

START 7713507.1601

0045891

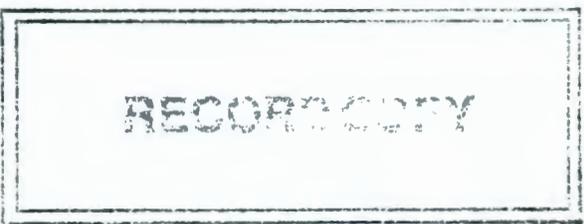
26070-WES-1281  
TELEDYNE ISOTOPES

WESTON/WESTINGHOUSE/HANFORD

50 VAN BUREN AVENUE  
WESTWOOD, NEW JERSEY 07875  
(201) 664-7070

Case Narrative/Cover Sheet for Reports of Analysis and Lab Data

Date 10/20/93  
TI #'s 26070 - 26076  
WO # 4-3735



Comments:

There were no unusual occurrences with these samples.

Contents:

	<u>Procedure #'s</u>	<u>Bench &amp; Work Sheet Pages</u>	<u>Calibration Pages</u>	<u>Tracers/Carrier Pages</u>
Reports of Analysis		<u>10</u>		
Gross Alpha	PRO-032-1	<u>4</u>	<u>18</u>	
Gross Beta		<u>-</u>	<u>-</u>	
Sr-90	PRO-032-16	<u>6</u>	<u>80</u>	<u>2</u>
Gamma	PRO-042-5	<u>10</u>	<u>8</u>	
Tc-99	PRO-032-78	<u>6</u>	<u>51</u>	<u>1</u>
Total-Uranium	PRO-032-89	<u>2</u>	<u>11</u>	
H-3	PRO-032-35	<u>2</u>	<u>9</u>	
Pu-238,239/240	PRO-062-114	<u>15</u>	<u>11</u>	<u>4</u>
U-235-238	PRO-062-110	<u>-</u>	<u>-</u>	<u>-</u>
Am-241	PRO-062-111	<u>-</u>	<u>-</u>	<u>-</u>
C-O-C		<u>1</u>		
Other		<u>-</u>		

"I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the laboratory manager or his designee, as verified by the following signature." A. J. Hogan

## Spike Activity for TI #26075

<u>Nuclide</u>	<u>Activity pCi/l</u>	<u>Acceptable Range</u>
Technetium-99	98.5	79. - 118.
Gross Alpha	11.2	6. - 17.
Gross Beta	22.	17. - 28.
Strontium-90	80.	68. - 92.
Total Uranium	18.6 ug/l	15.8 - 21.4
Cobalt-60	2.5 E 04	1.7 - 3.2 E 04
Cesium-137	2.16 E 04	1.51 - 2.81 E 04
Plutonium-238, 239/240	1.09	0.9 - 1.3
Tritium	1.4 E 03	1.1 - 1.7 E 03

Activity for Matrix Spike TI# 26071& Matrix Spike Duplicate TI# 26072

<u>Nuclide</u>	<u>Activity pCi/l</u>	<u>Acceptable Range</u>
Tritium	1.4 E 03	1.1 - 1.7 E 03

