and acid / Np inpp itic and acid	88.83% 89.17% ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	19,993           20,003           20,003           0,800           0,871           0,146           0,00	% 0.66977 % 0.67030 2.01060 0.01122 1.78000 9 9 9 9 9 9 9 9 9 9 9 9 9	0.002832           0.002832           0.00284           0.00449           0.00449           0.00751           Predicted (BC           Predicted (BC           11/2, years           87.7           Zr-95           Bq/mL           9.00E+02           Beta Bq/mL           9.00E+02           Pu-238           pp6 (ng/mL)           3.90E+02	Pu238         t1/2           days         32032.425           Ru-106         Bq/mL           2.90E406         2.40E407           total activity Bq/mL         9.80E406           9.80E406         4.30E406           Pu-239         ppb (ng/mL)           9.80E406         1.800E407	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 3.80E+05 3.00E+05 9.0241 ppb (ng/mL) 45,0E+01	Cs-137 Bg/mL 2.90E+06 2.50E+06 Pu-242 ppb (ng/mL) < 5,0E+01	Ce-144 Bq/mL 2.90E+07 Pu-244 ppb (ng/mL) 45.0E±07	Eu-155 Bq/mL 2.20E+05	Eu-154 Bq/mL 8.20E+04
Peilet Input Peilet Input Total Dejacket Waste Acid Dissol Np Residual Amo Pu-238/Total Pu- Conversion of Np Conversion of Np Pu-236 content pm Pu-236 content pm NpO <sub>3</sub> <sup>37</sup> (oxide) Np237 Pu-238 Pu-238 Pu-238 Pu-238 Pu-240 Pu-241 Pu-242 Conversion Conversion (Np) Pu-236 Pu-238 Pu-240 Pu-248 Pu-24	MK-20.2 MK-20.2 MK-20.2 MK-20.2 (wt basis) = (wt basis) = (wt basis) = to Pu (mol bas void to Pi (mol bas)	BNP-52 BNP-49 BNP-45 BNP-15, 23, 20 BNP-15, 23, 20 (Np caustic + N is) = Pu-28 cas ) = Gum offset ( (vt basis) = N; (vt basis) = N 7/7/2003 Density g/cc 11,443 19,861 19,861 19,865 Bg/Cl	222 222 22 22 22 22 22 22 22 22 22 22 2	BJ-22, 030604-003           AD-22, 030604-004           AD-22, 030604-004           itc + total Pu / Np input           itc and acid / Np input           + Np dejacket) =           itc + Pu acid) =           Pu-236           1           2.85	88.83%         89.17%           at =         )=           Pu-236 t1/2         1040.94           at significant of the significant of	19.993           20.003           Actual           0.850           0.871           0.146           0.000           Adjusted           Pu-236           Pu-236           ppm           3           Sample           DJ-22, 030604-003           AD-22, 030604-004           DJ-22, 030604-004           DJ-22, 030604-004           AD-22, 030604-004           AD-22, 030604-004	% 0.68977 % 0.67032 2.01066 0.01122 1.78000 9 7 9 9 7 9 0 3 3 7 7 8 8 CO-60 Bq/mL 3.10E+04 Alpha Bq/mL 2.00E+02 2.90E+02 3.50E+02 3	0.002830           0.002830           0.00284           0.0044           0.0045           0.0005           0.000751           Predicted (BC           Predicted (BC           1.00275           Predicted (BC           21-95           Baym           21-95           Boyn           9.00E+005           1.40E+06           9.00E+05           9.00E+05           1.40E+06           9.00E+05           9.00E+05           1.40E+06           9.00E+05	Pu238 11/2 days 32032.425 Ru-106 Bq/mL 2.90E+06 2.40E+07 total activity Bq/mL 9.80E+06 4.30E+06 4.30E+00 8.00E+01 8.00E+01 6.83E+04	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 3.80E+05 3.00E+05 3.00E+05 3.00E+05 1.22E+03	Cs-137 Bg/mL 2:90E+06 2:50E+06 2:50E+06 pbb(rng/mL) <5.0E+01 1:40E+02	Ce-144 Bq/mL 2.90E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bg/mL 2.20E+05	Eu-154 Bg/mL 8.20E+04
Peilet Input Peilet Input Total Dejacket Waste Acid Dissol Np Residual Armo Pu-238 frontal Pu Conversion of Np Fractional loss of Fractional loss of Fractional loss of Pu-236 content ppm 2.38 Reference Inforr NpO <sub>3</sub> <sup>337</sup> (oxide) Np237 Pu-238 Pu-238 Pu-240 Pu-241 Pu-242 Conversion	MK-20.2 MK-20.	BNP-52 BNP-45 BNP-45 BNP-52, 20 BNP-15, 23, 20 ENP-52, 23, 20 ENP-52, 23, 20 ENP-52, 23, 20 ENP-52, 23, 20 ENP-52, 20 ENP	222 222 22 22 22 22 22 22 22 22 22 22 2	DJ-22, 030604-003 [AD-22, 030604-004 itic + total Pu / V Ip input itic and acid / Np input + Np dejacket) = itic + Pu acid) = Pu-236 t1/2 years 2.86	88.83% 89.17% 11 = Pu-236 t1/2 days 1040.94 Analysis Gr gamma Alpha & Beta ICP Pu-Alpha Sreat	19.993 20.003 20.003 20.003 Actual 0.890 0.877 0.146 0.010 0.000 Adjusted Pu-236 ppm 3.55 Sample DJ-22, 030604-003 AD-22, 030604-004 AD-22	%         0.68972           %         0.67033           %         0.67033           0.01125         1.78000           9         -           9         -           9         -           0         -           3         -           7         -           8         Co-60           Bq/mL         -           1.10E+04         -           1.0E+04         -           2.00E+05         -           Npb (rog/mL)         2.25E+04           3.56E+04         3.56E+04	0.002832           0.002832           0.002842           0.00444           0.00445           0.00045           0.000751           Predicted (BC           Pu-238           t1/2, years           87.7           Zr-95           Bq/mL           9.002-005           1.40E-005           Pu-238           ppb (ng/mL)           3.90E-005           5.17E-005           Relative arm	Pu238 t1/2 days 32032 425 Ru-106 Ba/mL 2.90E+06 2.40E+07 total activity Ba/mL 9.80E+01 8.00E+01 6.83E+04	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 3.80E+05 3.00E+05 Pu-241 ppb (ng/mL) <5.0E+01 1.22E+03	Cs-137 Bg/mL 2.90E+06 2.50E+06 Pu-242 ppb (ng/mL) <5.0E+01 1.40E+02	Ce-144 Bq/mL 2.90E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bg/mL 2.20E+05	Eu- 154 Bg/mL 8.20E+04
Peilet Input Peilet Input Total Dejacket Waste Acid Dissol Np Residual Armo Pu-238/Total Pu Conversion of Np Conversion of Np Conversion of Np Conversion of Np Conversion of Np Conversion of Np Conversion of Np Pu-236 content Pu-236 content Pu-236 Reference Inforr NpQ, <sup>337</sup> (oxide) Np237 Pu-238 Pu-238 Pu-238 Pu-238 Pu-241 Pu-241 Conversion 365.25	MK-20.2 MK-20.	BNP-45 BNP-45, 23, 20 BNP-15, 23, 20 BNP-15, 23, 20 (Np causic + h ()) = Pu-238 cat ) = (Nu of Niss ) (wt basis) = N (wt basis) = N (wt basis) = N Analysis Date 7/7/2003 Density g/cc 11,443 19,851 19,855 1	222 222 22 22 22 22 22 22 22 22 22 22 2	DJ-22, 030604-003 [AD-22, 030604-004 itic + total Pu / Np input itic and acid / Np input + Np dejack(t) = itic + Pu acid) = Pu-236 t1/2 years 2.85	88.83%         88.83%           88.17%         89.17%           It =         )=           It =         (Intersection)	19.993           20.003           Actual           0.890           0.871           0.460           0.000           0.000           0.000           Adjusted           Pu-236           Pu-236           Sample           DJ-22, 030604-003           AD-22, 030604-003           AD-22, 030604-003           AD-22, 030604-003           AD-22, 030604-004	% 0.68970 % 0.67030 2.01066 0.01122 1.78000 9 9 9 9 9 0 3 7 7 9 9 0 3 3 7 7 9 0 3 3 7 7 9 0 3 3 3 3 3 3 3 3 1.78000 9 9 9 0 3 3 3 3 3 3 3 3 3 3 3 3 3	0.002832           0.002832           0.00284           0.00444           0.00045           0.000751           Predicted (BC           Predicted (BC           Predicted (BC           Predicted (BC           Predicted (BC           Pu-238           pt12_years           87.7           ZT-95           Bq/mL           9_00E+05           Pu-238           pp0 (ng/mL)           3_30E+026           5_17E+02           Relative error %	Pu238         t1/2           days         32032.425           Ru-106         Bg/mL           9.00E+00         2.40E+07           total activity Bg/mL         9.00E+00           9.00E+00         4.30E+00           Pu-239         ppb (ng/mL)           8.00E+01         6.83E+04	Actual/Prod #DIV/01 #D	Cs-134 Bg/mL 3.80E+05 3.00E+05 4.00E+05 4.00E+01 1.22E+03	Cs-137 Bq/mL 2.90E+06 2.50E+06 2.50E+06 2.50E+01 1.40E+02	Ce-144 Bq/mL 2.90E+07 Pu-244 ppb (ng/mL) <5.0E+01	Eu- 155 Bq/mL 2.20E+05	Eu- 154 Bg/mL 8.20E+04
Peilet Input Total Delact Input Total Dejacket Waste Acid Dissol Np Residual Amo Pu-2307 ctal Pu Conversion of Np Conversion	MK-20.2 MK-20.	BNP-52 BNP-49 BNP-45, 23, 20 BNP-15, 23, 20 BNP-15, 23, 20 S) = (Up caustic + N. is) = PU-236 cat s) = (Suno rises or (wir basis) = P (wir basis) = P (wir basis) = P Analysis Date 7/7/2003 Density g/cc 11,143 20,476 19,851 19,851 19,851 19,851 19,851	222 222 22 22 22 22 22 22 22 22 22 22 2	DJ-22, 030604-003 AD-22, 030604-004 itc + total Pu / Np input itc and acid / Np input Np dejackel = itc + Pu acid) = Pu-236 t1/2 years 2.85	88.83%         89.17%           89.17%         89.17%           Image: state stat	19.993           20.003           20.003           20.003           0.800           0.871           0.145           0.001           0.002           Adjusted           Pu-236           Pu-236           Sample           DJ-22, 030604-003           AD-22, 030604-003           AD-22, 030604-004           AD-22, 030604-004	% 0.66977 % 0.67030 2.01060 0.01122 1.78000 9 9 9 9 9 9 9 9 9 9 9 9 9	0.002830           0.002830           0.002840           0.00440           0.00440           0.00751           Predicted (BC           Predicted (BC           11/2, years           87.7           Zr-95           Bg/mL           9.00E+005           9.00E+005           9.00E+005           9.00E+005           Pu-238           ppb (ng/mL)           3.30E-005           5.17E+005           Relative error           9.2.7	Pu238         t1/2           days         32032.425           Ru-106         Bq/mL           2.90E+00         2.40E+07           total activity Bq/mL         9.80E+00           9.80E+00         4.30E+00           Pu-239         ppb (ng/mL)           8.00E+00         6.83E+04	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 3.80E+05 3.00E+05 9u-241 ppb (ng/mL) <5.0E+01 1.22E+03	Cs-137 Bg/mL 2.90E+06 2.50E+06 Pu-242 ppb (ng/mL) <.50E+01 1.40E+02	Ce-144 Bg/mL 2.90E+07 Pu-244 ppb (ng/mL) <5.0E+01	Eu- 155 Bg/mL 2.20E+05	Eu-154 Bg/mL 8.20E+04
Peilet Input Peilet Input Total Dejacket Waste Acid Dissol Np. Residual Armo Pu-2387 (rotal Pu- Conversion of Np. Fractional loss of Fractional loss of Fractional loss of Pu-236 content ppm 2.38 Reference Inforr NpQ <sub>3</sub> <sup>237</sup> (oxide) Np237 Pu-238 Pu-238 Pu-240 Pu-241 Pu-242 Conversion	MK-20.2 MK-20.2 MK-20.2 MK-20.2 MK-20.2 MK-20.2 MK-20.2 (wt basis) = (wt basis	BNP-52 BNP-45 BNP-45 BNP-15, 23, 20 BNP-15, 23, 20 (Np caustic + N- is) = Pu-238 cat. ) = Pu-238 cat. ) = Gwon offsa ( with basis) = N ( w	222 222 22 22 22 22 22 22 22 22 22 22 2	DJ-22, 030604-003           [AD-22, 030604-004           [AD-22, 030604-004           itic + total Pu / Np input           itic and acid / Np input           itic and acid / Np input           PU-236           [D-236]           10           Pu-236           112           years           2.85	88.83%     88.83%     89.17%     99.236 t1/2     days     1040.90     Analysis     Gr gamma     ICP     ICP     Pu-Alpha Scat     TTA extraction	19.993           20.003           Actual           0.850           0.871           0.146           0.000           Actual           0.871           0.146           0.0000           0.0000           0.0000           0.0000           0.0000           0.0000           0.0000           0.0000           0.0000           0.0000           0.0000           0.0000           0.0000           0.0000           0.0000           0.0000           0.00000 <t< td=""><td>%         0.68972           %         0.67033           2.01066         0.01125           1.78000         1.78000           9         -           9         -           9         -           9         -           3         -           7         -           8         -           8         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           1.78000         -           9         -           9         -           9         -           3.10E+04         -           2.90E+00         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -</td><td>0.00283           0.00283           0.00284           0.00449           0.00449           0.00041           0.000751           Predicted (BC           Predicted (BC           Pu-238           t1/2, years           67.7           Zr-95           Bq/mL           9.002+005           9.002+005           9.002+005           9.002+005           9.002+005           S17E+007           %           2.7</td><td>Pu238         t1/2           days         32032.425           Ru-106         Bq/mL           32032.425         12           Ru-106         Bq/mL           2.90E+06         2.40E+07           total activity Bq/mL         9.80E+06           9.80E+06         4.30E+06           9.00E+01         6.83E+04</td><td>Actual/Pred #DIV/01 #D</td><td>Cs-134 Bq/mL 3.80E+05 3.00E+05 3.00E+05 9-241 ppb (rg/mL) &lt;5.0E+01 1.22E+03</td><td>Cs-137 Bq/mL 2.90E+06 2.50E+06 PU-242 ppb (ng/mL) &lt;5.0E+01 1.40E+02</td><td>Ce-144 Bq/mL 2.90E+07 2.90E+07 45.0E+01 &lt;5.0E+01</td><td>Eu- 155 Bq/mL 2.20E+05</td><td>Eu- 154 Bg/mL 8.20E+04</td></t<>	%         0.68972           %         0.67033           2.01066         0.01125           1.78000         1.78000           9         -           9         -           9         -           9         -           3         -           7         -           8         -           8         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           1.78000         -           9         -           9         -           9         -           3.10E+04         -           2.90E+00         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -	0.00283           0.00283           0.00284           0.00449           0.00449           0.00041           0.000751           Predicted (BC           Predicted (BC           Pu-238           t1/2, years           67.7           Zr-95           Bq/mL           9.002+005           9.002+005           9.002+005           9.002+005           9.002+005           S17E+007           %           2.7	Pu238         t1/2           days         32032.425           Ru-106         Bq/mL           32032.425         12           Ru-106         Bq/mL           2.90E+06         2.40E+07           total activity Bq/mL         9.80E+06           9.80E+06         4.30E+06           9.00E+01         6.83E+04	Actual/Pred #DIV/01 #D	Cs-134 Bq/mL 3.80E+05 3.00E+05 3.00E+05 9-241 ppb (rg/mL) <5.0E+01 1.22E+03	Cs-137 Bq/mL 2.90E+06 2.50E+06 PU-242 ppb (ng/mL) <5.0E+01 1.40E+02	Ce-144 Bq/mL 2.90E+07 2.90E+07 45.0E+01 <5.0E+01	Eu- 155 Bq/mL 2.20E+05	Eu- 154 Bg/mL 8.20E+04
Peliet Input Peliet Input Total Dejacket Waste Acid Dissol Np Residual Amo Pu-2387 Total Pu Conversion of Np Conversion of Np Conversion of Np Pu-236 content pm 2.38 Reference Inforr NpO, <sup>327</sup> (oxide) Np237 Pu-238 Pu-240 Pu-242 Conversion Specific activity C Factor =	MK-20.2 MK-	BNP-52 BNP-45 BNP-45, 23, 20 BNP-15, 23, 20 BNP-15, 23, 20 (m causic + h - 15, 23, 20 (m causic + h - 15, 23, 20) (m basis) = N - 10, 20, 20, 20, 20, 20, 20, 20, 20, 20, 2	222 222 22 22 22 22 22 22 22 22 22 22 2	BJ-22, 030604-003           [AD-22, 030604-004           (AD-22, 030604-004           tic + total Pu / VNp input           * Np dejacket) =           tic + total (/ Np input           * Np dejacket) =           tic + vu acid) =           * Pu-236           years           2.86	88.83%         88.83%           88.17%         89.17%           It =         )=           It =         )=           It =         )=           It =         )=           It =         (Intersection)           It =         (Intersection) <td>19.993           20.003           20.003           20.003           Actual           0.890           0.871           0.146           0.000           Adjusted           Pu-236           Pu-236           Sample           DJ-22, 030604-003           AD-22, 030604-003           AD-22, 030604-004</td> <td>%         0.68970           %         0.67030           %         0.67030           9         -           7         -           9         -           7         -           9         -           7         -           8         -           2.0106+05         -           1.78000         -           9         -           7         -           9         -           0         -           3         -           7         -           8         -           2.00E+05         -           2.00E+05         -           9.0Pb (ng/mL)         2.25E+04           3.56E+00         -           9.55E+04         -           2.38         -</td> <td>0.002830           0.002830           0.002840           0.00444           0.000454           0.000454           0.00051           0.000751           Predicted (BC           Predicted (BC           Predicted (BC           Predicted (BC           Predicted (BC           Predicted (BC           Pu-238           Py 0.00E+005           <td< td=""><td>Pu238         t1/2           days         32032.425           Ru-106         Bg/mL           Bg/mL         2.90E+06           total activity Bg/mL         9.80E+01           total activity Bg/mL         9.80E+01           pb(ng/mL)         9.80E+01           0.6.83E+04         6.83E+04</td><td>Actual/Prod #01/v01 #000 #00 #00 #00 #00 #00 #00 #00 #00</td><td>Cs-134 Bg/mL 3.80E+05 3.00E+05 Pu-241 pob (ng/mL) &lt;50E+01 1.22E+03</td><td>Cs-137 Bg/mL 2.90E+06 2.50E+06 2.50E+06 2.50E+01 3.50E+01 1.40E+02</td><td>Ce-144 Bg/mL 2.90E+07 Pu-244 ppb (ng/mL) &lt;5.0E+01 &lt;5.0E+01</td><td>Eu- 155 Bg/mL 2.20E+05</td><td>Eu- 154 Bg/mL 8.20E+04</td></td<></td>	19.993           20.003           20.003           20.003           Actual           0.890           0.871           0.146           0.000           Adjusted           Pu-236           Pu-236           Sample           DJ-22, 030604-003           AD-22, 030604-003           AD-22, 030604-004	%         0.68970           %         0.67030           %         0.67030           9         -           7         -           9         -           7         -           9         -           7         -           8         -           2.0106+05         -           1.78000         -           9         -           7         -           9         -           0         -           3         -           7         -           8         -           2.00E+05         -           2.00E+05         -           9.0Pb (ng/mL)         2.25E+04           3.56E+00         -           9.55E+04         -           2.38         -	0.002830           0.002830           0.002840           0.00444           0.000454           0.000454           0.00051           0.000751           Predicted (BC           Predicted (BC           Predicted (BC           Predicted (BC           Predicted (BC           Predicted (BC           Pu-238           Py 0.00E+005           Py 0.00E+005 <td< td=""><td>Pu238         t1/2           days         32032.425           Ru-106         Bg/mL           Bg/mL         2.90E+06           total activity Bg/mL         9.80E+01           total activity Bg/mL         9.80E+01           pb(ng/mL)         9.80E+01           0.6.83E+04         6.83E+04</td><td>Actual/Prod #01/v01 #000 #00 #00 #00 #00 #00 #00 #00 #00</td><td>Cs-134 Bg/mL 3.80E+05 3.00E+05 Pu-241 pob (ng/mL) &lt;50E+01 1.22E+03</td><td>Cs-137 Bg/mL 2.90E+06 2.50E+06 2.50E+06 2.50E+01 3.50E+01 1.40E+02</td><td>Ce-144 Bg/mL 2.90E+07 Pu-244 ppb (ng/mL) &lt;5.0E+01 &lt;5.0E+01</td><td>Eu- 155 Bg/mL 2.20E+05</td><td>Eu- 154 Bg/mL 8.20E+04</td></td<>	Pu238         t1/2           days         32032.425           Ru-106         Bg/mL           Bg/mL         2.90E+06           total activity Bg/mL         9.80E+01           total activity Bg/mL         9.80E+01           pb(ng/mL)         9.80E+01           0.6.83E+04         6.83E+04	Actual/Prod #01/v01 #000 #00 #00 #00 #00 #00 #00 #00 #00	Cs-134 Bg/mL 3.80E+05 3.00E+05 Pu-241 pob (ng/mL) <50E+01 1.22E+03	Cs-137 Bg/mL 2.90E+06 2.50E+06 2.50E+06 2.50E+01 3.50E+01 1.40E+02	Ce-144 Bg/mL 2.90E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bg/mL 2.20E+05	Eu- 154 Bg/mL 8.20E+04
Peliet Input Peliet Input Total Dejacket Waste Acid Dissol Np Residual Amo Pu-238/total Amo Pu-238/total Amo Pu-238/total Amo Pu-238 content pm 2.38 Reference Inforr NpQ <sup>237</sup> (oxide) Np237 Pu-238 Pu-248 P	MK-20.2 MK-	BNP-52 BNP-45 BNP-45, 23, 20 BNP-15, 23, 20 BNP-15, 23, 20 (vp caustic + h. (s) = Pu-238 caus) (wt basis) = Ny (wt basis) = Ny	222 222 222 222 222 222 222 222 222 22	DJ-22, 030604-003           [AD-22, 030604-004]           [AD-22, 030604-004]           itic + total Pu / Np input           itic and acid / Np input           Np dejacket) =           itic + Pu acid) =           Pu-236           Vgars           2.85           Specific activity           CVI           CVI           CVI           CVI           CVI           CVI           CVI           CVI           CVI	88.83%         89.17%           89.17%         89.17%           It =	19.993           20.003           20.003           20.003           Actual           0.890           0.871           0.146           0.003           Adjusted           Pu-236           Pu-236           Sample           D.J-22, 030604-003           AD-22, 030604-003           AD-22, 030604-004           AD-22, 030604-004           AD-22, 030604-004           PU-236/238 nom =	%         0.68977           %         0.67030           %         0.67030           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           0         -           3         -           8         -           8         -           2         -           2         -           2         -           2         -           9         -           2         -           2         -           2         -           2         -           9         -           2	0.002832           0.002832           0.002832           0.00284           0.0044           0.00041           0.00051           0.00051           Predicted (BC           Beta Bq/mL           9.00E+05           Beta Bq/mL           9.00E+05           Pu-238           pp((ng/mL))           3.90E+005           S.17E+05           Relative error           %           2.7           Counte V.P.*	Pu238 t1/2 days 32032.425 Ru-106 Bq/mL 9.80E+06 2.40E+07 Iotal activity Bq/mL 9.80E+06 4.30E+06 Pu-239 ppb (ng/mL) 8.80E+06 6.83E+04	Actual/Prod #DIV/01 #D	Cs-134 Bg/mL 3.80E+05 3.00E+05 3.00E+05 4.50E+01 1.22E+03	Cs-137 Bg/mL 2.90E+06 2.50E+06 2.50E+06 2.50E+01 1.40E+02	Ce-144 Bq/mL 2.90E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bg/mL 2.20E+05	Eu- 154 Bq/mL 8.20E+04
Peliet Input Peliet Input Total Dejacket Waste Acid Dissol Np. Residual Armo Pu-2387 (Total Pu- Conversion of Np. Fractional loss of Fractional loss of Pu-236 content ppm 2.38 Reference Inforr NpQ <sub>2</sub> <sup>237</sup> (oxide) Np237 Pu-238 Pu-238 Pu-240 Pu-238 Pu-240 Pu-238 Pu-240 Specific activity C Factor = Co-60 7-95 5	MK-20.2 MK-20.2 MK-20.2 MK-20.2 MK-20.2 MK-20.2 (wt basis) = (wt basis) = (wt basis) = (wt basis) = (wt basis) = to PL (wnol basis) = to PL (wnol basis) = to PL (wnol basis) = to PL (wnol basis) = No in Liq Waste Discharge Date Discharge Date Date MW Sale (Waste) = MW Sale (Waste) = Sale (Waste) = MW Sale (Waste) = Sale	BNP-52 BNP-52 BNP-45 BNP-55, 23, 20 BNP-15, 23, 20 (Np caustic + N- is) = Pu-238 cat, 30 (Np caustic + N- is) = Pu-238 cat, 30 (Nt basis) = N; (wt basis) = N;	222           223           224           224           225           226           226           226           226           226           226           226           226	BJ-22, 030604-003           AD-22, 030604-003           AD-22, 030604-004           itic + total Pu / V Ip input           and acid / Np input           itic and acid / Np input           Pu digated1           itic + Du acid) =           Pu-238           Pu-238           102           Vears           2.85	88.83%     88.83%     89.17%     99.236 t1/2     days     i 040.94     Analysis     Gr gamma     Alpha & Beta     ICP  Pu-Alpha Scar     TTA extraction	19.993 20.003 20.003 20.003 Actual 20.893 20.003 20.003 20.003 20.003 20.003 20.003 20.003 20.003 20.003 20.003 20.003 20.004 20.003 20	%         0.68970           %         0.67030           %         0.67030           %         0.67030           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           9         -           1.78000         -           9         -           9         -           9         -           9         -           9         -           2.001         -           9         -           9         -           9         -           9         -           9         -           9         -	0.002830           0.002830           0.002840           0.00444           0.00044           0.000751           Predicted (BC           Predicted (BC           Pu-238           t1/2, years           t1/2, years           g.7.7           Zr-95           Bq/mL           9.60E+005           1.40E+005           Pu-238           Ppb (ng/mL)           3.90E+005           5.17E+005           S.10E+005           Relative error           %           2.7           Scounts X Pu-2	28)           Pu238         H/2           days         32032.425           Ru-106         Bq/mL           32032.425         12           Ru-106         Bq/mL           2.90E+06         2.40E+07           total activity Bq/mL         9.80E+06           9.205+06         4.30E+06           9.00E+01         6.83E+04           369_mxX236) X 166         238_mX236) X 165	Actual/Prod #DIV/01 #D	Cs-134 Bq/mL 3.80E+05 3.00E+05 3.00E+05 Pu-241 ppb (rq/mL) <5.0E+01 1.22E+03	Cs-137 Bq/mL 2.90E+06 2.50E+06 2.50E+06 ppb.(ng/mL) <5.0E+01 1.40E+02	Ce-144 Bq/mL 2.90E+07 2.90E+07 <5.0E+01 <5.0E+01	Eu- 155 Bq/mL 2.20E+05	Eu-154 Bg/mL 8.20E+04
Peliet Input Peliet Input Total Dejacket Waste Acid Dissol Np Residual Amo Pu-2387 total Pu Conversion of Np Fractional loss of Fractional loss of Fractional loss of Pu-236 content pm 2.38 Reference Inforr NpO <sub>3</sub> <sup>37</sup> (oxide) Np237 Pu-238 Pu-240 Pu-242 Conversion Specific activity O Factor = Co-80 Zr-95 Ru-106	MK-20.2 MK-	BNP-52 BNP-45 BNP-45 BNP-45, 23, 20 BNP-15, 23, 20 BNP-15, 23, 20 (v) caustic + N (v) caustic	222 222 222 222 222 222 222 222 222 22	DJ-22, 030604-003           DJ-22, 030604-003           AD-22, 030604-004           itic + total Pu / V Ip input           itic and acid / Np input           N / dejackel) =           itic + total pu / V Ip input           Pu-236           years           2.86           Clig           Clig           2 1489.000           3306.000	88.83%         89.17%           89.17%         89.17%           If #         )#           Idags         1040.94           Analysis         Gr gamma           Alpha & Beta         ICP           ICP         ICP           ICP         ICP	19.993           20.003           20.003           20.003           0.800           0.817           0.146           0.000           0.000           Pu-236           ppm           3.5           Sample           DJ-22, 030604-003           AD-22, 030604-003           AD-22, 030604-004           AD-22, 030604-004           AD-22, 030604-004           Pu-236/238 ppm =	%         0.68970           %         0.67030           %         0.67030           %         0.67030           0.01125         1.78000           9         -           9         -           0         -           3         -           7         -           8         -           Alpha Bg/mL         2.00E+05           2.90E+00         2.36E+04           3.56E+04         3.56E+04           9.0Pm (ug/mL)         2.38           (5.80 MeV Areas (Full Spectru         -	0.002832           0.002832           0.00284           0.00444           0.00445           0.00045           0.000751           Predicted (BC           Predicted (BC           Pu-238           t12, years           87.7           Zr-95           Bg/mL           9.005-005           1.406-005           9.005-005           1.406-005           9.005-005           Relative error           %           2.7           1.3096-005           Str8-05           1.408-005	Pu238 t1/2 days 32032 425 Ru-106 Bg/mL 2.30E+00 total activity Bg/mL 9.80E+01 total activity Bg/mL 9.80E+01 6.83E+04 6.83E+04 38.00E+01 6.83E+04 38.00E+01 6.83E+04 38.00E+01 6.83E+04 38.00E+01 6.83E+04 38.00E+01 6.83E+04 38.00E+01 6.83E+04 8.00E+01 6.83E+04 8.00E+01 6.83E+04 8.00E+01 6.83E+04 8.00E+01 6.83E+04 8.00E+01 6.83E+04 8.00E+01 6.83E+04 8.00E+01 6.83E+04 8.00E+01 6.83E+04 8.00E+01 8.00E+00E+00E+00E+00E+00E+00E+00E+00E+00E	Actual/Prod #01/V01 #01/V01 #01/V01 #01/V01 #01/V01 #01/V01 #01/V01 #01/V01 #01/V01 #01/V01 #01/V01 #01/V01 Bg/mL 4.90E+05 Pb-(238,g 4.90E+05 Pb-(238,g 4.90E+05 Bg/mL 5.50E+03	Cs-134 Bg/mL 3.80E+05 3.00E+05 Pu-241 ppb (ng/mL) <5.0E+01 1.22E+03	Cs-137 Bg/mL 2.90E+06 2.50E+06 Pu-242 ppb (ng/mL) <5.0E+01 1.40E+02	Ce-144 Bg/mL 2.90E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bg/mL 2.20E+05	Eu- 154 Bg/mL 8.20E+04
Peilet Input Peilet Input Total Dejacket Waste Acid Dissol Np Residual Armo Pu-238/Total Conversion of Np Conversion of Np Pu-238 content pm 2.38 Reference Inforr NpO <sub>3</sub> <sup>37</sup> (oxide) Np237 Pu-238 Pu-238 Pu-238 Pu-238 Pu-238 Specific activity C Specific activity C Specific activity C Factor = Co-60 Zr-95 Ru-106 SB-125	MK-20.2 MK-	BNP-45 BNP-45 BNP-45, 23, 20 BNP-15, 23, 20 BNP-15, 23, 20 (Np caustic + h ); = Pu-238 caus ) (wt basis) = N (wt basis) = N (w	222           222           23           -613.00	Specific activity           CV/2           V3366           V3           V4           V5           V6           V7           V8           V9           V10           V11           V9           V11           V9           V9           V11           V9           V11	88.83%         88.83%           88.17%         89.17%           it =         )=	19.993 20.003 20	<ul> <li>6.6897C</li> <li>0.67030</li> <li>0.67030</li> <li>2.01060</li> <li>0.67030</li> <li>1.78000</li> <li>1.78000</li> <li>1.78000</li> <li>9</li> <li>9</li> <li>0</li> <li>3</li> <li>3</li> <li>3</li> <li>3</li> <li>3</li> <li>3</li> <li>3</li> <li>10E+04</li> <li>Alpha Bq/mL</li> <li>2.00E+05</li> <li>2.90E+00</li> <l< td=""><td>0.00283           0.00283           0.00283           0.00284           0.0044           0.0004           0.00051           0.000751           Predicted (BC           Predicted (BC           Predicted (BC           Predicted (BC           Predicted (BC           Pu-238           gt12, years           87.7           ZT-95           Bq/mL           9.00E+05           Pu-238           pp(rog/mL)           3.90E+05           Pu-238           pp(rog/mL)           3.90E+05           Relative error           2.7           Counts X.Pu-2           Counts X.Pu-2           B0 MeV Area C</td><td>Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 2.90E+06 2.40E+07 total activity Bg/mL 9.80E+06 4.33E+04 Pu-239 ppb (ng/mL) 6.83E+04 3.83E</td><td>Actual/Prod #DIV/01 #D</td><td>Cs-134 Bg/mL 3.80E+05 3.00E+05 3.00E+05 45.0E+01 1.22E+03</td><td>Cs-137 Bg/mL 2.90E+06 2.50E+06 2.50E+06 2.50E+01 1.40E+02</td><td>Ce-144 Bg/mL 2.90E+07 Pu-244 ppb (ng/mL) &lt;5.0E+01</td><td>Eu- 155 Bq/mL 2.20E+05</td><td>Eu-154 Bg/mL 8.20E+04</td></l<></ul>	0.00283           0.00283           0.00283           0.00284           0.0044           0.0004           0.00051           0.000751           Predicted (BC           Predicted (BC           Predicted (BC           Predicted (BC           Predicted (BC           Pu-238           gt12, years           87.7           ZT-95           Bq/mL           9.00E+05           Pu-238           pp(rog/mL)           3.90E+05           Pu-238           pp(rog/mL)           3.90E+05           Relative error           2.7           Counts X.Pu-2           Counts X.Pu-2           B0 MeV Area C	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 2.90E+06 2.40E+07 total activity Bg/mL 9.80E+06 4.33E+04 Pu-239 ppb (ng/mL) 6.83E+04 3.83E	Actual/Prod #DIV/01 #D	Cs-134 Bg/mL 3.80E+05 3.00E+05 3.00E+05 45.0E+01 1.22E+03	Cs-137 Bg/mL 2.90E+06 2.50E+06 2.50E+06 2.50E+01 1.40E+02	Ce-144 Bg/mL 2.90E+07 Pu-244 ppb (ng/mL) <5.0E+01	Eu- 155 Bq/mL 2.20E+05	Eu-154 Bg/mL 8.20E+04
Peliet Input Peliet Input Total Dejacket Waste Acid Dissol Np. Residual Armo Pu-238/Total Pu Conversion of Np. Fractional loss of Fractional loss of Pu-236 content ppm 2.38 Reference Inforr NpQ2 <sup>327</sup> (oxide) Np237 Pu-238 Pu-239 Pu-240 Pu-239 Pu-240 Specific activity C Factor = Co-60 Zr-95 Ru-106 SB-125 Co-134 Co-137	MK-20.2 MK-20.2 MK-20.2 MK-20.2 MK-20.2 (wt basis) = (wt basis) = (wt basis) = (wt basis) = (wt basis) = to PL (wol basis) No in Liq Waste Discharge Date Date Date Date Date 238,0496 239,0452 238,0496 239,0452 238,0496 239,0452 239,0452 230,0588 241,0568 24,0558 24,0568 24,0588	BNP-52 BNP-52 BNP-55 BNP-55 BNP-55 (Np caustic + N (Np caustic + 3, 20 (Np caustic + 3, 20 (Np caustic + 3, 20 (NT basis) = N; (wt basis) = N;	222           223           224           225           235           294           295           294           2052472           235           235           235           235           235           235           240           235           235           235           240           235           235           235           240           250           250           250           250           250	Specific activity           Cl/22, 030604-003           AD-22, 030604-004           AD-22, 030604-004           itic + total Pu / Np input           itic and acid / Np input           * Np dejacket] =           itic + Pu acid) =           Pu-238           Pu-238           1102           years           2           1103.036           2           1103.036           2           1103.036           2           1048.000           1048.000           1048.000           1048.000	88.83%     88.83%     89.17%     99.4236 t1/2     49.4236 t1/2     4	19.993           20.003           Actual           0.850           0.871           0.146           0.000           Adjusted           Pu-236           DJ-22, 030604-003           AD-22, 030604-003           AD-22, 030604-004           DJ-22, 030604-004           AD-22, 030604-004           Pu-236/238 ppm =           Relative Error =	%         0.68970           %         0.67033           %         0.67033           2.01066         0.01125           1.78000         1.78000           9         7           9         7           9         7           9         3.3           7         7           8         2.01640           Alpha Bg/mL         2.00E+05           2.90E+05         2.90E+05           Ppb (rg/mL)         2.25E+04           3.56E+00         2.36E+00           Pu-236/Pu-238         ppm (ug/mL)           2.38         (5.80 MeV Aress (Full Spectru           2.X (5.5)         1	0.00283           0.00283           0.00284           0.00445           0.00445           0.00045           0.00051           0.00051           0.00051           0.00051           0.00051           Predicted (BC           Pu-238           ±1/2, years           ±7.95           Bq/mL           9.60±/061           1.40±/061           Pu-238, mL           9.60±/061           9.60±/061           1.40±/061           Pu-238, mL           9.60±/061           1.40±/061           Pu-238, mL           2.7           Counts X Pu-2           1.00±/071           2.00±/071           2.00±/071           2.00±/071           2.00±/071           3.00±/071           2.00±/071           2.00±/071           2.00±/071           2.00±/071           2.00±/071           3.00±/071           3.00±/071           3.00±/071           3.00±/071           3.00±/071           3.00±/071	Pu238         11/2           days         32032.425           Ru-106         Bq/mL           2.40E+07         2.40E+07           Itotal activity Bq/mL         9.80E+06           9.80E+06         4.30E+06           9.80E+06         4.30E+06           9.80E+04         6.83E+04           238 <sub>112</sub> X 236) X 1E6         238 <sub>112</sub> X 236)           238 <sub>112</sub> X 236) X 1E6         15	Actual/Prod #DIV/01 #D	Cs-134 Bg/mL 3.80E+05 3.00E+05 3.00E+05 9b-241 ppb (rg/mL) <5.0E+01 1.22E+03	Cs-137 Bg/mL 2.90E+06 2.50E+06 2.50E+06 ppb (ng/mL) <5.0E+01 1.40E+02	Ce-144 Bg/mL 2.90E+07 2.90E+07 2.90E+07 <5.0E+01 <5.0E+01	Eu- 155 Bq/mL 2.20E+05	Eu- 154 BajmL 8 20E+04
Peilet Input Peilet Input Total Dejacket Waste Acid Dissol Np Residual Armo Pu-238 for the Pu-238 for the Pu-238 Pu-238 content ppm 2.38 Reference Inforr NpO <sub>3</sub> <sup>337</sup> (oxide) Np237 Pu-238 Pu-238 Pu-238 Pu-238 Pu-238 Pu-239 Pu-240 Pu-241 Pu-242 Conversion of Np Specific activity C Factor = Co-80 Zr-96 Ru-106 SB-125 Co-134 Co-137 Co-134	MK-20.2 MK-	BNP-52 BNP-45 BNP-45 BNP-45, 23, 20 BNP-15, 23, 20 BNP-15, 23, 20 (Np caustic + N- is) = Pu-238 cat, 20 ) = (Wn of Missi) = N (wt basis) = N	222 222 222 222 222 222 222 222 222 22	Specific activity           2.265           Years           2.2700           2.2700           2.2700           2.2700           2.2700           2.2700           2.2700           2.2700           2.2800           2.2800           2.2800           2.2800           2.2800           2.21460,000           2.1460,000           3.306,000           1.124,000           3.122,800	88.83%     88.83%     89.17%     9     9     9     9     9     9     1040.94     104	19.993 20.003 20	%         0.68972           %         0.67033           %         0.67033           %         0.67033           9         -           9         -           9         -           7         -           9         -           7         -           8         -           8         -           9         -           1.78000         -           9         -           0         -           3         -           7         -           9         -           0         -           3         -           7         -           9         -           10         -           2.901         -           2.905         -           9.907         -           9.907         -           9.908         -           9.907         -           9.908         -           9.908         -           9.907         -           9.907         -           9.907	0.002830           0.002830           0.002840           0.00444           0.00445           0.00045           0.000751           Predicted (BC           Pu-238           t1/2, years           87.7           Zr-95           Bg/mL           9.000-v05           1.400-v05           9.000-v05           1.400-v05	Pu238 t1/2 days 32032 425 Ru-106 Bq/mL 2.30E+00 total activity Bq/mL 9.80E+01 6.83E+04 6.83E+04 36.usX236) X 1E6 -238.usX236) X 1E6 -238.usX236) X 1E6 ts	Actual/Prod #01/V01 #00 #00 #00 #00 #00 #00 #00 #00 #00 #	Cs-134 Bg/mL 3.80E+05 3.00E+05 Pu-241 ppb (ng/mL) <5.0E+01 1.22E+03	Cs-137 Bq/mL 2.90E+06 2.50E+06 Pu-242 ppb (ng/mL) <5.0E+01 1.40E+02	Ce-144 Bq/mL 2.90E+07 Pu-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bg/mL 2.20E+05	Eu- 154 Bg/mL 8.20E+04
Peilet Input Peilet Input Total Dejacket Waste Acid Dissol Np Residual Amo Pu-238/Total Pu Conversion of Np Conversion of Np Pu-236 content pm 2.38 Pu-236 content pm 2.38 Pu-240 Pu-241 Conversion 2.59 Co-60 Co-60 Co-8137 Co-144 Eur 165 Co-8137 Co-144 Eur 165 Co-8137 Co-8144 Eur 165 Co-8137 Co-8144 Eur 165 Co-810 Co-8107 C	MK-20.2 MK-20.	BNP-452 BNP-452 BNP-45, 23, 20 BNP-15, 23, 20 BNP-15, 23, 20 C (Np caustic + h	222 222 222 222 222 222 222 222 222 22	Specific activity           Cirg         2148.000           Specific activity         2148.000           Cirg         2148.000           Specific activity         21489.000           1124.000         31366.000           124.600.001         31482.000           1284.000         31482.000           1284.000         31482.000           1284.000         31482.000           1284.000         31482.000           1284.000         31482.000           1284.000         31482.000	88.83%     88.83%     88.83%     89.17%     9=     1040.94	19.993 20.003 20	% 0.68970 % 0.67030 2.01066 0.01122 1.78000 9 9 7 9 9 0 3 7 7 9 9 0 3 3 7 7 9 9 0 3 3 7 7 9 9 0 3 3 7 7 9 9 0 3 3 7 7 9 9 0 3 3 7 7 9 9 0 3 3 7 7 9 9 0 3 3 7 7 7 9 9 0 3 3 7 7 7 9 9 0 0 3 3 7 7 7 7 9 9 0 3 3 7 7 7 9 9 0 3 3 7 7 7 7 7 7 7 7 7 7 7 7 7	0.002830           0.002830           0.002840           0.00444           0.00445           0.000751           Predicted (BC           Predicted (BC           Predicted (BC           Predicted (BC           Pu-238           P12, years           87.7           Z7-95           Bq/mL           9.00E+05           P0-238           pp0 (ng/mL)           3.90E+026           5.17E+02           Relative error %           2.7           Counts X Pu-2           Relative error %           2.7           Counts X Pu-2           80 MeV Area C           80 MeV Area Court	Pu238         t1/2           days         32032.425           Ru-106         Bg/mL           Bg/mL         2.90E-06           2.40E+07         Iotal activity Bg/mL           9.80E-001         4.30E+07           Pu238         r12           2.40E+07         8.00E+01           8.00E+01         6.83E+04           238 <sub>1/0</sub> X 236) X 1E6         -238 <sub>1/12</sub> X 238)           ounts) <sup>1/2</sup> ts	Actual/Prod #01/v/01 #01/v/01 #01/v/01 #01/v/01 #01/v/01 #01/v/01 #01/v/01 #01/v/01 #01/v/01 #01/v/01 \$02521 4.90E+05 4.90E+05 \$0.50E+03	Cs-134 Bg/mL 3.80E+05 3.00E+05 4.0E+01 1.22E+03	Cs-137 Bg/mL 2.90E+06 2.50E+06 2.50E+06 9.0242 pb (ng/mL) <6.0E+01 1.40E+02	Ce-144 Bg/mL 2.90E+07 2.90E+07 <5.0E+01 <5.0E+01	Eu-155 Bg/mL 2 20E+05	Eu- 154 Bg/mL 8.20E+04
Peliet Input Peliet Input Total Dejacket Waste Acid Dissol Np Residual Armo Pu-238/Total Pu Conversion of Np Fractional loss of Fractional loss of Pu-236 content ppm 2.38 Reference Inforr NpQ <sub>2</sub> <sup>237</sup> (oxide) Np237 (oxide) Np237 Pu-238 Pu-239 Pu-240 Pu-239 Pu-240 Specific activity C Factor = Co-60 Zr-95 Ru-106 SB-125 Ca-134 Ca-137 Ca-144 Eu-135 Pu-238	MK-20.2 MK-20.2 MK-20.2 MK-20.2 MK-20.2 (wt basis) = (wt basis) = (wt basis) = (wt basis) = to PL (wol basis) = Discharge Date Discharge Date Discharge Date 238,0496 239,0422 240,0588 241,0588 244,0588 240,0588	BNP-45 BNP-45 BNP-45 BNP-45, 23, 20 BNP-15, 23, 20 ENP-45, 25 ENP-45, 25 EN	222           223           224           225	Specific activity           Cl/22, 030604-003           AD-22, 030604-004           AD-22, 030604-004           AD-22, 030604-004           Itic + total Pu / Np input           itic and acid / Np input           Pu dejacket) =           Itic + Pu acid) =           Pu-236           Pu-236           Iti2           years           2.86           V           Cl/g           1100.366           21409.000           1284.000           1284.000           1282.800           1284.000           1282.800           1284.000           1282.800           1128.800           1128.800           1128.800           1128.800           1128.800           1128.800           1128.800           1128.800           1128.800           1128.800           1128.800           1128.800           1128.800           1128.800           1128.800           1128.800           1128.800           1128.800           1128.800     <	88.83%         89.17%           89.17%         89.17%           9#         9#           9#         1040.94           Analysis         Gr gamma           ICP         1040.94           Pu-Alpha & Beta         ICP           Pu-Alpha Scat         ICP	19.993           20.003           20.003           Actual           0.850           0.871           0.146           0.000           Adjusted           Pu-236           ppm           3           3           Sample           DJ-22, 030604-003           AD-22, 030604-004           DJ-22, 030604-004           AD-22, 030604-004           AD-22, 030604-004           AD-22, 030604-004           AD-22, 030604-004           Pu-236/238 ppm =           Relative Error =	6 0.68972 0.67032 0.1725 0.77032 0.1125 1.78000 9 7 9 0 3 7 7 9 0 3 7 7 9 0 3 3 7 7 9 0 3 3 7 7 9 0 3 3 7 7 9 0 3 3 7 7 9 0 3 3 7 7 9 0 3 3 1.78000 9 9 7 7 9 0 3 3 1.78000 9 9 7 7 9 9 0 3 3 1.78000 9 9 9 1.78000 9 9 1.78000 9 9 1.78000 9 9 1.78000 9 9 1.78000 9 9 1.78000 9 9 1.78000 9 1.78000 9 1.78000 9 1.78000 9 1.78000 9 1.78000 9 1.78000 9 1.78000 9 1.78000 9 1.78000 9 1.78000 9 1.78000 9 1.78000 9 1.78000 9 1.78000 9 1.02500 9 2.2654000 2.2654000 2.2654000 2.2654000 2.2654000 2.2654000 2.2654000 2.2654000 2.2654000 2.2654000 2.26540000 2.26540000 2.26540000 2.27570000000000000000000000000000000000	0.002830           0.002830           0.00284           0.0044           0.0044           0.00751           Predicted (BC           Predicted (BC           11/2, years           87.7           Zr-95           Bq/mL           9.00E+02           Beta Bq/mL           9.00E+02           Beta Bq/mL           9.00E+02           Relative error           9.390E+02           Relative error           2.7           2.70           2.70           2.70           2.70           2.70           2.70           2.70           2.70           2.70           2.70           2.70           2.70           2.70           2.70           2.70           2.70           2.70           2.70           2.70           2.71           2.72           2.73           2.74           2.75           2.80 MeV Area C           2.80 Area Cour <td>Pu238         t1/2           days         32032.425           Ru-106         Bq/mL           2.90E+06         2.40E+07           Itotal activity Bq/mL         9.80E+06           9.00E+06         4.30E+06           Pu-239         ppb (ng/mL)           8.00E+06         4.30E+06           236x X236) X 1E6         -238<sub>1/2</sub> X236)           cunts)<sup>2</sup>         ts</td> <td>Actual/Pred #DIV/01 #D</td> <td>Cs-134 Bg/mL 3.80E+05 3.00E+05 3.00E+05 4.00E+01 1.22E+03</td> <td>Cs-137 Bg/mL 2:90E+06 2:50E+06 2:50E+06 2:50E+01 1:40E+02</td> <td>Ce-144 Bg/mL 2.90E+07 9U-244 ppb (ng/mL) &lt;5.0E+01 &lt;5.0E+01</td> <td>Eu- 155 Bg/mL 2.20E+05</td> <td>Eu-154 Bg/mL 8.20E+04</td>	Pu238         t1/2           days         32032.425           Ru-106         Bq/mL           2.90E+06         2.40E+07           Itotal activity Bq/mL         9.80E+06           9.00E+06         4.30E+06           Pu-239         ppb (ng/mL)           8.00E+06         4.30E+06           236x X236) X 1E6         -238 <sub>1/2</sub> X236)           cunts) <sup>2</sup> ts	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 3.80E+05 3.00E+05 3.00E+05 4.00E+01 1.22E+03	Cs-137 Bg/mL 2:90E+06 2:50E+06 2:50E+06 2:50E+01 1:40E+02	Ce-144 Bg/mL 2.90E+07 9U-244 ppb (ng/mL) <5.0E+01 <5.0E+01	Eu- 155 Bg/mL 2.20E+05	Eu-154 Bg/mL 8.20E+04

				MK-20.1	DJ-16	Input			1						
				Pellet Number =	BNP-41 BNP-53	0.6694	g g								
				Pellet Number = Total Np 237=	BNP-59 2 0111	0.6704	g 0.00848	a-moles							
				10(2110) 207 -	2.0111	g -	0.00040	g-moles	1						
Add 2 3	2M NaNO to di	eeolvor	r						Output	Cauetic Diee	olvor Wasto			٦	
Vol (mL) =	= 200	)		Ī				_	Cutput	Sample # DJ3	DJ-16, 03040	2-036			
			-			Caustic Dissolut	ion		Ru-106	2 10E+06	Ci/mL 5.6757E-05	g 8.58E-0	g-mol	ppm (Pu-2	38 basis)
Meter	caustic into di	ssolver	, I			DJ-16			Cs-134	6.40E+05	1.7297E-05	6.68E-0	6 4.99E-0	28	
10M NaOH Vol (ml.) =	(rate 1mL.min)			▶ ▶		Digest for 4 hour at ger Temp = 104 C	tle reflux	•	Cs-137	4.30E+06	0.00011622	6.68E-04	4 4.88E-0	2766	
vor (mz)						Tomp 1010			Np-237	1.46E+03		7.30E-04	4 3.08E-0	6	
	Caustic Washe	s		1					Pu-238	<5.0E1			0.00E+0	D	
Vol (mL) =	= 240.0000	)							Vol(mL) =	500.0000			0.00E+0	1	
			-			▼ Asid Disselutio	-	1						_	
		Acid	Addition	1		AD-16			Back Flushes		1				
		8.0M HNO <sub>3</sub>				Digest using gentle	reflux	4	8M HNO3- 0.02M N	laF					
		0.02M NaF 0.04 M AI(NO.)				for 3 -4 hours. Temperature = 100-	1000	` <b>↑</b>	Vol (mL) =	50					
		Vol (mL) =	150			Temperature - 100-	1090								
				-					Filter Back F	lushes / Acid	Washes				
						↓ I			Three washes with Vol (mL) =	8M HNO3- 0.0 300	2M NaF				
						Filter						•			
						2um SS									
							•							-	
					Product Out	but and Back Flushes		T		Fission Prod	lucts in Prod tion Product	uct Output		1	
					Acid Dis	ssolution Product				Sample =	AD-16, 0304	02-037			
				Element	Sample # = ppb (ng/mL)	AD-16, 030402-037	a-mol		Element Co-60	Bq/mL 0.00E+00	Ci/mL 0.00E+00	g	g-mol	ppm (Pu-2	38 basis)
				Np-237	3.35E+06	a 1.6750	7.07E-03	5	Zr-95	2.80E+06	7.57E-05	1.76E-0	6 1.857E-0	3 7	
				Pu-238 Pu-239	4.83E+05 7.59E+04	0.2415	1.01E-03 1.59E-04		Ru-106 SB-125	4.20E+07 7.00E+05	1.14E-03 1.89E-05	1.72E-04 9.03E-06	4 1.621E-0 6 7.2264E-0	5 711 3 37	
				Pu-240	9.27E+03	0.0046	1.93E-05		Cs-134	5.90E+05	1.59E-05	6.16E-0	6 4.6013E-0	26	
				Pu-241 Pu-242	2.10E+03	0.0010	4.17E-00 4.34E-07	-	Ce-144	5.00E+00	1.35E-04	2.12E-04	4 1.4751E-0	5 2444 5 879	)
				Total Pu Vol. (ml.)	5.70E+05	0.2852	0.0012	2	Eu- 155 Fu-154	4.70E+05 1.10E+05	1.27E-05	1.37E-0	5 8.8165E-0	5 57 23	
							1	•							
Pellet Input	Target Number	Pellet Number	Dissolution Number	Dissolution Sample Code	% Density	Pellet Vol % NpOX	Pellet Mass Np g	Pellet g-mole Np	Pu-236 ppm	Adjusted Pu-236 ppm					
Pellet Input	MK-20.1	BNP-53	16		89.00%	19.98%	0.66940	0.00200	2.70	0.00					
1						10.00%	0.00010	0.00282							
Pellet Input Total	MK-20.1	BNP-59	16		89.18%	20.00%	0.67040	0.00283	5						
Pellet Input Total Dejacket Waste	MK-20.1 MK-20.1 MK-20.1	BNP-59 BNP-41, 53, 59 BNP-41, 53, 59	16 16	DJ-16, 030402-036	89.18%	20.00%	0.67040 2.01110 0.00073 1.67500	0.00282							
Pellet Input Total Dejacket Waste Acid Dissol	MK-20.1 MK-20.1 MK-20.1	BNP-59 BNP-41, 53, 59 BNP-41, 53, 59	16 16 16	DJ-16, 030402-036 AD-16, 030402-037	89.18%	20.00%	0.67040 2.01110 0.00073 1.67500	0.00282 0.00283 0.00283 0.00848 0.00000 0.00707	2 2 2 2						
Pellet Input Total Dejacket Waste Acid Dissol	MK-20.1 MK-20.1 MK-20.1	BNP-59 BNP-41, 53, 59 BNP-41, 53, 59	16 16 16	DJ-16, 030402-036 AD-16, 030402-037	89.18%	Actual	0.67040 2.01110 0.00073 1.67500	0.00282 0.00283 0.00848 0.00000 0.00707 Predicted (BC	35)	Actual/Pred		]			
Pellet Input Total Dejacket Waste Acid Dissol Np Residual Amo	MK-20.1 MK-20.1 MK-20.1 0unt (wt basis) =	BNP-59 BNP-41, 53, 59 BNP-41, 53, 59 = (Np caustic + 1	16 16 16 Np acid)/ Np input =	DJ-16, 030402-036 AD-16, 030402-037	89.18%	Actual 0.8332	0.6704 2.01110 0.00073 1.67500	0.00283 0.00283 0.00848 0.00000 0.00707 Predicted (BC	SS)	Actual/Pred #DIV/0! #DIV/0!		]			
Pellet Input Total Dejacket Waste Acid Dissol Np Residual Amo Pu-238/Total Pu Conversion of Np	MK-20.1 MK-20.1 MK-20.1 ount (wt basis) (wt basis) = p to Pu (mol basis)	BNP-59 BNP-41, 53, 59 BNP-41, 53, 59 = (Np caustic + 1 sis) = Pu-238 ca	16 16 16 Np acid)/ Np input = ustic + Pu-239 cau:	DJ-16, 030402-036 AD-16, 030402-037 stic + total Pu )/ Np inpu	89.18%	Actual 0.8332 0.8468 0.1411	0.67040 2.01110 0.00073 1.67500	0.00283 0.00283 0.00848 0.00000 0.00707	38)	Actual/Pred #DIV/0! #DIV/0! #DIV/0!		]			
Pellet Input Total Dejacket Waste Acid Dissol Np Residual Amc Pu-238/Total Pu Conversion of Np Fractional loss of	MK-20.1 MK-20.1 MK-20.1 (wt basis) (wt basis) = p to FP (mol bas f Np in Liq Wast	BNP-59 BNP-41, 53, 59 BNP-41, 53, 59 = (Np caustic + 1 sis) = Pu-238 ca is) = Sum of fissi e (wt basis) = N	16 16 Np acid)/ Np input = ustic + Pu-239 cau: on product in caust p caustic/ (Np acid	DJ-16, 030402-036 AD-16, 030402-037 stic + total Pu )/ Np input ) ic and acid / Np input ) + Np dejacket) =	89.18%	Actual 0.8332 0.4468 0.1411 0.0004	0.67040 2.0111 0.00073 1.67500	0.00283 0.00848 0.00000 0.00707 Predicted (BC	38)	Actual/Pred #DIV/0! #DIV/0! #DIV/0!		]			
Pellet Input Total Dejacket Waste Acid Dissol Np Residual Amo Pu-238/Total Pu Conversion of Np Fractional loss of Fractional loss of	MK-20.1 MK-20.1 MK-20.1 MK-20.1 (wt basis) = p to Pu (mol bas f Np in Liq Wast f Pu in Liq Wast	BNP-59 BNP-41, 53, 59 BNP-41, 53, 59 BNP-41, 53, 59 e (Np caustic + 1 sis) = Pu-238 ca is) = Sum of fissi e (wt basis) = N e (wt basis) = F	16 16 16 Np acid)/ Np input = ustic + Pu-239 cau: on product in caust p caustic/ (Np acid 'u caustic /(Pu caust	DJ-16, 030402-036 AD-16, 030402-037 = stic + total Pu )/ Np inpu ic and acid / Np input ic and acid / Np input stic + Np dejackt) = stic + Pu acid) =	89.18%	Actual 0.8332 0.8466 0.1411 0.0000 0.0000	0.67040 2.01110 0.00073 1.67500	0.00283 0.00283 0.00848 0.00000 0.00707 Predicted (BC	38)	Actual/Pred #DIV/0! #DIV/0! #DIV/0!		]			
Pelleti Input Total Dejacket Waste Acid Dissol Np Residual Arm Pu-238/Total Pu Conversion of Np Conversion of Np Fractional loss of Fractional loss of Fractional loss of Pu-236 content ppm 2.75	MK-20.1 MK-20.1 MK-20.1 MK-20.1 MK-20.1 (wt basis) = to Pu (mol basis) to FP (mol	BNP-59 BNP-41, 53, 59 BNP-41, 53, 59 BNP-41, 53, 59 e (Np caustic + 1 sis) = Pu-238 ca sis) = Sum of fissi sis) = Sum of fissi e (wt basis) = N e (wt basis) = N	16 16 16 16 16 16 16 16 16 16	DJ-16, 030402-036 AD-16, 030402-037 stic + total Pu )/ Np input ) to and acid / Np input ) + Np dejacket) = stic + Pu acid) = Pu-236 tt/2 years 2.85	89.18%	Actual 0.8332 0.4468 0.1411 0.0015 0.0000 Adjusted Pu-236 ppm 3.888	0.67040 2.01110 0.00073 1.67500	0.00283 0.00283 0.00848 0.00000 0.00707 Predicted (BC	3S) Pu238 11/2 days 32032.425	Actual/Pred #DIV/0! #DIV/0! #DIV/0! #DIV/0! Adjusted Pu-238, g 0.2442		]			
Peliet Input Total Dejacket Waste Acid Dissol Np Residual Amc Pu-238/Total Pu Conversion of Np Fractional loss of Fractional loss of Pu-236 content ppm 2.75	MK-20.1 MK-20.1 MK-20.1 MK-20.1 MK-20.1 (wt basis) = p to Pu (mol bas to FP (mol bas) to FP (mol bas to FP (mol bas) to FP (mol bas)	BNP-59 BNP-41, 53, 59 BNP-41, 53, 59 BNP-41, 53, 59 e (Np caustic + 1 sis) = Pu-238 ca sis) = Sum of fissi sis) = Sum of fissi sis) = Sum of fissi e (wt basis) = N e (wt basis)	16 16 16 16 16 16 16 16 16 16	DJ-16, 030402-036 AD-16, 030402-037 = static + total Pu )/ Np input ) = Np dejacket) = stic + Pu acid) = Pu-236 t1/2 years 2.85	89.18%	Actual 0.8332 0.8468 0.1411 0.0015 0.0004 0.0000 Adjusted Pu-236 ppm 3.88	0.67040 2.01110 0.00073 1.67500	Predicted (BC	Pu238 11/2 days 32032.425	Actual/Pred #DIV/0! #DIV/0! #DIV/0! #DIV/0! Adjusted Pu-238, g 0.2442		]	- 0- <i></i>		
Peliet Input Total Dejacket Waste Acid Dissol Pu-238/Total Pu Conversion of Ng Fractional loss of Fractional loss of Pu-236 content ppm 2.75 Reference Inform	MK-20.1 MK-20.1 MK-20.1 MK-20.1 (wt basis) = to FP (mol bas f Np in Liq Wast f Pu in Liq Wast f Discharge 5 11/1/2001 mation MW	BNP-59 BNP-41, 53, 59 BNP-41, 53, 59 BNP-41, 53, 59 E (Np caustic + 1 sis) = Pu-238 ca is) = Sum of fissi e (wt basis) = N e (wt basis) = N e (wt basis) = F Analysis Date 4/2/2003 Density	16 16 16 16 16 16 16 16 16 16	DJ-16, 030402-036 AD-16, 030402-037 stic + total Pu // Np input i + Np dejacket) = stic + Pu acid) = Pu-236 t1/2 years 2.85	89.18%           It =           =           Pu-236 t1/2           days           1040.96           Analysis	Actual 0.8332 0.8468 0.1411 0.0015 0.0004 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 0.000000 0.0000000 0.00000000	0.67040 2.01110 0.00073 1.67500	0.00223 0.00242 0.00944 0.00000 0.00000 Predicted (BC Predicted (BC Pred	Pu238 11/2 days 32032.425 Ru-106 Bg/mL	Actual/Pred #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0!	Cs-134 Bg/mL	Cs-137 Bq/mL	Ce-144 Bq/mL	Eu- 155 Bq/mL	Eu- 154 Bg/mL
Pellet input Total Dejacket Waste Acid Dissol Np. Residual Ame Pu-238/Total Pu- Conversion of Np. Conversion of Np. Conv	MK-20.1 MK-20.1 MK-20.1 MK-20.1 (W1 basis) = to Pu (mol bas to P (mol bas) to P (mol bas to P (mol bas to P (mol bas to P (mol bas) to P (mol bas to P (mol bas) to P (mol bas to P (mol bas to P (mol bas) to P (mol bas) to P (mol bas to P (mol bas) to P (mol bas) to P (mol bas to P (mol bas) to P (mol bas to P (mol bas) to P (mol bas) to P (mol bas to P (mol bas) to	BNP-59 BNP-41, 53, 59 BNP-41, 53, 59 BNP-41, 53, 59 BNP-41, 53, 59 BNP-41, 53, 59 BNP-41, 53, 59 BNP-41, 53, 59 e (wt basis) = N e (wt basis) = N e (wt basis)	16 16 16 16 16 16 16 16 16 16	DJ-16, 030402-036 AD-16, 030402-037 stic + total Pu // Np input tic and acid / Np input ) + Np dejacket) = stic + Pu acid) = Pu-236 t1/2 years 2.85	89.18%           ut =           =           Queza6 t1/2           days           1040.96           Analysis           Gr gamma	Actual 0.8332 0.4868 0.1411 0.0015 0.0000 Adjusted Pu-236 ppm 3.88 Sample DJ-16, 030402-036 DJ-16, 030	0.8704 2.01110 0.00073 1.67500	0.00223 0.00242 0.00945 0.00000 Predicted (BC Pu-238 t1/2, years 87.7 Zr-95 Bg/mL	Pu238 t1/2 days 32032.425 Ru-106 Bq/mL 2.105-00	Actual/Pred #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0!	Cs-134 Bg/mL 6.40E+050	Cs-137 Bq/mL 4.30E+0	Ce-144 Bq/mL 6	Eu- 155 Bq/mL	Eu-154 Bq/mL
Peliet Input Total Dejacket Waste Acid Dissol Np. Residual Ann Pu-238/Total Pu- Conversion of Ng Conversion	MK-20.1 MK-	BNP-59 BNP-41, 53, 59 BNP-41, 50 BNP-41, 50	16 16 16 16 16 16 16 16 16 16	DJ-16, 030402-036 AD-16, 030402-037 = stic + total Pu )/ Np input ) + Np dejacket) = tic + Pu acid) = Pu-236 t1/2 years 2.85	89.18%	20.00% Actual 0.8332 0.8458 0.1411 0.0000 Actual 0.0000 Actual Pu-236 ppm 3.388 Sample DJ-16,030402-037	0.67040 2.01110 0.00073 1.67500 1.67500	0.00223 0.00242 0.00045 0.00000 0.000707 Predicted (BC Pu-238 t1/2, years 87.7 Zr-95 Bq/mL 2.80E+06	Pu238 t1/2 days 32032.425 Ru-106 Bq/mL 2.10E+06 4.20E+07	Actual/Pred #DIV/01 #D	Cs-134 Bq/mL 6.40E+05 5.90E+05	Cs-137 Bq/mL 4.30E+00 3.80E+00	Ce-144 Bq/mL 6 6 5.00E+0	Eu- 155 Bq/mL 7 4.70E+05	Eu- 154 Bq/mL 1.10E+05
Peliet Input Total Dejacket Waste Acid Dissol Np. Residual Ame Pu-238/Total Pu Conversion of Np Conversion of Np Fractional loss of Pu-236 content ppm 2.76 Reference Inform NpO, <sup>327</sup> (oxide) Np237 pu-238	MK-20.1 MK-20.1 MK-20.1 MK-20.1 (wt basis) = to PP (mol basis) = to PP (mol basis) = to PP (mol basis) = to PP (mol basis) = to PI (mol basis) = t	BNP-59 BNP-41, 53, 59 BNP-41, 50 BNP-41,	16 16 16 16 16 16 16 16 16 16	DJ-16, 030402-036 AD-16, 030402-037 stic + total Pu )/ Np input ic and acid / Np input ) + Np dejacket) = stic + Pu acid) = Pu-236 t1/2 years 2.85	89.18%           It =	Actual 0.8332 0.4468 0.4411 0.0015 0.0001 0.0000 Adjusted Pu-236 ppm 3.88 Sample DJ-16, 030402-036 AD-16, 030402-036 DJ-16, 030402-036 DJ-	0.67040 2.01110 0.00073 1.67500 1.67500 0.00073 1.67500 0.00073 0.00075 0.00075 0.00075 0.00075 0.00075 0.00075 0.00075 0.00075 0.00075 0.0000000000	0.0224 0.0224 0.02042 0.0000 0.00707 Predicted (BC Pu-238 t1/2, years 87.7 Zr-95 Bg/mL 2.80E+06 Beta Bg/mL	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 2.10E-06 4.20E+07 total activity Bg/mL	Actual/Prod #DIV/01 #D	Cs-134 Bq/mL 6.40E+05 5.90E+05	Cs-137 Bq/ml 4.30E+00 3.80E+00	Ce-144 Bg/mL 6 5.00E+0	Eu- 155 Bq/mL 7 4.70E+05	Eu-154 Bg/mL 1.10E+05
Peliet Input Total Dejacket Waste Acid Dissol Np. Residual Ann Pu-238/Total Pu Conversion of Ng Fractional loss of Fractional loss of Fractional loss of Pu-236 content ppm Pu-236 content ppm NpO <sub>2</sub> <sup>237</sup> (oxide) NpO <sub>2</sub> <sup>237</sup> (oxide) Pu-238 Pu-238	MK-20.1 MK-20.1 MK-20.1 MK-20.1 (wf basis) = to EP (mol basi	BNP-59 BNP-41, 53, 59 BNP-41, 50 BNP-41, 50	16 16 16 16 16 16 16 16 16 16	DJ-16. 030402-036 AD-16. 030402-037 stic + total Pu )/ Np input ) to and acid / Np input ) + Np dejacket) = tic + Pu acid) = Pu-236 t1/2 years 2.85	89.18%           It =           =           Quest I/2           days           1040 96           Gr gamma           Alpha & Beta	Actual 0.8332 0.4468 0.1411 0.0015 0.0004 0.0000 Adjusted Pu-236 ppm 3.88 Sample DJ-16, 030402-036 AD-16, 030402-036 AD-16, 030402-037 DJ-16, 030402-037 DJ-	0.67040 2.01110 0.00073 1.67500 1.67500 0.00073 1.67500 0.00073 0.00073 0.00073 0.00073 0.00073 0.00070 0.00073 0.00070 0.00073 0.00075 0.0000000000	0.0222 0.0223 0.0264 0.0000 0.0000 Predicted (BC Pu-238 H12, years 87.7 Zr-95 Bq/mL 2.80E+06 Beta Bq/mL 2.80E+06	Pu238 t1/2 days 32032 425 Ru-106 Bq/mL 2.10E406 4.20E407 Iotal activity Bg/mL 9.80E400 5.70E406	Actual/Pred #DIV/01 #D	Cs-134 Bg/mL 6.40E+05 5.90E+05	Cs-137 Bq/mL 4.30E+00 3.80E+00	Ce-144 Bq/mL 8 6 5.00E+0	Eu- 155 Bq/mL 7 4.70E+05	Eu-154 Bq/mL 1.10E+05
Peliet Input Total Dejacket Waste Acid Dissol Np Residual Amc Pu-238/Total Pu Conversion of Np Fractional loss of Fractional loss of Pu-236 content ppm 2.75 Reference Infor NpO <sub>2</sub> <sup>237</sup> (oxide) Np237 Pu-238 Pu-238 Pu-239 Pu-240 Pu-241 Pu-242	MK-20.1           MK           It of Purperson           MK           Value           MW           280.043           230.0492           240.0633           240.0543	BNP-59 BNP-41, 53, 59 BNP-41, 50 BNP-41, 50 BNP	16 16 16 16 16 16 16 16 16 16	DJ-16, 030402-036 AD-16, 030402-037 static + total Pu )/ Np input ) itic and acid / Np input ) + Np dejacket) = stic + Pu acid) = Pu-236 t1/2 years 2.85	89.18%	Actual 0.8332 0.8468 0.1411 0.0015 0.0004 Adjusted Pu-236 ppm 3.88 Sample DJ-16,030402-036 AD-16,030402-037 DJ-16,030402-037	0.67040 2.01110 0.00073 1.67500 1.67500 0.00073 1.67500 0.00073 1.67500 0.00073 0.00073 0.00073 0.00070 0.00073 0.00070 0.00073 0.00070 0.00073 0.00075 0.00075 0.00075 0.00075 0.00075 0.00075 0.00075 0.00075 0.00075 0.00075 0.00075 0.00075 0.00075 0.00075 0.00075 0.00075 0.0000000000	0.0222 0.0222 0.0284 0.0000 0.000707 Predicted (BC Pu-238 t1/2, years 87.7 Zr-95 Bg/mL 2.80E+00 Beta Bg/mL 2.80E+00 Beta Bg/mL	Pu238 11/2 days 32032.425 Ru-106 Bq/mL 2.10E+06 4.20E+07 total activity.Bq/mL 9.80E+06 5.70E+06 5.70E+06	Actual/Pred #DIV/01 #D	Cs-134 Bq/mL 6.40E+05 5.90E+05	Cs-137 Bq/mL 4.30E+00 3.80E+00	Ce-144 Bq/mL 6 5.00E+0 Pit-244	Eu- 155 Bq/mL 7 4.70E+05	Eu-154 Bq/mL 1.10E+05
Peliet Input Total Dejacket Waste Acid Dissol Np. Residual Ame Pu-238/Total Pu- Conversion of Ng. Conversion of Ng. Conversion of Ng. Pu-236 content ppm 2.75 Reference Infor NpQ. <sup>237</sup> (oxide) NpQ. <sup>237</sup> (oxide) NpQ. <sup>237</sup> (oxide) Np2.23 Pu-238 Pu-238 Pu-234 Pu-234 Pu-234 Pu-236 Conversion Conversion	MK-20.1 MK-20.1 MK-20.1 MK-20.1 MK-20.1 (wt basis) = to PT (mol bas to PT (mol bas) to PT (mol bas to PT (mol bas) to PT (mol bas to PT (mol bas) to P	BNP-59 BNP-41, 53, 59 BNP-41, 53, 59 Analysis Date 4/2/2003 Density g/cc 1, 14, 43 2, 04, 476 2, 19, 86 19, 8619, 86 19, 86 19, 86 19, 86 19, 86 19, 8619,	16 16 16 16 16 16 16 16 16 16	DJ-16, 030402-036 AD-16, 030402-037 static + total Pu // Np input ) + Np dejacket) = stic + Pu acid) = Pu-236 t1/2 years 2.85	89.18%           It =           Pu-236 11/2 days           days           1040.96           Analysis           Gr gamma           Alpha & Beta           ICP	Actual 0.8332 0.8468 0.1411 0.0015 0.0004 0.0000 Adjusted Pu-236 ppm 9u-236 ppm 3.88 Sample DJ-16, 030402-037 DJ-16, 030402-037 DJ-16, 030402-037 DJ-16, 030402-037	0.67040 2.01110 0.00073 1.67500 1.67500 0.00073 1.67500 0.00073 1.67500 0.000750 0.0000000000	0.00223 0.00242 0.00046 0.00000 Predicted (BC Pu-238 t1/2, years 87.7 Zr-95 Bg/mL 2.80E+00 Beta Bg/mL 9.79E+06 9.79E+06 2.30E+00 Deta Bg/mL	Pu238 11/2 days 32032.425 Ru-106 Bq/mL 2.10E+06 4.20E+00 9.80E+06 5.70E+06 5.70E+06 9.80E+060	Actual/Pred #DIV/01 #D	Cs-134 Bq/mL 6.40E+05 5.90E+05 Pu-241 ppb (ng/mL)	Cs-137 Bq/mL 4.30E+0 3.80E+0 Pu-242 ppb (ng/mL	Ce-144 Bq/mL 6 5.00E+0 ) ppb (ng/mL	Eu- 155 Bq/nL 7 4.70E+05	Eu- 154 Bg/mL 1.10E+05
Peliet Input Total Dejacket Waste Acid Dissol Np. Residual Anne Pu-238/Total Pu- Conversion of Ng Conversion of Ng Pu-236 content ppm 2.75 Reference Infor NpD2 <sup>37</sup> (oxide) Np237 Pu-238 Pu-240 Pu-242 Conversion Conversion	MK-20.1 MK-20.1 MK-20.1 MK-20.1 MK-20.1 MK-20.1 MK-20.1 MK-20.1 MK-20.1 (vf basis) = to to FP (mol basis) = to to F	BNP-59 BNP-41, 53, 59 BNP-41, 53, 59 BNP-41, 53, 59 PN-20, 53, 59 BNP-41, 53, 59 PN-20, 50, 50 BNP-41, 53, 59 PN-20, 50 PN-20,	16 16 16 16 16 16 16 16 16 16	DJ-16, 030402-036 [AD-16, 030402-037 = stic + total Pu )/ Np input ) + Np dejacket) = tic + Pu acid) = Pu-236 t1/2 years 2.85	89.18%           Jt =           -           <	20.00%           Actual           0.8332           0.4468           0.1411           0.0000           Adjusted           Pu-236           Pu-336           DJ-16, 030402-036           AD-16, 030402-037           DJ-16, 030402-037           DJ-16, 030402-037	0.67040 2.01110 0.00073 1.67500 1.67500 1.67500 1.67500 1.67500 Bq/mL 1.20E+04 3.40E+08 Np-237 ppb(ng/mL) 1.46E+03 3.35E+06	0.00223 0.00242 0.00045 0.00000 Predicted (BC Pu-238 t1/2, years 87.7 Zr-95 Bg/mL 2.80E+06 Beta Bg/mL 9.79E+00 2.30E+06 Pu-238 t1/2, years 87.7 Zr-95 Bg/mL 2.80E+06 Beta Bg/mL 9.79E+00 2.30E+06 Soler 4.38E+05 4.38E+05	Pu238 t1/2 days 32032 425 Ru-106 Bq/mL 2.10E+06 4.20E+07 total activity.Bg/mL 9.80E+06 5.70E+06 Pu-239 ppb (ng/mL) <1.80E=07 7.59E+04	Actual/Prod #DIV/01 #DIV/02 #D	Cs-134 Bq/mL 6.40E+05 5.90E+05 Pu-241 ppb (ng/mL) <5.0E1 2.01E+03	Cs-137 Bq/mL 4/30E+04 3.80E+04 9b0 (ng/mL <5.0E 2.10E+04	Ce-144 Bq/mL 6 5.00E+0 Pu-244 ) ppb (ng/mL 1 < 5.0E 2 < 5.0	Eu- 155 Bq/mL 7 4.70E+05	Eu- 154 Bq/mL 3 1.10E+05
Pellet Input Total Dejacket Waste Acid Dissol Np. Residual Ann Pu-238/Total Pu Conversion of Nr Conversion of Nr Conversion of Nr Fractional loss of Pu-236 content ppm 2.75 Reference Infor NpO, <sup>337</sup> (oxide) Np237 Pu-238 Pu-240 Pu-241 Pu-242 Conversion	MK-20.1 MK-20.1 MK-20.1 MK-20.1 Unt Dasis) = 10 FP (mol basis) = 11/1/2007 mation MW 289.043 239.045 23	BNP-59 BNP-41, 53, 59 BNP-41, 53, 59 BNP-41, 53, 59 BNP-41, 53, 59 P1/230 24 E (Wp caustic + 1 sis) = P1/230 24 (W basis) = N e (W basis) = N e (W basis) = N e (W basis) = N e (W basis) = N Analysis Date 4/2/2003 Density g/cc 7 11.143 2 20.474 1 9.851 3 1 9.851 3 1 9.851 9 Bq/Cl	16 16 16 16 16 16 16 16 16 16	DJ-16, 030402-036 AD-16, 030402-037 * stic + total Pu )/ Np input ic and acid / Np input ) + Np dejacket) = stic + Pu acid) = Pu-236 t1/2 years 2.85	89.18%           Pu-236 t1/2           days           1040.96           Analysis           Gr gamma           Alpha & Beta           ICP           Pu-Alpha Scar           TTA extraction	20.00%           20.00%           20.00%           20.00%           20.00%           20.00%           0.8332           0.8332           0.4468           0.1411           0.0015           0.0000           Adjusted           Pu-236         ppm           3.88           Sample           DJ-16, 030402-036           AD-16, 030402-036           AD-16, 030402-037           DJ-16, 030402-037           AD-16, 030402-037	0.67040 2.01110 0.00073 1.67500 1.67500 1.67500 1.67500 1.67500 8g/mL 1.20E+04 3.40E+08 3.40E+08 3.40E+08 3.40E+08 3.40E+08 3.40E+08 3.40E+08 3.40E+08 3.40E+08 1.46E+03 3.40E+08 1.46E+03 3.40E+08 1.46E+03 3.40E+08 1.46E+03 3.40E+08 1.46E+03 3.40E+08 1.46E+03 3.40E+08 1.46E+03 3.40E+08 1.46E+03 3.40E+08 1.46E+08 3.40E+08 1.46E+08 3.40E+08 1.46E+08 3.40E+08 1.46E+08 3.40E+08 1.46E+08 3.40E+08 1.46E+08 3.40E+08 1.46E+08 3.40E+08 1.46E+08 3.40E+08 1.46E+08 3.40E+08 1.46E+08 3.40E+08 1.46E+08 3.40E+08 1.46E+08 3.40E+08 1.46E+08 3.40E+08 1.46E+08 3.40E+08 1.46E+08 3.40E+08 1.46E+08 3.40E+08 3.40E+08 1.46E+08 3.46E+08 3.46E+08 1.46E+08 3.46E+08 1.46E+08 3.46E+08 1.46E+08 3.46E+08 1.46E	0.0224 0.0224 0.02044 0.0000 0.00707 Predicted (BC Pu-238 t1/2, years 11/2, years 87.7 Zr-95 Bg/mL 2.80E+06 Beta Bg/mL 9.765-06 Pu-238 ppb (mpL) < 5.0E+10 Relative error % 5.12	Pu238 t1/2 days 32032.425 Ru-106 Bg/mL 2.10E+07 total activity Bg/mL 9.80E+06 5.70E+06 Pu-239 ppb (ng/mL) c1.80e2 7.59E+04	Actual/Prod #DIV/01 #DIV/01 #DIV/02 #DIV/02 #DIV/02 #DIV/02 #DIV/02 #DIV/02 #DIV/02 #DIV/02 #DIV/02 #DIV/02 #DIV/02 #DIV/01 #D	Cs-134 Bq/mL 6.40E+05 5.90E+05 5.90E+05 5.90E+05 2.01E+03	Cs-137 Bg/mL 4.30E+00 3.80E+00 3.80E+00 3.80E+00 ~5.0E 2.10E+00	Ce-144 Bg/mL 6 5.00E+0 9pb (ng/mL 1 <6.0E 2 <5.0E	Eu- 155 Bq/mL 7 4.70E+05	Eu-154 Bg/mL 1.10E+05