TELEDYNE ISOTOPES

REPORT OF ANALYSIS

RUN DATE 10/15/93

MRS JOSIE EDWARDS WESTON/WESTINGHOUSE/HANFORD 208 WELSH POOL ROAD PICKERING CREEK INDUSTRIAL PARK LIONVILLE PA	WORK ORDER NUMBER 4-3735	CUSTOMER P.O. NUMBER LL-1140-F4	DATE RECEIVED 09/14/93	DELIVERY DATE 10/17/93	PAGE 1
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W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME		VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE				DATE	TIME		
26070	9309L869-001	B094W3	09/08		PH TEST	VERIF IED					3
					TC-99	1.6 +-0.1 E 03		09/24			3
					GR-A	L.T. 2. E 00		09/23			3
					GR-B	8.4 +-0.2 E 02		09/22			3
					SR-90	L.T. 1. E 00		10/08			3
					TOTAL-U	2.6 +-0.4 E 00	UGM/LITER *				3
					TOTAL-U	L.T. 5. E-02	UGM/LITER *				3
					GR-A	9.5 +-15.1E-01		09/23			3
					GR-B	L.T. 2. E 00		09/22			3
					TC-99	L.T. 3. E 00		09/24			3
					SR-90	2.1 +-6.47E-01		10/08			3
					BE-7	L.T. 6. E 01		09/30			4
					BE-7 -	1.9 +-34.9E 00		09/30			4
					K-40	L.T. 1. E 02		09/30			4
					K-40 -	2.4 +- 6.5E 01		09/30			4
					MN-54	L.T. 7. E 00		09/30			4
					MN-54	1.8 +- 3.9E 00		09/30			4
					CO-58	L.T. 6. E 00		09/30			4
					CO-58 -	1.8 +- 4.0E 00		09/30			4
					FE-59	L.T. 1. E 01		09/30			4
					FE-59 -	6.8 +-80.4E-01		09/30			4
					CO-60	3.32+-0.61E 01		09/30			4
					CO-60	L.T. 1. E 01		09/30			4
					ZN-65	L.T. 1. E 01		09/30			4
					ZN-65 -	6.5 +- 7.7E 00		09/30			4
					ZR-95	L.T. 8. E 00		09/30			4
					ZR-95	7.3 +- 4.3E 00		09/30			4
					RU-103	L.T. 8. E 00		09/30			4
					RU-103	3.3 +- 4.5E 00		09/30			4
					RU-106	L.T. 6. E 01		09/30			4
					RU-106	2.5 +- 3.7E 01		09/30			4
					I-131	L.T. 2. E 01		09/30			4

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## TELEDYNE ISOTOPES

## REPORT OF ANALYSIS

RUN DATE 10/15/93

WORK ORDER NUMBER

CUSTOMER P.O. NUMBER

DATE RECEIVED

DELIVERY DATE

PAGE 2

MRS JOSIE EDWARDS  
 WESTON/WESTINGHOUSE/HANFORD  
 208 WELSH POOL ROAD  
 PICKERING CREEK INDUSTRIAL PARK  
 LIONVILLE PA 19341-1313

4-3735

LL-1140-F4

09/14/93

10/17/93

## W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME		VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE				DATE	TIME		
26070	9309L869-001	B094W3	09/08		I-131 -	5.5 +- 9.7E 00		09/30			4
					CS-134	L.T. 7. E 00		09/30			4
					CS-134 -	2.0 +- 4.2E 00		09/30			4
					CS-137	L.T. 7. E 00		09/30			4
					CS-137 -	7.5 +-40.0E-01		09/30			4
					BA-140	L.T. 1. E 01		09/30			4
					BA-140 -	1.7 +- 6.7E 00		09/30			4
					CE-141	L.T. 1. E 01		09/30			4
					CE-141 -	1.7 +- 6.2E 00		09/30			4
					CE-144	L.T. 4. E 01		09/30			4
					CE-144 -	1.5 +- 2.3E 01		09/30			4
					EU-152	L.T. 2. E 01		09/30			4
					EU-152 -	1.5 +- 1.3E 01		09/30			4
					EU-154	L.T. 3. E 01		09/30			4
					EU-154 -	7.9 +-14.8E 00		09/30			4
					EU-155	L.T. 2. E 01		09/30			4
					EU-155 -	7.1 +- 1.3E 01		09/30			4
					RA-226	L.T. 1. E 02		09/30			4
					RA-226 -	2.9 +-701.E-01		09/30			4
					TH-228	L.T. 1. E 01		09/30			4
					TH-228	9.1 +- 6.6E 00		09/30			4
					TH-234	L.T. 1. E 02		09/30			4
					TH-234	1.9 +-75.2E 00		09/30			4
					H-3	3.3 +-1.0 E 02		09/23			5
					H-3	L.T. 1. E 02		09/23			5
					PU-238	L.T. 9. E-02		09/28			6
					PU-239	L.T. 9. E-02		09/28			6
					PU-238	5.4 +-54.2E-03		09/28			6
					PU-239	5.4 +-54.2E-03		09/28			6

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## TELEDYNE ISOTOPES

## REPORT OF ANALYSIS

RUN DATE 10/15/93

WORK ORDER NUMBER

CUSTOMER P.O. NUMBER

DATE RECEIVED

DELIVERY DATE

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MRS JOSIE EDWARDS  
 WESTON/WESTINGHOUSE/HANFORD  
 208 WELSH POOL ROAD  
 PICKERING CREEK INDUSTRIAL PARK  
 LIONVILLE PA 19341-1313