Pelleti Input Total Dejacket Waste Acid Dissol Np. Residual Ame Pu-238/Total Pu Conversion of Np Fractional loss of Pu-236 content ppm 2.75 Reference Infor NpO <sub>2</sub> <sup>327</sup> (oxide) Np237 Pu-238 Pu-238 Pu-239 Pu-239 Pu-239 Pu-241 Pu	MK-20.1 MK-20.1 MK-20.1 MK-20.1 (wt basis) = to PP (mol basis) = to PP (mol basis) = to PP (mol basis) = to PP (mol basis) = to PI (mol basis) = t	BNP-59 BNP-41, 53, 59 BNP-41, 53, 59 BNP-41, 53, 59 BNP-41, 53, 59 E (Np caustic + 1 ais) = Pu-23a caustic + 1 ais) = Pu-23a caustic + 1 bis) = Pu-23a caustic + 1 ais) = Pu-23a caustic + 1 bis) = Pu-23a caustic + 1 ais) = Pu-23a caustic + 1 bis) = Pu-23a caustic + 1 ais) = Pu-23a caustic + 1 bis) = Pu-23a caustic + 1 ais) = Pu-23a caustic + 1 bis) = Pu-2	Mp acid)/ Np input = Np acid)/ Np input = ustic + Pu-239 cau: on product in caust p caustic (Np acid u caustic (Np acid u caustic (Np acid u caustic (Np acid caustic - Np acid to acid	DJ-16. 030402-036 AD-16. 030402-037 stic + total Pu )/ Np input ) to and acid / Np input ) + Np dejacket) = tic + Pu acid) = Pu-236 t1/2 years 2.85 Specific activity	Alpha & Beta	Actual 0.8332 0.4468 0.4411 0.0015 0.0000 Adjusted Pu-236 ppm Pu-236 ppm DJ-16,030402-037 DJ-16,030402-037 DJ-16,030402-037 DJ-16,030402-037 AD-16,030402-037 Pu-236/238 ppm =	0.67040 2.01110 0.00073 1.67500 1.67500 1.67500 1.67500 1.67500 8q/mL 1.20E+04 3.40E+02 3.40E+02 3.35E+06 Pu-236/Pu-238 ppm (ug/mL) 2.75 (5.80 MeV Area C.	0.0224 0.0224 0.0204 0.0200 0.000707 Predicted (BC Predicted (BC Predicted (BC Predicted (BC Predicted (BC Predicted (BC Predicted (BC Bc) Bc) Bc) Bc) Predicted (BC Predicted (BC Predi	Pu238         t1/2           days         32032.425           Ru-106         Bq/mL           9.00E-006         4.20E+07           total activity Bq/mL         9.00E-006           9.00E-006         5.70E+06           Pu-239         ppb (ng/mL)           <1.80e2         7.59E+04	Actual/Pred #DIV/01 #D	Cs-134 Bq/mL 6.40E+05 5.90E+05 5.90E+05 5.90E+05 2.01E+03	Cs-137 Bq/mL 4.30E+00 3.80E+00 9.00242 ppb (ng/mL <5.0E 2.10E+0;	Ce-144         Bq/mL           6         5.00E+0           9         pb(ng/mL           1         <5.0E           2         <5.0E	Eu- 155 Bq/mL 7 4.70E+05	Eu-154 Bq/mL 1.10E+05
Peliet input Total Dejacket Waste Acid Dissol Np. Residual Am Pu-238/Total Pu Conversion of Ng Fractional loss of Fractional loss of Pu-236 content ppm Pu-236 content ppm Pu-237 Reference Infor NpO <sub>2</sub> <sup>237</sup> (oxide) Np237 Pu-238 Pu-238 Pu-238 Pu-238 Pu-238 Pu-238 Pu-238 Pu-238 Pu-238 Pu-238 Pu-238 Pu-238 Pu-238 Pu-238 Pu-238 Pu-240 Pu-240 Pu-241 Pu-240 P	MK-20.1 MK-20.1 MK-20.1 MK-20.1 (wt basis) = to to Pu (mol basis) = to Pu (mol basis) = t	BNP-59 BNP-41, 53, 59 BNP-41,	M M M M M M M M M M M M M M	DJ-16. 030402-036 AD-16. 030402-037 stic + total Pu )/ Np input ) to and acid / Np input ) + Np dejacket) = stic + Pu acid) = Pu-236 t1/2 years 2.85 Specific activity Cl/g	89.18%           at =           Pu-236 t1/2           days           1040 96           Gr gamma           Alpha & Beta           ICP           Pu-Alpha Scar           TTA extraction	20.00%           20.00%           0.8332           0.8332           0.8468           0.1411           0.0015           0.0004           0.0015           0.0016           0.0004           0.0017           Adjusted           Pu-236 ppm           3.88           Sample           DJ-16, 030402-036           AD-16, 030402-037           DJ-16, 030402-037           AD-16, 030402-037           AD-16, 030402-037           Pu-236/238 ppm =	0.67040 2.01110 0.00073 1.67500 1.67500 1.67500 1.67500 8g/mL 1.20E+04 3.40E+02 Np-237 ppb (ng/mL) 1.46E+03 3.35E+06 Pu-236/Pu-238 ppm (ug/mL) 2.75 (5.80 MeV Area C (Full Spectru (Full Spectru	0.00223 0.00242 0.00242 0.0000 0.000707 Predicted (BC Pu-238 H1/2, years 11/2, years 87.7 Zr-95 Bq/mL 2.80E+06 Beta Bq/mL 2.30E+06 Beta Bq/mL 2.30E+06 Pu-238 pp(rog/mL) 4.83E+06 Relative error 5.12 n 5.12 n Counts X Pu-236	Pu238 t1/2 days 32032.425 Ru-106 Bq/mL 2.10E+06 4.20E+07 total activity Bq/mL 9.80E+06 5.70E+06 7.59E+04 Pu-239 ppb (ng/mL) <1.59E+04 	Actual/Pred #DIV/01 #D	Cs-134 Bq/mL 6.40E+05 5.90E+05 90-241 ppb (ng/mL) <5.0E 2.01E+03	Cs-137 Bq/mL 4.30E+00 3.80E+00 3.80E+00 2.10E+02 2.10E+02	Ce-144 Bq/mL 6 5.00E+0 Pu-244 ) ppb (ng/mL 1 <5.0E 2 <5.0E	Eu- 155 Bq/mL 7 4.70E+05	Eu-154 Bg/mL 1.10E+05
Pelleti nput Total Dejacket Waste Acid Dissol Np. Residual Amc Pu-238/Total Pu- Conversion of Ng Conversion of Ng Conversion of Ng Conversion of Ng Conversion of Ng Conversion of Ng Conversion of Ng Pu-236 content ppm 2.75 Reference Infor Ng02 <sup>327</sup> (oxide) Ng237 Pu-239 Pu-239 Pu-240 Pu-239 Pu-240 Pu-239 Pu-240 Pu-239 Pu-240 Pu-24	MK-20.1 MK-20.1 MK-20.1 MK-20.1 MK-20.1 (wt basis) = to FP (mol bas to FP (mol bas) to FP (mol bas to FP (mol bas) to FP (mol bas to FP (mol bas) to FP	BNP-59 BNP-41, 53, 59 BNP-41, 50 BNP-41, 50	M M M M M M M M M M M M M M	DJ-16, 030402-036           AD-16, 030402-037           =           stic + total Pu )/ Np input );           tc + ny dejacket) =           stic + Pu acid) =           Pu-236         t1/2           years         2.85           Specific activity           Ci/g         1130.366           1130.366         1130.366	89.18%           It =           -           <	Actual 0.8332 0.8468 0.1411 0.0015 0.0004 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.000	0.67040 2.01110 0.00073 1.67500 1.67500 0.00073 1.67500 0.00073 1.67500 0.00073 0.00073 0.00073 0.00073 0.00073 0.00074 0.00073 0.00070 0.00073 0.00070 0.00000000	0.00223 0.00242 0.00242 0.0000 0.000707 Predicted (BC Pu-238 t1/2, years 87.7 2.r-95 Bg/mL 2.80E+00 Beta Bg/mL 2.80E+00 Pu-238 ppt (ng/mL) 4.83E+05 4.83E+05 4.83E+05 5.12 counts X.Pu-236 ounts X.Pu-236 0.0024 8.0024 5.12 0.0024 8.0024 8.0024 9.002	Pu238 112 days 32032.425 Ru-106 Bq/mL 2.10E+06 4.20E+07 total activity Bq/mL 9.80E+06 5.70E+06 FU-239 ppb (ng/mL) 7.59E+04 7.59E+04	Actual/Pred #DIV/01 #D	Cs-134 Bq/mL 6.40E+05 5.90E+05 9.00E+05 2.01E+03	Cs-137 Bq/mL 4.30E+01 3.80E+04 5.0E+02 2.10E+02	Ce-144 Bq/mL 6 5.00E+0 PU-244 ) ppb (ng/mL 1 <5.0E 2 <5.0E	Eu- 155 Bq/mL 7 4.70E+05	Ei+ 154 Bq/mL 1.10E+05
Peliet Input Total Dejacket Waste Acid Dissol Np. Residual Anne Pu-238/Total Pu- Conversion of Ng Conversion of Ng Conversion of Ng Conversion of Ng Pu-236 content ppm 2.75 Reference Infor NpD <sub>3</sub> <sup>237</sup> (oxide) Np237 Pu-238 Pu-240 Pu-242 Conversion Specific activity C Factor = Co-60 Zr-96 Ru-106	MK-20.1 MK-20.1 MK-20.1 MK-20.1 MK-20.1 MK-20.1 U(vt basis) = to FP (mol bass) = to FP (mol bass) to FP (mol bass) to FP (mol bass) = to	BNP-59 BNP-41, 53, 59 BNP-41, 53, 59 PNP-41, 50 PNP-41,	M Mp acid/) Np input = istic + Pu-239 caus on product in causis u caustic (Np acid u caustic (Np acid	DJ-16, 030402-036 AD-16, 030402-037 stic + total Pu )/ Np input ) tic and acid / Np input ) * Np dejacket) = tic + Pu acid) = Pu-236 t1/2 years 2.85 Specific activity Ci/g 1130.360 2.1469.00 3.306.00	89.18%           It =           -           <	20.00% Actual 0.4332 0.445 0.445 0.445 0.445 0.00% 0.0000 Actual 0.0000 Actual 0.0000 Actual 0.0000 Actual 0.0000 Actual 0.0000 Actual 0.0000 DJ-16, 030402-036 AD-16, 030402-037 DJ-16, 030402-037 DJ-16, 030402-037 DJ-16, 030402-037 DJ-16, 030402-037 PU-236/238 ppm = Relative Error =	0.67040 2.01110 0.00073 1.67500 1.67500 1.67500 1.67500 1.67500 1.67500 1.67500 Bg/mL 1.20E+04 3.40E+08 Np-237 ppb (ng/mL) 1.46E+03 3.40E+08 Np-237 ppb (ng/mL) 1.46E+03 3.40E+08 Pu-236/Pu-238 ppm (ug/mL) 2.752 (5.80 MeV Area C. (Full Spectru 2.X16, 1 1.525	0.0224           0.0224           0.0224           0.0224           0.0204           0.020707           Predicted (BC           Pau-238           Baymul.           2.80E+00           P.79E-004	SS) Pu238 t1/2 days 32032 425 Ru-106 Bq/mL 2.10E+06 4.20E+07 total activity. Bq/mL 9.806/mL 9.80	Actual/Prod #DIV/01 #D	Cs-134 Bq/mL 6.40E+05 5.90E+05 7.90E+05 90(mL) <5.0E+03 2.01E+03	Cs-137 Bq/mL 4.30E+00 3.80E+00 9.00g/mL <5.0E 2.10E+02	Ce-144 Bq/mL 6 5.00E+0 Pu-244 ) ppb (ng/mL 1 <5.0E 2 <5.0E	Eu- 155 Bq/mL 7 4.70E+05	Eu- 154 Bq/mL 1.10E+05
Peliet Input Total Dejacket Waste Acid Dissol Np. Residual Ann Pu-238/Total Pu- Conversion of Np Conversion of Np Fractional loss of Fractional loss of Pu-236 content ppm 2.75 Reference Infor NpO3 <sup>37</sup> (oxide) Np237 Pu-238 Pu-240 Pu-241 Pu-242 Conversion Specific activity Of Factor = Co-60 Zr-95 Su-125 Co-134	MK-20.1 MK-20.1 MK-20.1 MK-20.1 Unit Additional Control (with basis) = 10 to FP (mol basis) = 10 The first state of the firs	BNP-59 BNP-41, 53, 59 BNP-41, 53, 59 BNP-41, 53, 59 PN-20, 53, 59 PN-20, 50, 50 BNP-41, 53, 59 PN-20, 50 BNP-41, 53, 59 PN-20, 50 BNP-41, 53, 50 PN-20, 50 P	M M M M M M M M M M M M M M	DJ-16, 030402-036 AD-16, 030402-037 stic + total Pu )/ Np inpu ic and acid / Np input ) + Np dejacket) = tic + Pu acid) = Pu-236 t1/2 years 2.85 Specific activity Ci/g 1130.360 21469.00 3306.00 1048.00	Pu-236 t1/2 days 1040 96 Analysis Gr gamma Alpha & Beta ICP	20.00%           20.00%           20.00%           20.00%           20.00%           20.00%           0.832           0.8468           0.1411           0.0015           0.0000           Adjusted           Pu-236         ppm           3         3.88           Sample         DJ-16, 030402-036           DJ-16, 030402-036         AD-16, 030402-037           DJ-16, 030402-037         AD-16, 030402-037           AD-16, 030402-037         AD-16, 030402-037	0.67040 2.01110 0.00073 1.67500 1.67500 1.67500 1.67500 1.67500 Bq/mL 1.00E+04 3.40E+02 3.40E+02 3.40E+02 3.35E+06 9.0257 ppb (ng/mL) 1.46E+03 3.35E+06 9.0257 ppb (ng/mL) 1.46E+03 3.35E+06 Pu-236/Pu-238 ppm (ug/mL) 2.755 (5.80 MeV Area C (Full Spectru 2.X (5.8)	OU224     O	Pu238         t1/2           days         32032.425           Ru-106         Bg/mL           Bg/mL         2.10E+06           4.20E+07         10bit activity Bg/mL           9.80E+02         5.70E+06           Pu-239         ppb (ng/mL)           9.80E+04         -1.80e5           7.59E+04         -1.80e5           -238 <sub>1/2</sub> X 236) X 1E6         -238 <sub>1/2</sub> X 238)           ountb ½²         ts	Actual/Prod #DIV/01 #D	Cs-134 Bq/mL 6.40E+05 5.90E+05 5.90E+05 2.01E+03 2.01E+03	Cs-137 Bq/mL 4.30E+00 3.80E+00 5.0E 2.10E+0:	Ce-144 Bg/mL 6 5.00E+0 Pu:244 ) ppb (ng/mL 1 <\$ 0E 2 <\$.0E	Eu- 155 Bq/mL 7 4.70E+05	Eu-154 Bg/mL 1.10E+05
Peliet Input Total Dejacket Waste Acid Dissol Np. Residual Ame Pu-238/Total Pu Conversion of Np Conversion of Np Fractional loss of Pu-236 content ppm 2.76 Reference Infor NpQ <sup>37</sup> (oxide) Np237 Pu-238 Pu-238 Pu-240 Pu-241 Pu-242 Conversion Specific activity O Factor = Co-60 Zr.95 Ru-106 Sbi-125 Ca-134 Ca-137	MK-20.1 MK-20.1 MK-20.1 MK-20.1 MK-20.1 Unt basis) = 10 FP (mol basis) = 11/1/2007 mation MW 289.043 289.044 289.043 289.043 289.043 289.043 289.043 289.043 289.043 289.043 289.043 289.044 289.043 289.044 289.043 289.044 299.044 299.0	BNP-59 BNP-41, 53, 59 BNP-41, 53, 59 BNP-41, 53, 59 ENP-41, 53, 59 ENP-41, 53, 59 ENP-41, 53, 59 ENP-42, 53 ENP-42, 54 ENP-43, 55 ENP-43, 55	Mp acid)/ Np input = inf inf inf inf inf inf inf inf inf inf	DJ-16. 030402-036           AD-16. 030402-037           a           stic + total Pu )/ Np input )           ic and acid / Np input )           + Np dejacket) =           stic + Pu acid) =           Pu-236         t1/2           years         2.85           Cl/g         1130.36(           214806 /0         33066 /0           1246.00         1246.00           370.01         87.00	Alpha & Beta	20.00%           Actual           0.8332           0.466           0.1411           0.0076           Adjusted           Pu-236           Pu-36           3.88           Sample           DJ-16, 030402-036           AD-16, 030402-037           DJ-16, 030402-036           AD-16, 030402-037           AD-16, 030402-037           Pu-236/238 ppm =           Relative Error =	0.67040 2.01110 0.00073 1.67500 1.67500 1.67500 1.67500 1.67500 1.67500 8q/mL 1.20E+04 8q/mL 1.20E+04 3.40E+05 3.40E+05 3.40E+05 1.46E+03 3.40E+06 1.46E+03 3.45E+06 0.90/236/PU-238 ppm (ug/mL) 2.75 (5.80 MeV Area C (Full Spectru 2.X (5.1) 1.67500 1.20E+04 1.20E+04 1.20E+04 1.20E+04 1.20E+04 1.20E+04 1.20E+04 1.20E+04 1.20E+04 1.20E+04 1.20E+04 1.20E+04 1.20E+04 1.40E+05 1.4	OUC22     OUC22     OUC22     OUC22     OUC22     OUC22     OUC22     OUC22     Predicted (BC     Predicted (BC     Predicted (BC     Predicted (BC     Counce)     Predicted (BC     Pu-238     Pg/nL     2.80E+06     Beta Bg/mL     2.80E+06     Pu-238     pp6 (ng/mL)     <5.0E     Pu-238     Pu-238     Pu-238     Pu-238     m Counts X Pu     80 MeV Area Counce     80 Area Counce	Pu238         t1/2           days         32032.425           Ru-106         Bg/mL           Bg/mL         2.10E+06           4.20E+07         10da activity Bg/mL           9.00E+06         5.70E+06           Pu-239         ppb (ng/mL)           -7.59E+04         -1.80e2           activity 236) X 1E6         -238 <sub>1/2</sub> X 238)           ounts) <sup>20</sup> Is	Actual/Pred #DIV/01 #D	Cs-134 Bq/mL 6.40E+05 5.90E+05 5.90E+05 5.90E+05 2.01E+03	Cs-137 Bg/mL 4.30E+00 3.80E+00 3.80E+00 2.10E+0 2.10E+0	Ce-144 Bq/mL 6 5.00E+0 ) ppb (ng/mL 1 <5.0E 2 <5.0E	Eu- 155 Bq/mL 7 4.70E+05	Eu-154 Bq/mL 1.10E+05
Peliet Input Total Dejacket Waste Acid Dissol Np. Residual Amp Pu-238/Total Pu Conversion of Ng Fractional loss of Pu-238/Total Pu Conversion of Ng Fractional loss of Pu-236 content ppm 2.75 Reference Infor Np0, <sup>337</sup> (oxide) Np237 Pu-238 Pu-239 Pu-239 Pu-239 Pu-239 Pu-239 Pu-239 Pu-239 Pu-239 Pu-239 Pu-239 Pu-239 Pu-241 Pu-235 Specific activity C Factor = Co-60 Zr-95 Ru-106 SB-125 Cs-133 Ce-1144 Eu 155	MK-20.1 MK-20.1 MK-20.1 MK-20.1 MK-20.1 (wt basis) = to FP (mol ba	BNP-59 BNP-41, 53, 59 BNP-41, 53, 59 BNP-41, 53, 59 ENP-41, 53, 59 ENP-41, 53, 59 ENP-41, 53, 59 ENP-41, 53, 59 ENP-42, 53, 59 ENP-42, 53, 59 ENP-42, 53, 59 ENP-41, 53 ENP-41, 53 ENP-41, 54 ENP-41, 54	M g acid)' Np input = ustic + Pu-239 cau: on product in causi p caustic (Np acid) u caustic (NPu caus Time elapsed (t) days -517.00 M g/mol 69.9338222 94.9080427 105.907326 124.9052478 133.906713 133.9077335 143.90784	DJ-16. 030402-036 AD-16. 030402-037 stic + total Pu )/ Np input ) to and acid / Np input ) + Np dejacket) = stic + Pu acid) = Pu-236 t1/2 years 2.85 Pu-236 t1/2 years 2.85 1130.360 21469.00 3306.00 1294.00 1048.00 1294.00 3182.86	89.18%           It =           =           Qays           It =           =           It = <th>20.00%           20.00%           0.8332           0.468           0.1411           0.0016           0.0017           0.0016           0.0017           0.0016           0.0017           0.0017           0.0016           0.0017           Adjusted           Pu-236           ppm           3.88           DJ-16.030402-037           DJ-16.030402-036           AD-16.030402-037           DJ-16.030402-037           AD-16.030402-037           Pu-236/238 ppm =           Relative Error =</th> <th>0.67040 2.01110 0.00073 1.67500 1.67500 1.67500 1.67500 1.67500 1.67500 1.67500 1.67500 1.67500 8q/mL 1.20E+04 3.40E+02 1.20E+04 3.35E+06 Pu-236/Pu-238 ppm (ug/mL) 2.755 (5.80 MeV Area C (Full Spectru 2.X (5.1) 1.57500 1.67500 1.20E+04 1.20E+04 3.35E+06 1.20E+04 1.20E+04 3.35E+06 1.20E+04 1</th> <th>OUC22     OUC22     OUC22     OUC22     OUC22     OUC22     OUC22     OUC22     OUC22     Predicted (BC     Predict</th> <th>Pu238         t1/2           days         32032 425           Ru-106         Bq/mL           2.10E406         4.20E407           total activity Bq/mL         9.80E406           9.80E406         5.70E406           Pu-239         ppb (ng/mL)           -7.59E404         -           -236<sub>112</sub> X 238)         -           ounts)<sup>62</sup>         is</th> <th>Actual/Pred #DIV/01 #D</th> <th>Cs-134 Bq/mL 6.40E+05 5.90E+05 5.90E+05 4.50.0E 2.01E+03</th> <th>Cs-137 Bq/mL 4.30E+00 3.80E+00 3.80E+00 2.10E+00</th> <th>Ce-144 Bq/mL 6 5.00E+0 9 Pu-244 ) ppb (ng/mL 1 &lt;5.0E 2 &lt;5.0E</th> <th>Eu- 155 Bq/mL 7 4.70E+05</th> <th>Eu-154 Bq/mL 1.10E+05</th>	20.00%           20.00%           0.8332           0.468           0.1411           0.0016           0.0017           0.0016           0.0017           0.0016           0.0017           0.0017           0.0016           0.0017           Adjusted           Pu-236           ppm           3.88           DJ-16.030402-037           DJ-16.030402-036           AD-16.030402-037           DJ-16.030402-037           AD-16.030402-037           Pu-236/238 ppm =           Relative Error =	0.67040 2.01110 0.00073 1.67500 1.67500 1.67500 1.67500 1.67500 1.67500 1.67500 1.67500 1.67500 8q/mL 1.20E+04 3.40E+02 1.20E+04 3.35E+06 Pu-236/Pu-238 ppm (ug/mL) 2.755 (5.80 MeV Area C (Full Spectru 2.X (5.1) 1.57500 1.67500 1.20E+04 1.20E+04 3.35E+06 1.20E+04 1.20E+04 3.35E+06 1.20E+04 1	OUC22     OUC22     OUC22     OUC22     OUC22     OUC22     OUC22     OUC22     OUC22     Predicted (BC     Predict	Pu238         t1/2           days         32032 425           Ru-106         Bq/mL           2.10E406         4.20E407           total activity Bq/mL         9.80E406           9.80E406         5.70E406           Pu-239         ppb (ng/mL)           -7.59E404         -           -236 <sub>112</sub> X 238)         -           ounts) <sup>62</sup> is	Actual/Pred #DIV/01 #D	Cs-134 Bq/mL 6.40E+05 5.90E+05 5.90E+05 4.50.0E 2.01E+03	Cs-137 Bq/mL 4.30E+00 3.80E+00 3.80E+00 2.10E+00	Ce-144 Bq/mL 6 5.00E+0 9 Pu-244 ) ppb (ng/mL 1 <5.0E 2 <5.0E	Eu- 155 Bq/mL 7 4.70E+05	Eu-154 Bq/mL 1.10E+05
Peliet Input Total Dejacket Waste Acid Dissol Np. Residual Amc Pu-238/Total Pu- Conversion of Ng Conversion of Ng Conversion of Ng Conversion of Ng Conversion of Ng Conversion of Ng Conversion of Ng Pu-236 content ppm 2.75 Reference Infor NpQ3 <sup>237</sup> (oxide) Np237 (oxide) Np237 (oxide) Np237 Pu-239 Pu-239 Pu-239 Pu-240 Pu-239 Pu-240 Pu-239 Pu-240 Pu-239 Pu-240 Pu-239 Pu-240 Pu-239 Pu-240 Pu-239 Pu-240 Pu-239 Pu-240 Pu-239 Pu-240 Pu-239 Pu-240 Pu-236 Pu-236 Conversion Co-60 Zr-96 Co-137 Co-	MK-20.1 MK-20.1 MK-20.1 MK-20.1 MK-20.1 (wt basis) = to FP (mol ba	BNP-59 BNP-41, 53, 59 BNP-41, 50 BNP-41, 50 B	M M Ap acidly Np input = infe inffe inffe infe infe infe infe infe infe infe infe	DJ-16, 030402-036           AD-16, 030402-037           a           stic + total Pu )/ Np input ):           tc + ny dejacket) =           stic + Pu acid) =           Pu-236         t1/2           years         2.85           Cl/g         2.85           1130.366         2.1459 00           3306 00         3306 00           1130.362         2.1459 00           3306 00         3306 00           1284 00         3306 00           130.362         2.1459 00           3306 00         130.862           1130.362         2.1459 00           3306 00         130.862           1130.362         2.1459 00           3306 00         130.862           1120.465 00         117.12	89.18%           It =           =           -           <	20.00%           Actual           0.8332           0.8468           0.1411           0.0016           0.0000           Adjusted           Pu-236           Pu-3.88           Sample           DJ-16, 030402-036           AD-16, 030402-036           AD-16, 030402-037           DJ-16, 030402-037           AD-16, 030402-037           Pu-236/238 ppm =           Relative Error =	0.67040 2.01110 0.00073 1.67500 1.67500 0.00073 1.67500 0.00073 1.67500 0.00073 0.00070 0.00073 0.00070 0.0000 0.00070 0.00070 0.00000 0.00000000	0.00223 0.00242 0.00242 0.00000 0.000707 Predicted (BC Predicted (BC Pre	Pu238 11/2 days 32032.425 Ru-106 Bq/mL 2.10E+06 4.20E+07 total activity Bq/mL 9.80E+06 5.70E+06 5.70E+06 1.125 Pu-239 pp(1) 1.125 Pu-239 pp(1) 1.125 Pu-239 pp(1) 1.125 Pu-239 pp(1) 1.125 1	Actual/Pred #DIV/01 #D	Cs-134 Bq/mL 6.40E+05 5.90E+05 9u-241 ppb (ng/mL) <5.0E 2.01E+03	Cs-137 Bg/mL 4.30E+0 3.80E+0 3.80E+0 2.10E+0; 2.10E+0;	Ce-144 Bq/mL 6 5.00E+0 PU-244 ) ppb (ng/mL 1 <5.0E 2 <5.0E	Eu- 155 Bq/mL 7 4.70E+05	Ei+ 154 Bq/mL 1.10E+05

				Dosimeter								
	B			Np (g) =	0.0015							
	Acid solution					-			7			
	3	M HNO3		<u> </u>			Vanadium Ac	id Waste				
	/	mL		Vanadium Dissolu	tion	1	and Wasnes	- mal				
	Washes = 2 X 6 ml			22 Hour acid diges	suon		19	mL	1			
	Washes - 2 A 0 IIIL											
	12	2 mL										
	·		•	+								
				Np Dissolution			Product Wash	nes = 2 X 7 mL		T		
	Dissolver Solution			3 hour digestion		•	8	M HNO3				
	8	8 M HNO3		-			14	mL				
	0.1	M NaF								_		
	8	8 mL				-						
			-	<b>+</b>							•	
				Np Product	g	mole		Fission Prod	g	mole		
				Np-237 =	0.001187	5.0076E-06		∠r-95 =	4.50106E-10	4.74255E-12		
				Pu-238 =	0.000148	0.19812E-07		RU-106 =	4.8/161E-08	4.59988E-10		
				Pu-240 =	0.000018	5.56053E-09		$C_{s-134} =$	2 33991E-09	0 1 74742F-11		
				Pu-241 =	0.000001	0.000002-00		Cs-137 =	3.77647E-07	2.75842E-09		
				Total Pu =	0.000167	7.00256E-07		Ce-144 =	6.27462E-08	4.35999E-10		
				Sample wgt =	23.8362			Eu-155 =	0	0		
				Vol (mL) =	22						_	
				-				•				
Target	Diss #	Dosimeter Np input	Np input	Vial Tare	Solution & Vial	Solution weight	Np Prod.	Np Prod.	Pu-238	Pu-236	Adjusted Pu- 236 ppm	Total Pu
		g	mole	g	g	g	g	mole	g	ppm	ppm	g
/IK-10.4	ADD-26	0.001500	6.33E-06	27.1444	50.9806	23.836200	0.001187	5.01E-06	0.000148	1.840000	2.764341	0.000167
	DDJ-26			27.1495	45.4386	18.2891						
				Actual		Dredicted (D)	201	A atual/Drad	1			
In Residual Amount	(wt basis) Nn nrod / Nn in		-	Actual 0 7914		Predicted (B)	33)	#DIV/01				
Pu-238/Total Pu (w	t basis)		=	0.8847				#DIV/0!				
Conversion of Np to	Pu (mol basis) = Pu total/	Np in	=	0.1107				#DIV/0!				
Conversion of Np to	FP (mol basis) = Fp prod/N	Np in	=	0.0006								
Fractional loss of Np	in Liq Waste (wt basis)		=	NA								
ractional loss of Pu	in Liq Waste (wt basis)		=	NA					1			
	1	1	Time				I	·	Time			
Pu-236 content			elansed (t)	Pu-236 t1/2	t1/2	Adjusted			elansed (t)	Pu-238	Pu238 ±1/2	Adjusted
ppm	Discharge Date	Analysis Date	davs	vears	davs	Pu-236 ppm		Analysis Date	davs	t1/2. vears	davs	Pu-238. a
1.84	11/1/2001	7/7/2003	-613.00	2.86	1043.88	2.76		5/28/2003	-573.00	87.7	32032.425	0.000149
							-			•		
Analysis	Sample	Co-60	Zr-95	Ru-106	SB-125	Cs-134	Cs-137	Ce-144	Eu- 155			
Gr gamma	ADD-26 030429-050	Bd/g	1 50E±04	2 50E+05	вq/g	4 70E+02	5 10E+04	Bq/g 3 10E±05	Bd/g	1		
Gi yamina	ADD-20, 030429-039		1.50E+04	2.502+05		4.700403	5.TUE#04	3.102+05		1		
Alpha & Beta	Sample	Alpha Bq/g	Beta Bq/mL	total activity Bg/m	alpha PHA	Pu238, Bq						
	ADD-26, 030429-059	3.80E+06	Beta Bq/g	total activity Bq/g								
									-			
ICP	Sample	Np-237	Pu-238	Pu-239	Pu-240	Pu-241	Pu-242	Pu-244				
	ADD-26 030420-050	ppb (ng/g)	ppb (ng/g) 6 10E±02	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)	µpb (ng/ĝ)	ppb (ng/g)	-			
	ADD-20, 000428-008	4.902+04	0.196+03	7.512+02	5.00E+01	\$4.00E#01	~4.00E+01	<4.00 <u>₽</u> +01	1			
Pu-Alpha Scan	Sample	Pu-236/Pu-238	Relative error	1								
TTA extraction	· · · ·	ppm (ug/mL)	%									
	ADD-26, 030429-059	1.84	6.2									
			-							_		
	-								•			
Reference Informat	ion			Reference Inform	ation							