4-3735

LL-1140-F4

09/14/93

10/17/93

## W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME		VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE				DATE	TIME		
26076	9309L869-003	B094X1	09/08		GR-A	L.T. 2. E 00		09/22			3
					GR-B	L.T. 2. E 00		09/22			3
					TC-99	L.T. 4. E 00		09/24			3
					SR-90 -	3.3 +-54.6E-02		10/08			3
					BE-7	L.T. 5. E 01		09/30			4
					BE-7 -	3.2 +-29.7E 00		09/30			4
					K-40	L.T. 1. E 02		09/30			4
					K-40 -	1.7 +- 6.5E 01		09/30			4
					MN-54	L.T. 5. E 00		09/30			4
					MN-54	1.2 +- 3.2E 00		09/30			4
					CO-58	L.T. 5. E 00		09/30			4
					CO-58 -	1.4 +- 3.4E 00		09/30			4
					FE-59	L.T. 1. E 01		09/30			4
					FE-59 -	1.2 +- 7.1E 00		09/30			4
					CO-60	L.T. 5. E 00		09/30			4
					CO-60	0.0 +- 3.0E 00		09/30			4
					ZN-65	L.T. 1. E 01		09/30			4
					ZN-65	1.5 +- 6.6E 00		09/30			4
					ZR-95	L.T. 6. E 00		09/30			4
					ZR-95	3.7 +- 3.6E 00		09/30			4
					RU-103	L.T. 6. E 00		09/30			4
					RU-103 -	2.4 +- 3.6E 00		09/30			4
					RU-106	L.T. 5. E 01		09/30			4
					RU-106	0.0 +- 3.2E 01		09/30			4
					I-131	L.T. 1. E 01		09/30			4
					I-131	0.0 +- 8.7E 00		09/30			4
					CS-134	L.T. 6. E 00		09/30			4
					CS-134	2.2 +- 3.7E 00		09/30			4
					CS-137	L.T. 6. E 00		09/30			4
					CS-137 -	2.9 +- 3.5E 00		09/30			4
					BA-140	L.T. 9. E 00		09/30			4
					BA-140 -	7.7 +-58.0E-01		09/30			4

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TELEDYNE ISOTOPES

REPORT OF ANALYSIS

RUN DATE 10/15/93

MRS JOSIE EDWARDS WESTON/WESTINGHOUSE/HANFORD 208 WELSH POOL ROAD PICKERING CREEK INDUSTRIAL PARK LIONVILLE PA 19341-1313	WORK ORDER NUMBER 4-3735	CUSTOMER P.O. NUMBER LL-1140-F4	DATE RECEIVED 09/14/93	DELIVERY DATE 10/17/93	PAGE 10
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W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE			NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT		VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE	TIME				TIME	DATE		
26076	9309L869-003	B094X1	09/08			CE-141	L.T. 9. E 00		09/30		4	
						CE-141 -	1.5 +- 5.6E 00		09/30		4	
						CE-144	L.T. 3. E 01		09/30		4	
						CE-144 -	9.3 +-19.7E 00		09/30		4	
						EU-152	L.T. 2. E 01		09/30		4	
						EU-152 -	8.0 +-10.3E 00		09/30		4	
						EU-154	L.T. 2. E 01		09/30		4	
						EU-154	4.7 +-100.E-01		09/30		4	
						EU-155	L.T. 2. E 01		09/30		4	
						EU-155 -	6.2 +- 1.0E 01		09/30		4	
						RA-226	L.T. 1. E 02		09/30		4	
						RA-226	2.7 +- 6.3E 01		09/30		4	
						TH-228	L.T. 1. E 01		09/30		4	
						TH-228	4.3 +- 5.5E 00		09/30		4	
						TH-234	L.T. 1. E 02		09/30		4	
						TH-234 -	5.1 +- 6.5E 01		09/30		4	
						H-3	4.5 +-0.2 E 03		09/28		5	
						H-3	L.T. 2. E 02		09/28		5	
						PU-238	L.T. 8. E-02		09/28		6	
						PU-239	L.T. 8. E-02		09/28		6	
						PU-238	5.0 +-49.6E-03		09/28		6	
						PU-239	5.0 +-49.6E-03		09/28		6	

LAST PAGE OF REPORT

APPROVED BY *J. Guenther* 10/15/93

SEND 1 COPIES TO WE884S MRS JOSIE EDWARDS

2 - GAS LAB.      3 - RADIO CHEMISTRY LAB.      4 - GE(LI) GAMMA SPEC LAB.      5 - TRITIUM GAS/L.S. LAB.      6 - ALPHA SPEC LAB.