	MW	Density
		g/cc
NpO2	269.047	11.143
Np237	237.0482	20.476
Pu238	238.0496	19.851
Pu239	239.0522	19.851
Pu240	240.0538	19.851
Pu241	241.0568	19.851
Pu242	242.0587	19.851
Conversion	3.70E+10 E	3q/Ci
365.25	days/year	
N = N° *exp -(In2/t <sub>1/2</sub> *	t)	

Reference Infr	rmation			
Specific activity	Calculation			
Factor =	1.13E+13	T1/2	М	Specific activity
		s	g/mol	Ci/g
Co-60		166328640	59.9338222	1130.67
Zr-95		5531328	94.9080427	21469.000
Ru-106		32278176	105.9073269	3306.000
SB-125		87042172.32	124.9052478	1048.00
Cs-134		65160132.48	133.9067134	1294.00
Cs-137		948937032	136.9070835	87.000
Ce-144		24614755.2	143.9136427	3182.800
Eu- 155		150248889.4	154.9228894	465.000
Pu-238		2767601520	238.0495534	17 119

Pu-236/238 ppm =	(5.80 MeV Area Counts X Pu-236 <sub>F1/2</sub> X 236) X 1E6
	(Full Spectrum Counts X Pu-238 <sub>T1/2</sub> X 238)
Relative Error =	2 X (5.80 MeV Area Counts) <sup>1/2</sup>
	5.80 Area Counts

				Dosimeter MK-10.6 Np (g) =	0.0017							
	Acid solution					1	Vanadium Aai	d Wasta	1			
	3	ml		Vanadium Dissolu	tion	L	vanadium Aci	d waste				
		IIIL		22 hour acid diges	stion	•	19	mi				
	Washes = 2 X 6 mL		▶	22 Hour doid digod			10		3			
	3 12	M HNO3 mL				4						
				Np Dissolution		1	Product Wash	es = 2 X 7 mL				
	Dissolver Solution			3 hour digestion		4	8	M HNO3				
	8 0.1 8	M HNO3 M NaF					14	mL				
				↓								
				Np Product	g	mole		Fission Prod	g	mole		
				Np-237 =	0.001398	5.89572E-06		Zr-95 =	7.50589E-10	7.90859E-12		
				Pu-238 =	0.000209	8.78634E-07		Ru-106 =	8.38377E-08	7.91614E-10		
				Pu-239 =	0.000029	1.21/15E-07		SB-125 =	4.55139E-09	3.64388E-11		
				Pu-240 =	0.000003	1.18220E-08		Cs-134 = Cs-137 =	7 40892E-07	5 41164E-09		
				Total Pu =	0.000241	1.01217E-06		Ce-144 =	1.19486E-07	8.30261E-10		
				Sample wgt =	23.8493			Eu- 155 =	6.51507E-09	4.20536E-11		
				Vol (mL) =	22							
	1											
Torget	Dies #	Dosimeter Np	Nin innut	Viel Tere	Solution &	Solution	No Drod	No Dred	Du 220	D., 226	Adjusted Pu-	Total Du
raiget	DISS #	a	mole	viai Tale	viai	a	np Piou.	mole	Pu-230	ppm	236 ppm	n n
MK-10.6	ADD-27	0.001700	7.17E-06	26.9450	50.7943	23.849300	0.001398	5.90E-06	0.000209	1.590000	2.388751	0.000241
	DDJ-27			27.2825	46.4323	19.1498						
									-			
				Actual		Predicted (BC	GS)	Actual/Pred				
Np Residual Amount	(wt basis) Np prod / Np in		-	0.8221				#DIV/0!				
Conversion of Nn to I	Pu (mol basis) = Pu total/	Nn in	-	0.8075				#DIV/0!				
Conversion of Np to	FP (mol basis) = Fp prod/N	lp in	=	0.0010								
Fractional loss of Np	in Liq Waste (wt basis)		=	NA								
Fractional loss of Pu	in Liq Waste (wt basis)		=	NA								
Pu-236 content	Discharge Date	Analysis Date	Time elapsed (t) days	Pu-236 t1/2	t1/2 days	Adjusted		Analysis Date	Time elapsed (t) days	Pu-238 t1/2 years	Pu238, t1/2 days	Adjusted
1.59	11/1/2001	7/7/2003	-613.00	2.86	1043.88	2.39		5/28/2003	-573.00	87.7	32032.425	0.000212
									_			
Analysis	Sample	Co-60	Zr-95 Bc/c	Ru-106	SB-125	Cs-134	Cs-137	Ce-144	Eu- 155			
Gr gamma		Бү/у	Бү/у	Бү/у	7 40E+03	1 30E+04	1.00E+05	5.90E+05	64.70E+03			
	ADD-27, 030429-060		2.50E+04	4.30E+05	1.402.00	1.002.04	1.002.00					
Alpha & Beta	ADD-27, 030429-060 Sample	Alpha Bq/g	2.50E+04 Beta Bq/g	4.30E+05 total activity Bq/g	alpha PHA	Pu238, Bq	1.002.00					
Alpha & Beta	ADD-27, 030429-060 Sample ADD-27, 030429-060	Alpha Bq/g 5.30E+06	2.50E+04 Beta Bq/g 2.70E+06	4.30E+05 total activity Bq/g 8.00E+06	alpha PHA	Pu238, Bq	1.002.00					
Alpha & Beta	ADD-27, 030429-060 Sample ADD-27, 030429-060 Sample	Alpha Bq/g 5.30E+06 Np-237 ppb (ng/g)	2.50E+04 Beta Bq/g 2.70E+06 Pu-238 ppb (ng/g)	4.30E+05 total activity Bq/g 8.00E+06 Pu-239 ppb (ng/g)	Alpha PHA Pu-240 ppb (ng/g)	Pu238, Bq Pu-241 ppb (ng/g)	Pu-242 ppb (ng/g)	Pu-244 ppb (ng/g)	]			
Alpha & Beta	ADD-27, 030429-060 Sample ADD-27, 030429-060 Sample ADD-27, 030429-060	Alpha Bq/g 5.30E+06 Np-237 ppb (ng/g) 5.86E+04	2.50E+04 Beta Bq/g 2.70E+06 Pu-238 ppb (ng/g) 8.77E+03	4.30E+05 total activity Bq/g 8.00E+06 Pu-239 ppb (ng/g) 1.22E+03	alpha PHA Pu-240 ppb (ng/g) 1.19E+02	Pu238, Bq Pu-241 ppb (ng/g) <3.97E+01	Pu-242 ppb (ng/g) <3.97E+01	Pu-244 ppb (ng/g) <3.97E+01				
Alpha & Beta	ADD-27, 030429-060 Sample ADD-27, 030429-060 Sample ADD-27, 030429-060	Alpha Bq/g 5.30E+06 Np-237 ppb (ng/g) 5.86E+04	2.50E+04 Beta Bq/g 2.70E+06 Pu-238 ppb (ng/g) 8.77E+03	4.30E+05 total activity Bq/g 8.00E+06 Pu-239 ppb (ng/g) 1.22E+03	alpha PHA Pu-240 ppb (ng/g) 1.19E+02	Pu238, Bq Pu-241 ppb (ng/g) <3.97E+01	Pu-242 ppb (ng/g) <3.97E+01	Pu-244 ppb (ng/g) <3.97E+01				
Alpha & Beta ICP Pu-Alpha Scan	ADD-27, 030429-060 Sample ADD-27, 030429-060 Sample ADD-27, 030429-060 Sample	Alpha Bq/g 5.30E+06 Np-237 ppb (ng/g) 5.86E+04 Pu-236/Pu-238	2.50E+04 Beta Bq/g 2.70E+06 Pu-238 ppb (ng/g) 8.77E+03 Relative error	4.30E+05 total activity Bq/g 8.00E+06 Pu-239 ppb (ng/g) 1.22E+03	alpha PHA Pu-240 ppb (ng/g) 1.19E+02	Pu238, Bq Pu-241 ppb (ng/g) <3.97E+01	Pu-242 ppb (ng/g) <3.97E+01	Pu-244 ppb (ng/g) <3.97E+01				
Alpha & Beta ICP Pu-Alpha Scan TTA extraction	ADD-27, 030429-060 Sample ADD-27, 030429-060 Sample ADD-27, 030429-060 Sample ADD-27, 030429-060 Sample ADD-27, 030429-060	Alpha Bq/g 5.30E+06 Np-237 ppb (ng/g) 5.86E+04 Pu-236/Pu-238 ppm (ug/mL) 1 59	2.50E+04 Beta Bq/g 2.70E+06 Pu-238 ppb (ng/g) 8.77E+03 Relative error %	4.30E+05 total activity Bq/g 8.00E+06 Pu-239 ppb (ng/g) 1.22E+03	alpha PHA Pu-240 ppb (ng/g) 1.19E+02	Pu238, Bq Pu-241 ppb (ng/g) <3.97E+01	Pu-242 ppb (ng/g) <3.97E+01	Pu-244 ppb (ng/g) <3.97E+01				

Reference Information		
	MW	Density
		g/cc
NpO2	269.047	11.143
Np237	237.0482	20.476
Pu238	238.0496	19.851
Pu239	239.0522	19.851
Pu240	240.0538	19.851
Pu241	241.0568	19.851
Pu242	242.0587	19.851
Conversion	3.70E+10	Bq/Ci
365.25 days/y	ear	
$N = N^{\circ} * exp - (ln2/t_{1/2} * t)$		

Reference Info	rmation			
Specific activity	Calculation			
Factor =	1.13E+13	T1/2	М	Specific activity
		s	g/mol	Ci/g
Co-60		166328640	59.9338222	1130.670
Zr-95		5531328	94.9080427	21469.000
Ru-106		32278176	105.9073269	3306.000
SB-125		87042172.32	124.9052478	1048.000
Cs-134		65160132.48	133.9067134	1294.000
Cs-137		948937032	136.9070835	87.000
Ce-144		24614755.2	143.9136427	3182.800
Eu- 155		150248889.4	154.9228894	465.000
Pu-238		2767601520	238.0495534	17.119

Pu-236/238 ppm =	(5.80 MeV Area Counts X Pu-236 <sub>r1/2</sub> X 236) X 1E6 (Full Spectrum Counts X Pu-238 <sub>r1/2</sub> X 238)
Relative Error =	2 X (5.80 MeV Area Counts) <sup>1/2</sup> 5.80 Area Counts