9213507.1606



MEMORANDUM

TO: 200-BP-1 Project QA Record

December 30, 1993

FR: Susan Winter, Golder Associates Inc.



RE: RADIOCHEMISTRY ANALYSIS DATA VALIDATION SUMMARY FOR DATA PACKAGE 26070-WES-1281 (913-1719)

INTRODUCTION

This memo presents the results of data validation on data package 26070-WES-1281 consisting of two (2) water sample submitted for radiochemistry analysis which was performed by the Teledyne Isotopes laboratory. Information concerning the sample validated is provided in the following table.

SAMPLE ID	SAMPLE DATE	MEDIA
B094W3	09/08/93	WATER
B094X1	09/08/93	WATER

Data validation was conducted in accordance with the revise WHC statement of work (WHC 1993) and validation procedures (Bechtold 1992). Attachments 1 through 4 to this memo provide the data validation supporting documentation and a summary of the validated results.



DATA QUALITY OBJECTIVES

**Precision.** Goals for precision were met.

**Accuracy.** Goals for accuracy were met with the exception of the technetium-99 chemical recovery as summarized under "Minor Deficiencies".

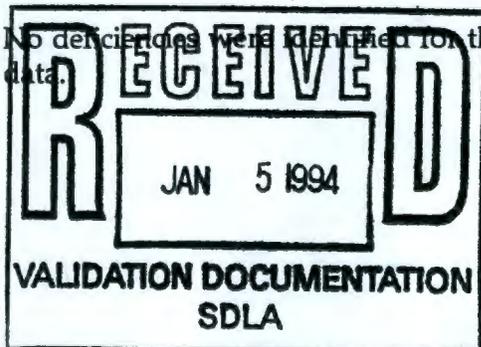
**Sample Result Verification.** All sample results were supported in the raw data.

**Detection Limits.** Detection limit goals were met.

**Completeness.** The data package was complete for all requested analyses. One (1) sample was validated in this data set with a total of 60 determinations reported, all of which were deemed valid. This results in a completeness of 100 percent, which meets the work plan objectives of 90%.

MAJOR DEFICIENCIES

No deficiencies were identified for the radiochemistry fraction which required rejection of data.



9713507.1609

**Golder Associates Inc.**

4104-148th Avenue, NE  
Redmond, WA 98052  
Telephone (206) 883-0777  
Fax (206) 882-5498



January 14, 1994

Our ref: 913-1719  
S/O/2757

Westinghouse Hanford Company  
Hanford Analytical Services Management  
345 Hills, MSIN H4-29  
Richland, Washington 99352

ATTENTION: Jeannette Duncan

RE: REVISED AND ADDITIONAL PAGES FOR THE DATA VALIDATION SUMMARIES  
OF PACKAGES 26561-WES-1280 AND 26070-WES-1281

Dear Ms. Duncan:

Enclosed are two revised pages corresponding to the validation summary for data package 26070-WES-1281. Also enclosed are copies of chain of custody records to be added to the back of the validation summaries for data packages 26561-WES-1280 and 26070-WES-1281.

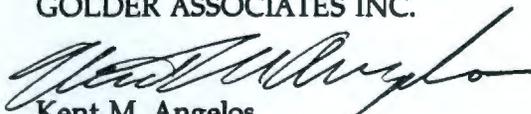
Please replace the current pages 2 and 26 of Data Package 26070-WES-1281 with the enclosed pages 2 and 26, and add to the back of the current package the enclosed pages 46, 47, 48, and 49 for Data Package 26070-WES-1281.

Please add to the back of the current validation summary for data package 26561-WES-1280 the enclosed pages 44 and 45.

If you have any questions, please call.

Sincerely,

GOLDER ASSOCIATES INC.

  
Kent M. Angelos  
Associate

  
Donald M. Caldwell  
Project Director

KMA/ah 2757.tr whc-2

Enclosures

cc: P.K. Brockman

## MEMORANDUM

TO: 200-BP-1 Project QA Record

December 30, 1993

FR: Susan Winter, Golder Associates Inc.