	Acid solution 3 7 Washes = 2 X 6 mL 3 12	M HNO3 mL M HNO3 mL	<b> </b> →	Dosimeter MK-10.1 Np (g) = Vanadium Dissolu 22 hour acid diges	0.0015 ution stion	]  ₊  _	Vanadium Aci and Washes Np-237 = Pu-238 = Pu-239 = Pu-239 = Pu-240 = Pu-241 = 19 Product Wash	g 1.314E-06 3.837E-06 4.885E-07 5.346E-08 1.143E-08 mL mes = 2 X 7 mL	mole 5.54518E-09 1.61164E-08 2.04337E-09 2.22698E-10 4.73982E-11			
	8 0.1 8	M HNO3 M NaF mL		S nour digestion	,		0 14	mL			r	
				NP Product Np-237 = Pu-238 = Pu-239 = Pu-240 = Pu-241 = Total Pu = Sample wgt = Vol (mL) =	9 0.000906 0.000158 0.000027 0.000003 0.000188 23.7881 22	mole 3.82339E-06 6.64529E-07 1.11451E-07 1.33778E-08 0 7.89358E-07		Fission Prod       Zr-95 =       Ru-106 =       SB-125 =       Cs-134 =       Cs-137 =       Ce-144 =       Eu-155 =	9 8.08556E-10 6.80649E-08 7.3617E-09 7.94957E-09 8.12889E-07 1.25239E-07 5.80703E-09	mole 8.51936E-12 6.42684E-10 5.89383E-11 5.9365E-11 5.93753E-09 8.70239E-10 3.74834E-11		
Target MK-10.1	Diss # ADD-25 DJJ-25	Dosimeter Np input g 0.001500	Np input mole 6.33E-06	Vial Tare g 27.0241 27.1424	Solution & Vial <u>g</u> 50.8122 48,1069	Solution weight <u>9</u> 23.788100 20.964500	Np Prod. g 0.000906 0.0000131	Np Prod. mole 3.82E-06	Pu-238 g 0.000158	Pu-236 ppm 2.540000	Adjusted Pu- 236 ppm ppm 3.790738	Total Pu g 0.000188
							0.000919					
r				Actual		Predicted (B	35)	Actual/Pred				
Np Residual Amount	(wt basis) Np prod / Np in		=	0.6042		Treatered (D	50)	#DIV/0!				
Pu-238/Total Pu (wt	basis)		=	0.8412				#DIV/0!				
Conversion of No to	Pu (mol basis) = Pu total/	Nn in	=	0 1247				#DIV/01				
Conversion of typ to i				0.12.11				#DIV/0:				
Conversion of Np to I	FP (mol basis) = Fp prod/N	lp in	=	0.0012				#01110:				
Conversion of Np to I Fractional loss of Np	FP (mol basis) = Fp prod/N in Liq Waste (wt basis)	Ip in	=	0.0012 NA				#51070:				
Conversion of Np to I Fractional loss of Np Fractional loss of Pu	FP (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis)	lp in	=	0.0012 NA NA				#51010:				
Conversion of Np to 1 Fractional loss of Np Fractional loss of Pu	FP (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis)	lp in	=	0.0012 NA NA				#DIVIO:				
Conversion of Np to I Fractional loss of Np Fractional loss of Pu Pu-236 content ppm	FP (moi basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date	Analysis Date	= = = elapsed (t) days	0.0012 NA NA Pu-236 t1/2 years	t1/2 days	Adjusted Pu-236 ppm		Analysis Date	Time elapsed (t) days	Pu-238 t1/2, years	Pu238, t1/2 days	Adjusted Pu-238, g
Conversion of Np to 1 Fractional loss of Np Fractional loss of Pu Pu-236 content ppm 2.54	FP (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001	Analysis Date 6/27/2003	= = = dapsed (t) days -603.00	0.0012 NA NA Pu-236 t1/2 years 2.86	<b>t1/2</b> <b>days</b> 1043.88	Adjusted Pu-236 ppm 3.79		Analysis Date 5/28/2003	Time elapsed (t) days -573.00	Pu-238 t1/2, years 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Pu Pu-236 content ppm 2.54	FP (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001	Analysis Date 6/27/2003	= = = elapsed (t) days -603.00	0.0012 NA NA Pu-236 t1/2 years 2.86	t1/2 days 1043.88	Adjusted Pu-236 ppm 3.79		Analysis Date 5/28/2003	Time elapsed (t) days -573.00	Pu-238 t1/2, years 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Pu Pu-236 content ppm 2.54 Analysis	FP (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 Sample	Analysis Date 6/27/2003	= = elapsed (t) days -603.00 Zr-95	0.0012 NA NA Pu-236 t1/2 years 2.86 Ru-106	t1/2 days 1043.88 SB-125	Adjusted Pu-236 ppm 3.79 Cs-134	Cs-137	Analysis Date 5/28/2003 Ce-144	Time elapsed (t) days -573.00 Eu- 155	Pu-238 t1/2, years 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Pu Pu-236 content ppm 2.54 Analysis	FP (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 Sample	Analysis Date 6/27/2003 Co-60 Bq/g	= = = dapsed (t) days -603.00 Zr-95 Bq/g	0.0012 NA NA Pu-236 t1/2 years 2.86 Ru-106 Bq/g	t1/2 days 1043.88 SB-125 Bq/g	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g	Cs-137 Bq/g	Analysis Date 5/28/2003 Ce-144 Bq/g	Time elapsed (t) days -573.00 Eu- 155 Bq/g	Pu-238 t1/2, years 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Pu Pu-236 content ppm 2.54 Analysis Gr gamma	FP (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 Sample	Analysis Date 6/27/2003 Co-60 Bq/g	= = = Hapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04	0.0012 NA NA Pu-236 t1/2 years 2.86 Ru-106 Bq/g 3.50E+05	t1/2 days 1043.88 SB-125 Bq/g 1.20E+04	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04	Cs-137 Bq/g 1.10E+05	Analysis Date 5/28/2003 Ce-144 Bq/g 6.20E+05	Time elapsed (t) 	Pu-238 t1/2, years 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Pu-236 content ppm 2.54 Analysis Gr gamma	FP (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 Sample ADD-25, 030429-058 DDJ-25, 030429-058	Analysis Date 6/27/2003 Co-60 Bq/g 7.30E+03	= = = = = = = = = = = = = = = = = = =	0.0012 NA NA Pu-236 t1/2 years 2.86 Ru-106 Bq/g 3.50E+05 3.20E+05	t1/2 days 1043.88 SB-125 Bq/g 1.20E+04	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 0-232 C	Cs-137 Bq/g 1.10E+05 6.00E+03	Analysis Date 5/28/2003 Ce-144 Bq/g 6.20E+05	Time elapsed (t) days -573.00 Eu- 155 Bq/g 4.20E+03	Pu-238 t1/2, years 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Pu-236 content ppm 2.54 Analysis Gr gamma Alpha & Beta	FP (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 Sample ADD-25, 030429-058 DDJ-25, 030429-059	Analysis Date 6/27/2003 Co-60 Bq/g 7.30E+03 Alpha Bq/g Alpha Bq/g	= = = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 Beta Bq/g 2.50E+05	0.0012 NA NA Pu-236 t1/2 years 2.86 Ru-106 Bq/g 3.50E+05 3.20E+04 total activity Bq/g 6 6 90E+02	t1/2 days 1043.88 SB-125 Bq/g 1.20E+04 alpha PHA	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq	Cs-137 Bq/g 1.10E+05 6.00E+03	Analysis Date 5/28/2003 Ce-144 Bq/g 6.20E+05	Time elapsed (t) days -573.00 Eu- 155 Bq/g 4.20E+03	Pu-238 <u>t1/2, years</u> 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Pu-236 content ppm 2.54 Analysis Gr gamma Alpha & Beta	PP (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 Sample ADD-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058	Analysis Date 6/27/2003 Co-60 Bq/g 7.30E+03 Alpha Bq/g 1.10E+05	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 Beta Bq/g 2.50E+06 Beta Bq/g	0.0012           NA           NA           Pu-236         t1/2           years         2.86           Ru-106         Bq/g           3.50E+05         3.20E+04           total activity Bq/g         6.80E+06           13E+05         13E+05	t1/2 days 1043.88 SB-125 Bq/g 1.20E+04 alpha PHA	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq	Cs-137 Bq/g 1.10E+05 6.00E+03	Analysis Date 5/28/2003 Ce-144 Bq/g 6.20E+05	Time elapsed (t) 	Pu-238 t1/2, years 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Pu-236 content ppm 2.54 Analysis Gr gamma Alpha & Beta	PP (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 Sample ADD-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058	Analysis Date 6/27/2003 Co-60 Bq/g Alpha Bq/g 4.30E+06 1.10E+05 No-237	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 Beta Bq/g 2.50E+06 2.50E+06 2.50E+06 Pul-238	0.0012           NA           NA           Pu-236         t1/2           years         2.86           Ru-106         Bq/g           3.50E+05         3.20E+04           total activity Bq/g         6.80E+06           1.30E+05         T.30E+05           PL-239         EL-239	t1/2 days 1043.88 SB-125 Bq/g 1.20E+04 alpha PHA Pu-240	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq Pu238, Bq	Cs-137 Bq/g 1.10E+05 6.00E+03	Analysis Date 5/28/2003 Ce-144 Bq/g 6.20E+05	Time elapsed (t) days -573.00 Eu- 155 Bq/g 4.20E+03	Pu-238 t1/2, years 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Pu-236 content ppm 2.54 Analysis Gr gamma Alpha & Beta	FP (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 Sample ADD-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058	Analysis Date 6/27/2003 Co-60 Bq/g 7.30E+03 Alpha Bq/g 4.30E+06 1.10E+05 Np-237 ppb (ng/q)	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 Beta Bq/g 2.50E+06 2.00E+04 Pu-238 ppb (ng/q)	0.0012 NA NA Pu-236 t1/2 years 2.86 Bq/g 3.50E+05 3.20E+04 total activity Bq/g 6.80E+06 1.30E+05 Pu-239 ppb (ng/g)	t1/2 days 1043.88 SB-125 Bq/g 1.20E+04 alpha PHA Pu-240 ppb (ng/q)	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq Pu-241 ppb (ng/q)	Cs-137 Bq/g 1.10E+05 6.00E+03 Pu-242 ppb (ng/q)	Analysis Date 5/28/2003 Ce-144 Bq/g 6.20E+05 Pu-244 ppb (ng/g)	Time elapsed (t) days -573.00 Eu- 155 Bq/g 4.20E+03	Pu-238 t1/2, years 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Pu-236 content ppm 2.54 Analysis Gr gamma Alpha & Beta ICP	P (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 Sample ADD-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 ADD-25, 030429-058	Analysis Date 6/27/2003 Co-60 Bq/g 7.30E+03 Alpha Bq/g 4.30E+06 1.10E+05 Np-237 Np-237 Np-237 Np-238 Np-237	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 Beta Bq/g 2.50E+06 2.00E+04 Pu-238 ppb (ng/g) 6.65E+03	0.0012           NA           NA           NA           Pu-236         t1/2           years           2.86           Bq/g           3.50E+05           3.20E+04           total activity Bq/g           6.80E+06           1.30E+05           Pu-239           ppb (ng/g)           1.12E+03	t1/2 days 1043.88 SB-125 Bq/g 1.20E+04 alpha PHA Pu-240 ppb (ng/g) 1.35E+02	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq Pu238, Bq Pu-241 pb(ng/g) <3.97E+01	Cs-137 Bq/g 1.10E+05 6.00E+03 Pu-242 ppb (ng/g) <3.97E+01	Analysis Date 5/28/2003 Ce-144 Bq/g 6.20E+05 Pu-244 ppb (ng/g) <3.97E+01	Time elapsed (t) days -573.00 Eu- 155 Bq/g 4.20E+03	Pu-238 <u>t1/2, years</u> 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Pu-236 content ppm 2.54 Analysis Gr gamma Alpha & Beta ICP	P (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 Sample ADD-25, 030429-058 DD-25, 030429-058 DD-25, 030429-058 DD-25, 030429-058 DD-25, 030429-058 DD-25, 030820-037	Analysis Date 6/27/2003 Co-60 Bq/g 7.30E+03 Alpha Bq/g 4.30E+06 1.10E+05 Np-237 ppb (ng/g) 3.81E+04 6.27E+02	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 Beta Bq/g 2.50E+06 2.00E+04 Pu-238 ppb (ng/g) 6.65E+03 1.83E+02	Nu           0.0012           NA           NA           Pu-236         t1/2           years           2.86           Bq/g           3.50E+05           3.20E+04           total activity Bq/g           6.80E+06           1.30E+05           Pu-239           ppb (ng/g)           1.12E+03           2.33E+01	t1/2 days 1043.88 Ba/g 1.20E+04 alpha PHA Pu-240 ppb (ng/g) 1.35E+00 2.55E+00	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq Pu238, Bq Pu241 ppb (ng/g) <3.97E+01 5.45E-01	Cs-137 Bq/g 1.10E+05 6.00E+03 Pu-242 ppb (ng/g) <3.97E+01 <4.55E-01	Analysis Date 5/28/2003 Ce-144 Bq/g 6.20E+05 Pu-244 ppb (ng/g) <3.97E+01 <4.55E-01	Time elapsed (t) days -573.00 Eu-155 Bq/g 4.20E+03	Pu-238 t1/2, years 87.7	Pu238, 11/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Pu-236 content ppm 2.54 Analysis Gr gamma Alpha & Beta ICP	PP (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 Sample ADD-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058	Analysis Date 6/27/2003 Co-60 Bq/g 7.30E+03 Alpha Bq/g 4.30E+06 1.10E+05 Np-237 ppb (ng/g) 3.81E+04 6.27E+02	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 2.50E+04 Pu-238 ppb (ng/g) 6.65E+03 1.83E+02	0.0012           NA           NA           Pu-236         t1/2           years         2.86           Bq/g         3.50E+05           3.20E+04         106           total activity Bq/g         6.80E+06           1.30E+05         Pu-239           ppb (ng/g)         1.12E+03           2.33E+01         2.33E+01	t1/2 days 1043.88 SB-125 Bq/g 1.20E+04 alpha PHA Pu-240 ppb (ng/g) 1.35E+02 2.55E+00	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq Pu238, Bq Pu-241 ppb (ng/g) <3.97E+01 5.45E-01	Cs-137 Bq/g 1.10E+05 6.00E+03 Pu-242 ppb (ng/g) <3.97E+01 <4.55E-01	Analysis Date 5/28/2003 Ce-144 Bq/g 6.20E+05 Pu-244 ppb (ng/g) <3.97E+01 <4.55E-01	Time elapsed (t) days -573.00 Eu-155 Bq/g 4.20E+03	Pu-238 t1/2, years 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Fractional loss of Pu Pu-236 content ppm 2.54 Analysis Gr gamma Alpha & Beta ICP Pu-Alpha Scan	P (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 Sample ADD-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030820-037 Sample	Analysis Date 6/27/2003 Co-60 Bq/g 7.30E+03 Alpha Bq/g 4.30E+06 1.10E+05 Np-237 ppb (ng/g) 3.81E+04 6.27E+02 Pu-236/Pu-238	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.50E+06 2.00E+04 Pu-238 ppb (ng/g) 6.65E+03 1.83E+02 Relative error	0.0012           NA           Pu-236           total activity Bd'(g)           1.30E+05           Pu-239           pbb (ng/g)           1.12E+03           2.33E+01	t1/2 days 1043.88 SB-125 Bq/g 1.20E+04 alpha PHA Pu-240 ppb (ng/g) 1.35E+02 2.55E+00	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq Pu238, Bq Pu-241 ppb (ng/g) <3.97E+01 5.45E-01	Cs-137 Bq/g 1.10E+05 6.00E+03 Pu-242 ppb (ng/g) <3.97E+01 <4.55E-01	Analysis Date 5/28/2003 Ce-144 Bq/g 6.20E+05 Pu-244 ppb (ng/g) <3.97E+01 <4.55E-01	Time elapsed (t) days -573.00 Eu- 155 Bq/g 4.20E+03	Pu-238 t1/2 , years 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Fractional loss of Pu Pu-236 content ppm 2.54 Analysis Gr gamma Alpha & Beta ICP Pu-Alpha Scan TTA extraction	PP (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 ADD-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058	Analysis Date 6/27/2003 Co-60 Bq/g 7.30E+03 Alpha Bq/g 4.30E+06 1.10E+05 Np-237 ppb (ng/g) 3.81E+04 6.27E+02 Pu-236/Pu-238 ppm (ug/mL)	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 2.00E+04 2.00E+04 Pu-238 ppb (ng/g) 6.65E+05 1.83E+02 Relative error %	0.0012           NA           Pu-236           1.30E+05           2.33E+01	t1/2 days 1043.88 Bq/g 1.20E+04 alpha PHA Pu-240 pb (ng/g) 1.35E+02 2.55E+00	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq Pu238, Bq Pu238, Bq Pu238, Bq Pu238, Bq Say Say Say Say Say Say Say Say Say Say	Cs-137 Bq/g 1.10E+05 6.00E+03 Pu-242 ppb (ng/g) <3.97E+01 <4.55E-01	Analysis Date 5/28/2003 Ce-144 Bq/g 6.20E+05 Pu-244 ppb (ng/g) <3.97E+01 <4.55E-01	Time elapsed (t) <u>days</u> -573.00 Eu- 155 Bq/g 4.20E+03	Pu-238 t1/2 , years 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Pu-236 content ppm 2.54 Analysis Gr gamma Alpha & Beta ICP Pu-Alpha Scan TTA extraction	P (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 ADD-25, 030429-058 DD-25, 030429-058 DD-25, 030429-058 DD-25, 030429-058 DD-25, 030429-058 DD-25, 030429-058 DD-25, 030429-058 DD-25, 030429-058	Analysis Date 6/27/2003 Co-60 Bq/g 7.30E+03 Alpha Bq/g 4.30E+06 1.10E+05 Np-237 ppb (ng/g) 3.81E+04 6.27E+02 Pu-236/Pu-238 ppm (ug/mL) 2.54	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 Beta Bq/g 2.50E+06 2.00E+04 Pu-238 ppb (ng/g) 6.65E+03 1.83E+02 Relative error % 4.2	0.0012           NA           NA           NA           Pu-236         t1/2           years         2.86           Ru-106         Bq/g           3.50E+05         3.20E+04           total activity Bg/g         6.80E+06           1.30E+05         1.30E+05           Pu-239         ppb (ng/g)           1.12E+03         2.33E+01	t1/2 days 1043.88 Ba/g 1.20E+04 alpha PHA Pu-240 ppb (ng/g) 1.35E+02 2.55E+00	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq Pu238, Bq Pu238, Bq Pu-241 ppb (ng/g) <3.97E+01 5.45E-01	Cs-137 Bq/g 1.10E+05 6.00E+03 Pu-242 ppb (ng/g) <3.97E+01 <4.55E-01	Analysis Date 5/28/2003 Ce-144 Bq/g 6.20E+05 Pu-244 ppb (ng/g) <3.97E+01 <4.55E-01	Time elapsed (t) days -573.00 Eu-155 Bq/g 4.20E+03	Pu-238 <u>t1/2, years</u> 87.7	Pu238, 11/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Pu-236 content ppm 2.54 Analysis Gr gamma Alpha & Beta ICP Pu-Alpha Scan TTA extraction	PP (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 Sample ADD-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058	Analysis Date 6/27/2003 Co-60 Bq/g 7.30E+03 Alpha Bq/g 4.30E+06 1.10E+05 Np-237 ppb (ng/g) 3.81E+04 6.27E+02 Pu-236/Pu-238 ppm (ug/mL) 2.54	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 Pu-238 ppb (ng/g) 6.65E+03 1.83E+02 Relative error % 4.2	0.0012           NA           Pu-236           1.30E+05           Pu-239           2.33E+01           1.12E+03           2.33E+01	t1/2 days 1043.88 SB-125 Bq/g 1.20E+04 alpha PHA Pu-240 ppb (ng/g) 1.35E+02 2.55E+00	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq Pu238, Bq Pu-241 ppb (ng/g) <3.97E+01 5.45E-01	Cs-137 Bq/g 1.10E+05 6.00E+03 Pu-242 ppb (ng/g) <3.97E+01 <4.55E-01	Pu-244           pb (ng/g)           <3.97E+01	Time elapsed (t) days -573.00 Eu-155 Bq/g 4.20E+03	Pu-238 t1/2, years 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Fractional loss of Pu Pu-236 content ppm 2.54 Analysis Gr gamma Alpha & Beta ICP Pu-Alpha Scan TTA extraction Bafarance Informetic	PP (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 Sample ADD-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058	Analysis Date 6/27/2003 Co-60 Bq/g 7.30E+03 Alpha Bq/g 4.30E+06 1.10E+05 Np-237 ppb (ng/g) 3.81E+04 6.27E+02 Pu-236/Pu-238 ppm (ug/mL) 2.54	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 Beta Bq/g 2.50E+06 2.00E+04 Pu-238 ppb (ng/g) 6.65E+03 1.83E+02 Relative error % 4.2	0.0012           NA           NA           Pu-236         t1/2           years         2.86           Ru-106         Bq/g           3.50E+05         3.20E+04           total activity Bq/g         6.80E+06           1.30E+05         Pu-239           ppb (ng/g)         1.12E+03           2.33E+01         2.33E+01	t1/2 days 1043.88 SB-125 Bq/g 1.20E+04 alpha PHA Pu-240 pbb (ng/g) 1.35E+00 2.55E+00	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq Pu238, Bq Pu238, Bq Pu238, Bq Pu-241 ppb (ng/g) 5.45E-01	Cs-137 Bq/g 1.10E+05 6.00E+03 Pu-242 ppb (ng/g) <3.97E+01 <4.55E-01	Analysis Date 5/28/2003 Ce-144 Bq/g 6.20E+05 Pu-244 pbb (ng/g) <3.97E+01 <4.55E-01	Time elapsed (t) days -573.00 Eu- 155 Bq/g 4.20E+03	Pu-238 t1/2, years 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Pu-236 content ppm	P (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 ADD-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058	Analysis Date 6/27/2003 Co-60 Bq/g 7.30E+03 Alpha Bq/g 4.30E+06 1.10E+05 Np-237 ppb (ng/g) 3.81E+04 6.27E+02 Pu-236/Pu-238 ppm (ug/mL) 2.54	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 Pu-238 ppb (ng/g) 6.65E+03 1.83E+02 Relative error % 4.2	0.0012           NA           NA           Pu-236         t1/2           years         2.86           Ru-106         Bq/g           3.50E+05         3.20E+04           total activity Bq/g         6.80E+06           1.30E+05         1.30E+05           Pu-239         ppb (ng/g)           1.12E+03         2.33E+01	t1/2 days 1043.88 Bq/g 1.20E+04 alpha PHA Pu-240 ppb (ng/g) 1.35E+02 2.55E+00	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq Pu238, Bq Pu238, Bq Pu238, Bq Pu234, Bq Safeton 5.45E-01	Cs-137 Bq/g 1.10E+05 6.00E+03 Pu-242 ppb (ng/g) <3.97E+01 <4.55E-01	Pu-244           ppb (ng/g)           <3.97E+01	Time elapsed (t) days -573.00 Eu- 155 Bq/g 4.20E+03	Pu-238 <u>t1/2, years</u> 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Pu-236 content ppm 2.54 Analysis Gr gamma Alpha & Beta ICP Pu-Alpha Scan TTA extraction Reference Informati	P (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 Sample ADD-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058	Analysis Date 6/27/2003 Co-60 Bq/g Alpha Bq/g 4.30E+06 1.10E+05 NP-237 ppb (ng/g) 3.81E+04 6.27E+02 Pu-236/Pu-238 ppm (ug/mL) 2.54 Density g/cc	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 Beta Bq/g 2.50E+06 2.00E+04 Pu-238 ppb (ng/g) 6.65E+03 1.83E+02 Relative error % 4.2	0.0012           NA           NA           Pu-236         t1/2           years         2.86           Ru-106         Bq/g           3.50E+05         3.20E+04           total activity Bq/g         6.80E+06           1.30E+05         3.20E+04           years         2.33E+01           LitzE+03         2.33E+01	t1/2 days 1043.88 Ba/g 1.20E+04 alpha PHA Pu-240 ppb (ng/g) 1.35E+02 2.55E+00 nation alculation 1.13E+13	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq Pu238, Bq Pu-241 ppb (ng/g) <3.97E+01 5.45E-01	Cs-137 Bq/g 1.10E+05 6.00E+03 Pu-242 ppb (ng/g) <3.97E+01 <4.55E-01	Analysis Date 5/28/2003 Ce-144 Bq/g 6.20E+05 Pu-244 ppb (ng/g) <3.97E+01 <4.55E-01	Time elapsed (t) days -573.00 Eu-155 Bq/g 4.20E+03	Pu-238 t1/2, years 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Pu-236 content ppm 2.54 Analysis Gr gamma Alpha & Beta ICP Pu-Alpha Scan TTA extraction Reference Informati	PP (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 Sample ADD-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058	Analysis Date 6/27/2003 Co-60 Bq/g 7.30E+03 Alpha Bq/g 4.30E+06 1.10E+05 Np-237 ppb (ng/g) 3.81E+04 6.27E+02 Pu-236/Pu-238 ppm (ug/mL) 2.54 Density g/cc 1.1.143	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 Pu-238 ppb (ng/g) 6.65E+03 1.83E+02 Relative error % 4.2	0.0012           NA           Ru-106           Bq/g           3.50E+05           3.20E+04           total activity Bq/g           6.80E+06           1.30E+05           Pu-239           2.33E+01           1.12E+03           2.33E+01           Reference Inform           Specific activity C           Factor =	t1/2 days 1043.88 SB-125 Bq/g 1.20E+04 alpha PHA Pu-240 ppb (ng/g) 1.35E+02 2.55E+00 alculation 1.13E+13	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq Pu-241 ppb (ng/g) <3.97E+01 5.45E-01	Cs-137 Bq/g 1.10E+05 6.00E+03 Pu-242 ppb (ng/g) <3.97E+01 <4.55E-01 M g/mol	Pu-244           pb (ng/g)           <3.97E+01	Time elapsed (t) days -573.00 Eu-155 Bq/g 4.20E+03	Pu-238 <u>t1/2, years</u> 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Fractional loss of Np Pu-236 content ppm	P (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 Sample ADD-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058 DDJ-25, 030429-058	Analysis Date 6/27/2003 Co-60 Bq/g 7.30E+03 Alpha Bq/g 4.30E+06 1.10E+05 Np-237 ppb (ng/g) 3.81E+04 6.27E+02 Pu-236/Pu-238 ppm (ug/mL) 2.54 Density g/cc 11.143 2.0.476	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 Pu-238 ppb (ng/g) 6.65E+06 2.00E+04 Pu-238 ppb (ng/g) 1.83E+02 Relative error % 4.2	0.0012 NA NA NA Pu-236 t1/2 years 2.86 Ru-106 Bq/g 3.50E+05 3.20E+04 total activity Bg/g 6.80E+06 1.30E+05 Pu-239 ppb (ng/g) 1.12E+03 2.33E+01 Reference Inform Specific activity C Factor = Co-60	t1/2 days 1043.88 Bq/g 1.20E+04 alpha PHA Pu-240 ppb (ng/g) 1.35E+02 2.55E+00 nation alculation 1.13E+13	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq Pu238, Bq Pu238, Bq Pu-241 ppb (ng/g) <3.97E+01 5.45E-01	Cs-137 Bq/g 1.10E+05 6.00E+03 Pu-242 ppb (ng/g) <3.97E+01 <4.55E-01 M g/mol 59.9338222	Pu-244           ppb (ng/g)           <3.97E+011	Time elapsed (t) <u>days</u> -573.00 Eu-155 Bq/g 4.20E+03	Pu-238 <u>t1/2, years</u> 87.7	Pu238, 11/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Pu-236 content ppm 2.54 Analysis Gr gamma Alpha & Beta ICP Pu-Alpha Scan TTA extraction Reference Informati NpO2 Np237 Pu238	P (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 ADD-25, 030429-058 DDJ-25, 030429-058	Analysis Date p in Analysis Date 6/27/2003 Cc-60 Bq/g 4.30E+06 1.10E+05 1.10E+05 1.10E+05 1.10E+05 1.10E+05 1.10E+05 Pu-237 ppb (ng/g) 3.81E+04 6.27E+02 Pu-236/Pu-238 ppm (ug/mL) 2.54 Density g/cc 1.1.43 20.476 19.881	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 2.00E+04 2.00E+04 2.00E+04 Pu-238 ppb (ng/g) 6.65E+03 1.83E+02 Relative error % 4.2	0.0012           NA           Ru-106           Bq/g           3.50E+05           3.20E+04           1.30E+05           1.30E+05           Pu-239           ppb (ng/g)           1.12E+03           2.33E+01           Specific activity C           Factor =           Co-60           Zr-95	t1/2 days 1043.88 Ba/g 1.20E+04 alpha PHA Pu-240 ppb (ng/g) 1.35E+02 2.55E+00 alculation 1.13E+13	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq Pu238, Bq Pu238, Bq Pu-241 ppb (ng/g) <3.97E+01 5.45E-01 5.45E-01 5.45E-01 5.45E-01 5.45E-01 5.45E-01	Cs-137 Bq/g 1.10E+05 6.00E+03 Pu-242 ppb (ng/g) <3.97E+01 <4.55E-01 M g/mol 59.9338222 94.9080427	Analysis Date 5/28/2003 Ce-144 Bq/g 6.20E+05 Pu-244 ppb (ng/g) <3.97E+01 <4.55E-01 Specific activity Ci/g 1130.670 21469.000	Time elapsed (t) days -573.00 Eu-155 Bq/g 4.20E+03	Pu-238 t1/2, years 87.7	Pu238, 11/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Fractional loss of Np Pu-236 content ppm 2.54 Analysis Gr gamma Alpha & Beta ICP Pu-Alpha Scan TTA extraction Reference Informati NpO2 Np237 Pu238 Pu239	P (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 Sample ADD-25, 030429-058 DDJ-25, 030429-058	Analysis Date 6/27/2003 Co-60 Bq/g 7.30E+03 Alpha Bq/g 4.30E+06 1.10E+05 Np-237 ppb (ng/g) 3.81E+04 6.27E+02 Pu-236/Pu-238 ppm (ug/mL) 2.54 Density g/cc 11.143 20.476 (19.851 19.851	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 2.50E+04 2.50E+04 Pu-238 ppb (ng/g) 6.65E+03 1.83E+02 Relative error % 4.2	0.0012           NA           Reference Inform           Specific activity C           Factor =           Co-60           Zr-95           Ru-106	t1/2 days 1043.88 SB-125 Bq/g 1.20E+04 alpha PHA Pu-240 ppb (ng/g) 1.35E+02 2.55E+00 nation 1.13E+13	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq Pu-241 ppb (ng/g) <3.97E+01 5.45E-01 5.45E-01 T1/2 s 166328640 5531328 32278176	Cs-137 Bq/g 1.10E+05 6.00E+03 Pu-242 ppb (ng/g) <3.97E+01 <4.55E-01 M g/mol 59.9338222 94.9080427 105.9073269	Pu-244           pp/ (ng/g)           <3.97E+01	Time elapsed (t) days -573.00 Eu-155 Bq/g 4.20E+03	Pu-238 t1/2 , years 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Fractional loss of Np Pu-236 content ppm 2.54 Analysis Gr gamma Alpha & Beta ICP U-Alpha Scan TTA extraction Reference Informati NpO2 Np237 Pu238 Pu240	P (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 ADD-25, 030429-058 DDJ-25, 040450 DDJ-25, 0404	Analysis Date 6/27/2003 Co-60 Bq/g 7.30E+03 Alpha Bq/g 4.30E+06 1.10E+05 Np-237 ppb (ng/g) 3.81E+04 6.27E+02 Pu-236/Pu-238 ppm (ug/mL) 2.54 Density g/cc 11.143 2.0.476 19.851 19.851	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 2.00E+04 Pu-238 ppb (ng/g) 6.65E+02 1.83E+02 Relative error % 4.2	0.0012           NA           Ru-106           Specific activity C           Factor =           Co-60           Zr-95           Ru-106           SB-125	t1/2 days 1043.88 Bq/g 1.20E+04 alpha PHA Pu-240 ppb (ng/g) 1.35E+00 2.55E+00 action 1.13E+13	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq Pu238, Bq Pu238, Bq Pu238, Bq Pu238, Bq Pu238, Bq Pu238, Bq Su27874 5.45E-01 5.45E	Cs-137 Bq/g 1.10E+05 6.00E+03 Pu-242 ppb (ng/g) <3.97E+01 <4.55E-01 4.55E-01 9.9382222 94.9080427 105.9073266 105.9073266 124.9052478	Analysis Date 5/28/2003 Ce-144 Bq/g 6.20E+05 	Time elapsed (t) <u>days</u> -573.00 Eu-155 Bq/g 4.20E+03	Pu-238 <u>t1/2, years</u> 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Fractional loss of Np Pu-236 content ppm 2.54 Analysis Gr gamma Alpha & Beta ICP U-Alpha Scan TTA extraction Reference Informati NpO2 Np237 Pu238 Pu239 Pu240 Pu241	P (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 Sample ADD-25, 030429-058 DD25, 030820-037 Sample ADD-25, 030429-058 DD25, 030820-037 Sample ADD-25, 030429-058 DD25, 030429-058 DD25, 030429-058 DD25, 030429-058 DD25, 030429-058 On MW 269.047 237.0482 238.0496 239.0522 240.0538	Analysis Date p in Co-60 Bq/g 7.30E+03 Alpha Bq/g 4.30E+06 1.10E+05 Np-237 ppb (ng/g) 3.81E+04 6.27E+02 Pu-236/Pu-238 ppm (ug/mL) 2.54 Density g/cc 11.143 2.0.476 1.9.851 1.9.851	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 2.00E+04 2.00E+04 2.00E+04 2.00E+04 Pu-238 ppb (ng/g) 6.65E+03 1.83E+02 Relative error % 4.2	0.0012           NA           Pu-236           1.302+05           3.502+06           1.302+05           Pu-239           ppb (ng/g)           1.12E+03           2.33E+01           Specific activity C           Factor =           Co-60           Zr-95           Ru-106           SB-125           Cs-134	t1/2 days 1043.88 Ba/g 1.20E+04 alpha PHA Pu-240 ppb (ng/g) 1.35E+02 2.55E+00 alculation 1.13E+13	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq Pu238, Bq Pu238, Bq Pu234 Pu-241 ppb (ng/g) <3.97E+01 5.45E-01 5.45E-01 166328640 5531328 32278176 87042172.32 65160132.48	Cs-137 Bq/g 1.10E+05 6.00E+03 Pu-242 ppb (ng/g) <3.97E+01 <4.55E-01 59.9338222 94.9080427 105.9073269 124.9052478 133.9067134	Analysis Date 5/28/2003 Ce-144 Bq/g 6.20E+05 Pu-244 ppb (ng/g) <3.97E+01 <4.55E-01 Specific activity Ci/g 1130.670 21469.000 3306.000 1048.000 1294.000	Time elapsed (t) days -573.00 Eu-155 Bq/g 4.20E+03	Pu-238 11/2, years 87.7	Pu238, 11/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Fractional loss of Np Pu-236 content ppm 2.54 Analysis Gr gamma Alpha & Beta ICP Pu-Alpha Scan TTA extraction Reference Informati NpO2 Np237 Pu238 Pu239 Pu240 Pu241 Pu242	P (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 Sample ADD-25, 030429-058 DDJ-25, 030429-058 Con MW 269.047 237.0482 239.0522 240.0538 241.0568 241.0568 241.0568	Analysis Date 6/27/2003 Co-60 Bq/g 7.30E+03 Alpha Bq/g 4.30E+06 1.10E+05 NP-237 ppb (ng/g) 3.81E+04 6.27E+02 Pu-236/Pu-238 ppm (ug/mL) 2.54 Density g/cc 11.143 2.0.476 19.851 19.851 19.851	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 2.50E+04 2.50E+04 Pu-238 ppb (ng/g) 6.65E+03 1.83E+02 Relative error % 4.2	0.0012           NA           Reference inform           Specific activity C           Factor =           Co-60           Zr-95           Ru-106           SB-125           Cs-134           Cs-137	t1/2 days 1043.88 SB-125 Bq/g 1.20E+04 alpha PHA Pu-240 ppb (ng/g) 1.35E+02 2.55E+00 nation 1.13E+13	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq Pu238, Bq Pu-241 ppb (ng/g) <3.97E+01 5.45E-01	Cs-137 Bq/g 1.10E+05 6.00E+03 Pu-242 ppb (ng/g) <3.97E+01 <4.55E-01 4.55E-01 59.9338222 94.9080427 105.9073269 124.9052478 133.9067134 136.9071835	Analysis Date 5/28/2003 Ce-144 Bq/g 6.20E+05 6.20E+05 4.20E+05 4.55E-01 4.55E-01 4.55E-01 1130.670 21469.000 3306.000 1294.000 1048.000 1048.000 87.000	Time elapsed (t) days -573.00 Eu-155 Bq/g 4.20E+03	Pu-238 t1/2, years 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Fractional loss of Np Pu-236 content ppm 2.54 Analysis Gr gamma Alpha & Beta ICP U-Alpha Scan TTA extraction Reference Informati NpO2 Np237 Pu238 Pu240 Pu241 Pu242 Conversion	P (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 ADD-25, 030429-058 DDJ-25,	Analysis Date 6/27/2003 Co-60 Bq/g 7.30E+03 Alpha Bq/g 4.30E+06 1.10E+05 Np-237 ppb (ng/g) 3.81E+04 6.27E+02 Pu-236/Pu-238 ppm (ug/mL) 2.54 Density g/cc 11.143 2.0.476 5.19.851 19.851 19.851 19.851	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 2.00E+04 Pu-238 ppb (ng/g) 6.65E+06 2.00E+04 Pu-238 pb (ng/g) 1.83E+02 Relative error % 4.2	0.0012           NA           Pu-236           PU-239           ppb (ng/g)           1.12E+03           2.33E+01           Specific activity C           Factor =           Co-60           Zr.95           Ru-106           SB-125           Cs-137           Ce-144	t1/2 days 1043.88 Bq/g 1.20E+04 alpha PHA Pu-240 ppb (ng/g) 1.35E+00 2.55E+00 nation 1.13E+13	Adjusted Pu-236 ppm 3.79 Cs-134 Bq/g 1.60E+04 2.00E+03 Pu238, Bq Pu238, Bq Pu238, Bq Pu238, Bq Pu238, Bq Pu238, Bq Su2787 5.45E-01 5.45E-01 5.45E-01 5.45E-01 5.45E-01 5.6132.48 322781276 87042172.32 65160132.48 948937032 246147552.5	Cs-137 Bq/g 1.10E+05 6.00E+03 Pu-242 ppb (ng/g) <3.97E+01 <4.55E-01 <4.55E-01 9.938222 94.9080427 105.9073269 124.9052478 133.9067134 136.9070835 143.9136427	Analysis Date 5/28/2003 Ce-144 Bq/g 6.20E+05 Pu-244 ppb (ng/g) <3.97E+01 <4.55E-01 <4.55E-01 Specific activity Ci/g 1130.670 21469.000 1048.000 1048.000 1024.000 87.000 31122.800 87.000 31122.800 87.000 3122.800 87.000 3122.800 87.000 3122.800 87.000 3122.800 87.000 3122.800 87.000 3122.800 87.000 3122.800 87.000 3122.800 87.000 3122.800 87.000 3122.800 87.000 3122.800 87.000 3122.800 87.000 3122.800 87.0000 87.0000 87.0000 87.0000 87.0000 87.0000 87.0000 87.0000 87.0000 87.0000 87.0000 87.0000 87.00000 87.00000 87.00000 87.000000 87.0000000 87.000000000000000000000000000000000000	Time elapsed (t) days -573.00 Eu-155 Bq/g 4.20E+03	Pu-238 <u>t1/2, years</u> 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160
Conversion of Np to 1 Fractional loss of Np Fractional loss of Np Fractional loss of Np Pu-236 content ppm	P (mol basis) = Fp prod/N in Liq Waste (wt basis) in Liq Waste (wt basis) Discharge Date 11/1/2001 ADD-25, 030429-058 DD-25, 030429-058 DD-25, 030429-058 DD-25, 030429-058 DD-25, 030429-058 DD-25, 030429-058 DD-25, 030429-058 DD-25, 030429-058 DD-25, 030429-058 DD-25, 030429-058 Con MW 269.047 237.0482 238.0496 239.0522 240.0583 241.0568 242.0587 3.70E+10	Analysis Date p in Co-60 Bq/g 7.30E+03 Alpha Bq/g 4.30E+06 1.10E+05 1.10E+05 1.10E+05 1.10E+05 1.10E+05 2.37 ppb (ng/g) 3.81E+04 6.27E+02 Pu-236/Pu-238 ppm (ug/mL) 2.54 Density g/cc 11.143 2.0476 19.851 19.	= = elapsed (t) days -603.00 Zr-95 Bq/g 2.70E+04 Pu-238 ppb (ng/g) 6.65E+03 1.83E+02 Relative error % 4.2	0.0012           NA           Pu-236           1.30E+05           3.30E+06           1.30E+05           Pu-239           ppb (ng/g)           1.12E+03           2.33E+01           Specific activity C           Factor =           Co-60           Zr-95           Ru-106           SB-125           Cs-134           Ce-144           Eu-155	t1/2 days 1043.88 Ba/g 1.20E+04 alpha PHA Pu-240 ppb (ng/g) 1.35E+02 2.55E+00 alculation 1.13E+13	Adjusted Pu-236 ppm 3.79 3.79 1.60E+04 2.00E+03 Pu238, Bq Pu238, Bq Pu238, Bq Pu238, Bq 2.397E+01 5.45E-01 5.45	Cs-137 Bq/g 1.10E+05 6.00E+03 Pu-242 ppb (ng/g) <3.97E+01 <4.55E-01 v4.55E-01 v4.55E-01 v4.55E-01 v4.9338222 94.9080427 105.9073269 133.9067134 136.9070335 133.9067134 136.9070835 133.906725478	Analysis Date 5/28/2003 Ce-144 Bq/g 6.20E+05 Ce-144 ppb (ng/g) <3.97E+01 <4.55E-01 Specific activity Ci/g 1130.670 21469.000 306.000 1048.000 1294.000 87.000 3182.800	Time elapsed (t) days -573.00 Eu-155 Bq/g 4.20E+03	Pu-238 11/2, years 87.7	Pu238, t1/2 days 32032.425	Adjusted Pu-238, g 0.000160

NpO2	269.047	11.143		S	g/mol
Np237	237.0482	20.476	Co-60	166328640	59.9338222
Pu238	238.0496	19.851	Zr-95	5531328	94.9080427
Pu239	239.0522	19.851	Ru-106	32278176	105.9073269
Pu240	240.0538	19.851	SB-125	87042172.32	124.9052478
Pu241	241.0568	19.851	Cs-134	65160132.48	133.9067134
Pu242	242.0587	19.851	Cs-137	948937032	136.9070835
Conversion	3.70E+10	Bq/Ci	Ce-144	24614755.2	143.9136427
365.25	days/year		Eu- 155	150248889.4	154.9228894
$N = N^{\circ} * exp - (In2/t_{1/2} *$	t)		Pu-238	2767601520	238.0495534

(5.80 MeV Area Counts X Pu-236<sub>r1/2</sub> X 236) X 1E6 (Full Spectrum Counts X Pu-238<sub>r1/2</sub> X 238) Pu-236/238 ppm =

Relative Error =

2 X (5.80 MeV Area Counts)<sup>1/2</sup> 5.80 Area Counts

			· ·		1				
			Dosimeter			Vanadium Aci	id Waste		
			MK-20.4			and Washes			
			Np (g) =	0.001443			g	mole	
Acid solution						Np-237 =	0.0000029	1.22363E-09	
	3 M HNO3		· · · · · · · · · · · · · · · · · · ·			Pu-238 =	0.0000056	2.34993E-09	
	7 mL	▶ ▶	Vanadium Dissolu	tion		Pu-239 =	0.0000011	4.39847E-10	
		_	22 hour acid diges	stion		Pu-240 =	0.0000001	4.57431E-11	
Washes = 2 X 6 m	L	1▶				Pu-241 =			
	3 M HNO3		-			19	mL		
	12 ml						=		1
		4	<b>↓</b>						
ssolver Solution	8 M HNO3	⊢	3 hour digestion		•	8 14	M HNO3 mL		
	0.1 M NaF					-			
	8 mL								
		4	4						
			Np Product	q	mole		Fission Prod	q	mole
			Np-237 =	0.000744	3.14067E-06		Zr-95 =	4.83731E-10	5.09683
			Pu-238 =	0.000120	5.02411E-07		Ru-106 =	4.12299E-08	3.89301
			Pu-239 =	0.000018	7.50455E-08		SB-125 =	3.34447E-09	2.67761
			Pu-240 =	0.000002	7.95345E-09		Cs-134 =	4.5646E-09	3.40879
			Pu-241 =		0		Cs-137 =	4.77481E-07	3.48763
			Total Pu =	0.000139	5.8541E-07		Ce-144 =	7.74943E-08	5.38478
			Sample wgt =	24.0158			Eu-155 =		
			Vol (mL) =	22				•	,
						1			
	Desimator	1	1	Solution 8	Solution				
	I I A ISILIEIEI								

,	· · · · ·	Dosimeter	,,	(	Solution &	Solution	,,	í′		,,	Adjusted Pu-	, <del></del> r
Target	Diss #	Np input	Np input	Vial Tare	Vial	weight	Np Prod.	Np Prod.	Pu-238	Pu-236	236 ppm	Total Pu
<u>ا</u>	<u>ر                                     </u>	g	mole	g	g	g	g l	mole	g	ppm	ppm	g
MK-20.4	ADD-23	0.001443	6.09E-06	27.0334	51.0492	24.015800	0.000744	3.14E-06	0.000120	2.380000	3.551951	0.000139
· · · · · ·	DDJ-23		, —	27.1932	44.4586	17.265400	0.0000029	í'		,,		

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		Actual	Predicted (BGS)	Actual/Pred
Np Residual Amount (wt basis) Np prod / Np in	=	0.5159		#DIV/0!
Pu-238/Total Pu (wt basis)	=	0.8577		#DIV/0!
Conversion of Np to Pu (mol basis) = Pu total/ Np in	=	0.0962		#DIV/0!
Conversion of Np to FP (mol basis) = Fp prod/Np in	=	0.0007		
Fractional loss of Np in Liq Waste (wt basis)	=	NA		
Fractional loss of Pu in Liq Waste (wt basis)	=	NA		

			Time					Time			
Pu-236 content		Analysis	elapsed (t)	Pu-236 t1/2	t1/2	Adjusted		elapsed (t)	Pu-238	Pu238, t1/2	Adjusted
ppm	Discharge Date	Date	days	years	days	Pu-236 ppm	Analysis Date	days	t1/2, years	days	Pu-238, g
2.38	11/1/2001	6/27/2003	-603.00	2.86	1043.88	3.55	5/28/2003	-573.00	87.7	32032.425	0.000121

Apolycia	Sampla	Co 60	7r 05	Du 106	CD 125	Co 124	Co 127	Co 144	Eu 166
Analysis	Sample	00-00	21-95	Ru-100	3B-123	05-134	08-137	06-144	Eu- 155
		Bq/g	Bq/g	Bq/g	Bq/g	Bq/g	Bq/g	Bq/g	Bq/g
Gr gamma	ADD-23, 030429-056		1.60E+04	2.10E+05	5.40E+03	9.10E+03	6.40E+04	3.80E+05	3.80E+03
	DDJ-23, 030820-036	7.30E+03		1.80E+04		2.10E+03	4.70E+03		
Alpha & Beta	Sample	Alpha Bq/g	Beta Bq/g	total activity Bq/g	alpha PHA	Pu238, Bq			
	ADD-23, 030429-056	2.90E+06	1.80E+06	6 4.70E+06					
	DDJ-23, 030820-036	1.90E+04	2.51E+05	2.70E+05					
ICP	Sample	Np-237	Pu-238	Pu-239	Pu-240	Pu-241	Pu-242	Pu-244	
		ppb (ng/g)	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)	
	ADD-23, 030429-056	3.10E+04	4.98E+03	7.47E+02	7.95E+01	<3.97E+01	<3.97E+01	<3.97E+01	
	DDJ-23, 030820-036	1.68E+02	3.24E+01	6.09E+00	6.36E-01	<4.55E-01	<4.55E-01	<4.55E-01	
				_					
Pu-Alpha Scan	Sample	Pu-236/Pu-23	Relative error	-					
TTA extraction		ppm (ug/mL)	%						
	ADD-23, 030429-056	2.38	5.2						

Reference Informati	on		Refer	ence Inform	ation			
	MW	Density	Speci	fic activity Ca	alculation			
	1 1	g/cc	Facto	r = .	1.13E+13	T1/2	М	Specific activity
NpO2	269.047	11.143				s	g/mol	Ci/g
Np237	237.0482	20.476	Co-60	)		166328640	59.9338222	1130.670
Pu238	238.0496	19.851	Zr-95			5531328	94.9080427	21469.000
Pu239	239.0522	19.851	Ru-10	06		32278176	105.9073269	3306.000
Pu240	240.0538	19.851	SB-12	25		87042172.32	124.9052478	1048.000
Pu241	241.0568	19.851	Cs-13	34		65160132.48	133.9067134	1294.000
Pu242	242.0587	19.851	Cs-13	37		948937032	136.9070835	87.000
Conversion	3.70E+10	Bq/Ci	Ce-14	14		24614755.2	143.9136427	3182.800
365.25	days/year		Eu- 1	55		150248889.4	154.9228894	465.000
N = N° *exp -(In2/t <sub>1/2</sub> *	t)		Pu-23	38		2767601520	238.0495534	17.119

(5.80 MeV Area Counts X Pu-236<sub>r1/2</sub> X 236) X 1E6 (Full Spectrum Counts X Pu-238<sub>r1/2</sub> X 238) Pu-236/238 ppm =

Relative Error =

2 X (5.80 MeV Area Counts)<sup>1/2</sup> 5.80 Area Counts

	Acid solution			Dosimeter MK-20.6 Np (g) =	0.001557							
	3	M HNO3		Ļ			Vanadium Aci	d Waste				
	7	mL		Vanadium Dissolu	tion	4	and Washes					
				22 hour acid diges	tion		19	mL				
	Washes = 2 X 6 mL											
	3	M HNO3										
	12	. IIIL		. ↓								
			-	Np Dissolution		1.	Product Wash	es = 2 X 7 mL		1		
	Dissolver Solution			3 hour digestion		•	8	M HNO3				
	0.1	M NaF	-				14	IIIL		1		
	8	mL		· · · · · · · · · · · · · · · · · · ·		4						
				Np Product	g	mole		Fission Prod	g	mole		
				NP-237 =	0.000951	4.01241E-06		ZI-95 = Ru-106 =	7.66351E-08	7 23605E-10		
				Pu-239 =	0.000032	1.33901E-07		SB-125 =	7.00001E 00	0		
				Pu-240 =	0.000004	1.74297E-08		Cs-134 =	1.19386E-08	8.91559E-11		
				Pu-241 =		0		Cs-137 =	9.94387E-07	7.26323E-09		
				Total Pu =	0.000215	9.03374E-07		Ce-144 =	1.61144E-07	1.11973E-09		
				Sample wgt =	22.8638			Eu-155 =	1.46179E-08	9.43563E-11		
				Vol (mL) =	22							
		Dosimeter No			Solution &	Solution					Adjusted Pu-	1
Target	Diss #	input	Np input	Vial Tare	Vial	weight	Np Prod.	Np Prod.	Pu-238	Pu-236	236 ppm	Total Pu
		g	mole	g	g	g	g	mole	g	ppm	ppm	g
MK-20.6	ADD-24	0.001557	6.57E-06	27.1896	50.0534	22.863800	0.000951	4.01E-06	0.000179	2.840000	4.238463	0.000215
	D33-24			27.1301	40.0320	19.0140						
				Actual		Predicted (BC	GS)	Actual/Pred				
Np Residual Amount	(wt basis) Np prod / Np in		=	0.6109				#DIV/0!				
Pu-238/Total Pu (wt	t basis)		=	0.8318				#DIV/0!				
Conversion of Np to	Pu (mol basis) = Pu total/ I	Np in	=	0.1375				#DIV/0!				
Eractional loss of No	in Lig Waste (wt basis)	ip in	-	0.0014								
Fractional loss of Pu	in Liq Waste (wt basis)		-	NA								
			Time	_		Adlineta			Time			
Pu-236 content			elapsed (t)	Pu-236 t1/2	t1/2	Adjusted			elapsed (t)	Pu-238	Pu238, t1/2	Adjusted
ppm	Discharge Date	Analysis Date	days	years	days	Pu-236 ppm		Analysis Date	days	t1/2, years	days	Pu-238, g
2.04	11/1/2001	6/27/2003	-003.00	2.00	1043.66	4.24		5/26/2003	-57 3.00	07.7	32032.425	0.000181
										_		
Analysis	Sample	Co-60	Zr-95	Ru-106	SB-125	Cs-134	Cs-137	Ce-144	Eu- 155	1		
0	ADD 04 000400 057	Bq/g	Bq/g	Bq/g	Bq/g	Bq/g	Bq/g	Bq/g	Bq/g	4		
Gr gamma	ADD-24, 030429-057		3.50E+04	4.10E+05		2.50E+04	1.40E+05	8.30E+05	1.10E+04			
Alpha & Beta	Sample	Alpha Bq/g	Beta Bq/g	total activity Bq/g	alpha PHA	Pu238, Bg	1					
	ADD-24, 030429-057	4.90E+06	3.60E+06	8.50E+06								
ICP	Samolo	No. 227	Du-220	Du 220	Du-240	Du. 244	Du. 949	Du 244	1			
104	Sample	ppb (ng/a)	ppb (ng/a)	ppb (ng/g)	ppb (ng/a)	ppb (ng/a)	ppb (ng/a)	ppb (ng/g)				
	1	11	······································		1 0 0 5 9/	1	17-1-3-3/	11				
	ADD-24, 030429-057	4.16E+04	7.83E+03	1.40E+03	1.83E+02	<3.98E+01	<3.98E+01	<3.98E+01				
<b>L</b>	ADD-24, 030429-057	4.16E+04	7.83E+03	1.40E+03	1.83E+02	<3.98E+01	<3.98E+01	<3.98E+01	I			
Pu-Alpha Scan	ADD-24, 030429-057 Sample	4.16E+04	7.83E+03 Relative error	1.40E+03	1.83E+02	<3.98E+01	<3.98E+01	<3.98E+01	I			
Pu-Alpha Scan TTA extraction	ADD-24, 030429-057 Sample	4.16E+04 Pu-236/Pu-238 ppm (ug/mL)	7.83E+03 Relative error	1.40E+03	1.83E+02	<3.98E+01	<3.98E+01	<3.98E+01	I			

	MW	Density g/cc
NpO2	269.047	11.143
Np237	237.0482	20.476
Pu238	238.0496	19.851
Pu239	239.0522	19.851
Pu240	240.0538	19.851
Pu241	241.0568	19.851
Pu242	242.0587	19.851
Conversion	3.70E+10 E	3q/Ci
365.25	days/year	

Reference Info	rmation			
Specific activity	Calculation			
Factor =	1.13E+13	T1/2	М	Specific activity
		s	g/mol	Ci/g
Co-60		166328640	59.9338222	1130.67
Zr-95		5531328	94.9080427	21469.00
Ru-106		32278176	105.9073269	3306.00
SB-125		87042172.32	124.9052478	1048.00
Cs-134		65160132.48	133.9067134	1294.00
Cs-137		948937032	136.9070835	87.00
Ce-144		24614755.2	143.9136427	3182.800
Eu- 155		150248889.4	154.9228894	465.000
Pu-238		2767601520	238.0495534	17.119
	1			

Pu-236/238 ppm =	(5.80 MeV Area Counts X Pu-236, X 236) X 1E6
	(Full Spectrum Counts X Pu-238 <sub>T1/2</sub> X 238
Relative Error =	2 X (5.80 MeV Area Counts) <sup>1/2</sup>
	5.80 Area Counts

				Dosimeter MK-20.2 Np (g) =	0.001466							
	Acid solution	MUNO2					Vanadium A-:	d Maata	1			
	3	ml HNU3	<b></b>	Vanadium Discolu	tion	1	vanadium Aci	u vvaste				
		ml		22 hour acid diges	tion	•	and washes	ml				
	Washes = 2 X 6 mL			LL from doid digod			10		1			
	3	M HNO3	F									
	12	mL										
				*						•		
			r	Np Dissolution			Product Wash	es = 2 X 7 mL				
	Dissolver Solution		<b>&gt;</b>	3 hour digestion		•	8	M HNO3				
	01	M NaF	-				14	IIIL				
	8	mL		<u> </u>		8						
	L Contraction of the second se			4								
				Np Product	g	mole		Fission Prod	g	mole	1	
				Np-237 =	0.001114	4.70081E-06		Zr-95 =	1.30419E-09	1.37416E-11	1	
				Pu-238 =	0.000214	8.99056E-07		Ru-106 =	9.70877E-08	9.16723E-10	1	
				Pu-239 =	0.000042	1.74406E-07		SB-125 =	7.81968E-09	6.26049E-11	1	
				Pu-240 =	0.000005	5.03144E-09		Cs-134 = Cs-137 =	1.42495E-08	8.60033E-09	1	
				Total Pu =	0.000262	1.10123E-06		Ce-144 =	1.974E-07	1.37166E-09	1	
				Sample wgt =	25.2680	00		Eu- 155 =			1	
				Vol (mL) =	22		'					
				•								
		Dosimeter			Solution &	Solution					Adjusted Pu-	<b>T</b> ( ) <b>D</b>
larget	Diss #	Np input	Np input	Vial Lare	Viai	weight	Np Prod.	Np Prod.	Pu-238	Pu-236	236 ppm	Total Pu
MK-20.2	ADD-22	0.001466	6 18E-06	27 1953	52 4633	9 25 268000	9 0.001114	4 70E-06	0 000214	2 230000	3 328089	9 0 000262
	DDJ-22			26.9513	46.8505	19.899200						
				Actual		Predicted (BC	GS)	Actual/Pred				
Np Residual Amount	t (wt basis) Np prod / Np in		=	0.7601				#DIV/0!				
Conversion of Nn to	Pu (mol basis) = Pu total/	Nn in	=	0.8157				#DIV/0!				
Conversion of Np to	FP (mol basis) = Fp prod/N	lo in	=	0.0018				#01110				
Fractional loss of Np	in Liq Waste (wt basis)	r.	=	NA								
Fractional loss of Pu	in Liq Waste (wt basis)		=	NA								
-	1									1		
Bu 226 content		Analysis	lime	Bu 226 +1/2	+1/2	Adjusted			l ime	Du 229	Bu220 +1/2	Adjusted
ppm	Discharge Date	Date	davs	vears	davs	Pu-236 ppm		Analysis Date	davs	t1/2. vears	davs	Pu-238. a
2.23	3 11/1/2001	6/27/2003	-603.00	2.86	1043.88	3.33		5/28/2003	-573.00	87.7	32032.425	0.000217
Analysis	Sample	Co-60	7r-95	Pu-106	SB-125	Ce-134	Ce-137	Ce-144	Eu. 155	1		
Andiysis	Sample	Ba/a	Ba/a	Ba/a	Ba/a	Ba/a	Ba/a	Ba/a	Eu- 155 Ba/a			
Gr gamma	ADD-22, 030429-055	54.9	4.10E+04	4.70E+05	1.20E+04	2.70E+04	1.50E+05	9.20E+05	24.9			
										-		
Alpha & Beta	Sample	Alpha Bq/g	Beta Bq/g	total activity Bq/g	alpha PHA	Pu238, Bq						
L	ADD-22, 030429-055	5.40E+06	3.80E+06	9.20E+06								
ICP	Sample	Np-237	Pu-238	Pu-239	Pu-240	Pu-241	Pu-242	Pu-244	1			
		ppb (ng/g)	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)				
	ADD-22, 030429-055	4.41E+04	8.47E+03	1.65E+03	2.16E+02	4.80E+01	<4.0 E+01	<4.0 E+01				
Du Alaba Casa	Comple	Du 006/Du 00	Deletive error	1								
Pu-Alpha Scan	Sample	Pu-236/Pu-23	Kelative error									
TA EXILAGUON	ADD-22, 030429-055	2.23	/0									
		2.20	0.2	4								

Reference informatio	n		Reference infor	mation			
	MW	Density	Density Specific activity Calculation				
		g/cc	Factor =	1.13E+13	T1/2	M	Specific activity
NpO2	269.047	11.143			s	g/mol	Ci/g
Np237	237.0482	20.476	Co-60		166328640	59.9338222	1130.670
Pu238	238.0496	19.851	Zr-95		5531328	94.9080427	21469.000
Pu239	239.0522	19.851	Ru-106		32278176	105.9073269	3306.000
Pu240	240.0538	19.851	SB-125		87042172.32	124.9052478	1048.000
Pu241	241.0568	19.851	Cs-134		65160132.48	133.9067134	1294.000
Pu242	242.0587	19.851	Cs-137		948937032	136.9070835	87.000
Conversion	3.70E+10	Bq/Ci	Ce-144		24614755.2	143.9136427	3182.800
365.25 0	days/year		Eu- 155		150248889.4	154.9228894	465.000
N = N° *exp -(In2/t <sub>1/2</sub> * 1	t)		Pu-238		2767601520	238.0495534	17.119

Pu-236/238 ppm =	(5.80 MeV Area Counts X Pu-236 <sub>F1/2</sub> X 236) X 1E6
	(Full Spectrum Counts X Pu-238 <sub>T1/2</sub> X 238)
Relative Error =	2 X (5.80 MeV Area Counts) <sup>1/2</sup> 5.80 Area Counts

				Dosimeter MK-20.1								
	Acid solution			Np (g) =	0.001942							
	3	M HNO3				-	Vanadium Ac	id Waste				
	7	mL	<b>→</b>	Vanadium Dissolu	ition	•	and Washes					
	Washes = 2 X 6 mL		<b></b> >	22 nour acid diges	Stion		19	/ mL				
	3	M HNO3	, r									
	12	mL		Ļ								
				No Dissolution			Product Wash	nes = 2 X 7 ml				
	Dissolver Solution			3 hour digestion		•	8	M HNO3				
	8	M HNO3		Ū			14	mL				
	0.1	M NaF		L								
	0	IIIL		4	,							
				Np Product	g	mole		Fission Prod	g	mole		
				Np-237 =	0.001399	5.90286E-06	6	Zr-95 =	2.38194E-09	2.50973E-11		
				Pu-239 =	0.000064	2.69359E-07	7	SB-125 =	1.40511E-08	1.12494E-10		
				Pu-240 =	0.000010	4.34334E-08	3	Cs-134 =	2.68979E-08	2.0087E-10		
				Pu-241 = Total Pu =	0.000002	1.58061E-06	ŝ	Ce-144 =	2.23114E-06 3.5751E-07	2.4842E-09		
				Sample wgt =	24.7657		1	Eu- 155 =	1.41066E-08	9.10555E-11		
				Vol (mL) =	22		J					
		Dosimeter			Solution &	Solution					Adjusted Pu-	
Target	Diss #	Np input	Np input	Vial Tare	Vial	weight	Np Prod.	Np Prod.	Pu-238	Pu-236	236 ppm	Total Pu
MK-20.1	ADD-21	0.001942	8.19E-06	9 26.9772	g 51.7429	24.765700	9 0.001399	5.90E-06	9 0.000300	ррпі	4.197451	9 0.000377
	DDJ-21			27.0216	45.8164	18.7948	8					
				Actual		Prodicted (B	GS)	Actual/Brod	1			
Np Residual Amount	(wt basis) Np prod / Np in		=	0.7205		Fredicted (D	00)	#DIV/0!				
Pu-238/Total Pu (wt	t basis) Du (mai basis) - Du tatal/I	Nie ie	=	0.7956				#DIV/0!				
Conversion of Np to	FP (mol basis) = Fp prod/N	lopin lopin	=	0.0024			_	#DIV/0!				
Fractional loss of Np	in Liq Waste (wt basis)	F	=	NA								
Fractional loss of Pu	in Liq Waste (wt basis)		=	NA								
Bu-236 content		Analysis	Time	Bu-236 t1/2	t1/2	Adjusted	]		Time	Bu-238	Pu238 ±1/2	Adjusted
ppm	Discharge Date	Date	days	years	days	Pu-236 ppm		Analysis Date	days	t1/2, years	days	Pu-238, g
2.82	11/1/2001	6/23/2003	-599.00	2.86	1043.88	4.20		5/28/2003	-573.00	87.7	32032.425	0.000303
	-		-		-	-						
Analysis	Sample	Co-60 Ba/a	Zr-95 Ba/a	Ru-106 Bg/g	SB-125 Ba/a	Cs-134 Ba/a	Cs-137 Ba/a	Ce-144 Ba/a	Eu- 155 Ba/a			
Gr gamma	ADD-21, 030429-054	Dq/g	7.64E+04	3.90E+05	2.20E+04	5.20E+04	2.90E+05	5 1.70E+06	9.80E+03			
Alpha & Beta	Sample	Alpha Bo/o	Beta Ba/a	total activity Bg/g	alnha PHA	Pu238 Br	1					
ripha a bota	ADD-21, 030429-054	7.60E+06	5.40E+06	1.30E+07	apria i rist	- u200, Dq						
ICP	Sample	Nn-237	Pu-238	Pu-230	Pu-240	Pu-241	Pu-242	Pu-244	I			
	campio	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)	ppb (ng/g)				
	ADD-21, 030429-054	5.65E+04	1.21E+04	2.60E+03	4.21E+02	8.74E+01	<3.97E+01	<3.97E+01	l			
Pu-Alpha Scan	Sample	Pu-236/Pu-23	Relative error	1								
TTA extraction	ADD-21 030420 054	ppm (ug/mL)	%									
L	ADD-21, 000429-004	2.82	3.7	1								
Poforonoc Information	ion			Deference Info	ation							
Reference informati	MW	Density		Specific activity Ca	alculation							
		g/cc		Factor =	1.13E+13	T1/2	М	Specific activity				
NpO2 Np237	269.047	11.143		Co-60		S 166328640	g/mol	Ci/g 1130.670				
Pu238	238.0496	19.851		Zr-95		5531328	94.9080427	21469.000				
Pu239	239.0522	19.851		Ru-106		32278176	105.9073269	3306.000				
Pu240 Pu241	240.0538 241.0568	19.851		Cs-134		65160132.48	124.9052478 133.9067134	1048.000				
Pu242	242.0587	19.851		Cs-137		948937032	136.9070835	87.000				
Conversion 365.25	3.70E+10	i вq/Сі		Ce-144 Eu- 155		24614755.2	143.9136427	3182.800				
000.20	0 davs/vear											
$N = N^{\circ} * exp - (ln2/t_{1/2})$	* t)		1	Pu-238		2767601520	238.0495534	17.119				
$N = N^{\circ} * exp - (ln2/t_{1/2})^{\circ}$	* t)		1	Pu-238		2767601520	238.0495534	17.119				
N = N <sup>o</sup> *exp -(In2/t <sub>1/2</sub> *	(5.80 MeV Area Counts	× X Pu-236	(236) X 1E6	Pu-238		2767601520	238.0495534	17.119				
N = N <sup>o</sup> *exp -(ln2/t <sub>1/2</sub> * Pu-236/238 ppm =	(5.80 MeV Area Counts (Full Spectrur	<u>s X Pu-236<sub>11/2</sub> X</u> m Counts X Pu	(236) X 1E6 -238 <sub>T1/2</sub> X 238)	Pu-238		2767601520	238.0495534	17.119				
N = N <sup>o</sup> *exp -(ln2/t <sub>1/2</sub> ) Pu-236/238 ppm =	(5.80 MeV Area Counts (Full Spectrur	s <u>X Pu-236<sub>112</sub> X</u> m Counts X Pu	(236) X 1E6 -238 <sub>T1/2</sub> X 238)	Pu-238		2767601520	238.0495534	17.119				

2 X (5.80 MeV Area Counts)<sup>1/2</sup> 5.80 Area Counts

## ORNL/TM-2003/220

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