RE: RADIOCHEMISTRY ANALYSIS DATA VALIDATION SUMMARY FOR DATA  
PACKAGE 26070-WES-1281 (913-1719, 26060R.BP1)

## INTRODUCTION

This memo presents the results of data validation on data package 26070-WES-1281 consisting of two (2) water samples submitted for radiochemistry analysis which was performed by the Teledyne Isotopes laboratory. Information concerning the samples validated is provided in the following table.

SAMPLE ID	SAMPLE DATE	MEDIA
B094W3	09/08/93	WATER
B094X1	09/08/93	WATER

Data validation was conducted in accordance with the revised WHC statement of work (WHC 1993) and validation procedures (Bechtold 1992). Attachments 1 through 4 to this memo provide the data validation supporting documentation and a summary of the validated results.

## DATA QUALITY OBJECTIVES

**Precision.** Goals for precision were met.

**Accuracy.** Goals for accuracy were met with the exception of the technetium-99 blank spike recovery as summarized under "Minor Deficiencies".

**Sample Result Verification.** All sample results were supported in the raw data.

**Detection Limits.** Detection limit goals were met.

**Completeness.** The data package was complete for all requested analyses. Two samples were validated in this data set with a total of 60 determinations reported, all of which were deemed valid. This results in a completeness of 100 percent, which meets the work plan objectives of 90%.

## MAJOR DEFICIENCIES

No deficiencies were identified for the radiochemistry fraction which required rejection of data.

*Revised Page  
12/31/93  
MWB*

**MINOR DEFICIENCIES**

The following qualifications were required as a result of the data validation.

All results reported as less than (L.T.) by the laboratory have been qualified as undetected. (U).

The blank spike percent recovery for technetium-99 was 122%, which is greater than the upper control limit of 120%. Therefore, all associated positive results have been qualified as estimated (J).

**REFERENCES**

WHC, 1993, Westinghouse Hanford Company, Validation of 200-BP-1 Data, Statement of Work, Revision F, April 1993. Westinghouse Hanford Company, Richland, Washington.

Bechtold, 1992, Westinghouse Hanford Company, Data Validation Procedures for Radiochemical Analyses, WHC-SD-EN-SPP-001, Rev. 0, 1992. Westinghouse Hanford Company, Richland, Washington.

*Revised Page  
6/3/94  
mm*

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ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

## GLOSSARY OF RADIOCHEMISTRY DATA REPORTING QUALIFIERS

- U - The constituent was analyzed for, but was not detected above the minimum detectable activity (MDA). The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory. The data are usable for decision making purposes.
- UJ - The constituent was analyzed for and was not detected. Due to a quality control deficiency identified during data validation the value reported may not accurately reflect the sample quantitation limit. The data are usable for decision making purposes.
- J - Indicates the constituent was analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation. The data are usable for decision making purposes.
- UR - Indicates the constituent was analyzed for and not detected; however, due to an identified quality control deficiency the data are unusable.
- R - Indicates the constituent was analyzed for and detected; however, due to an identified quality control deficiency the data are unusable.

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ATTACHMENT 2  
SUMMARY OF DATA QUALIFICATIONS



9713507.1616

4

ATTACHMENT 3  
AS QUALIFIED DATA SUMMARY

Validated Radiochemistry Results for SDG: 26070-WES-1281

Parameter	Samp#	B094W3		B094X1	
	Date	09/08/93		09/08/93	
	Type	Water		Water	
	Units	Result	Q	Result	Q
TECHNETIUM-99	pCi/L	1600.000	J	270.000	J
GROSS ALPHA SCAN	pCi/L	2.000	U	7.500	
GROSS BETA SCAN	pCi/L	840.000		120.000	
STRONTIUM-90	pCi/L	1.000	U	0.900	U
TOTAL URANIUM	UGM/L	2.600		28.000	
BERYLLIUM-7	pCi/L	60.000	U	50.000	U
POTASSIUM-40	pCi/L	100.000	U	100.000	U
MANGANESE-54	pCi/L	7.000	U	5.000	U
COBALT-58	pCi/L	6.000	U	5.000	U
IRON-59	pCi/L	10.000	U	10.000	U
COBALT-60	pCi/L	33.200	U	5.000	U
ZINC-65	pCi/L	10.000	U	10.000	U
ZIRCONIUM-95	pCi/L	8.000	U	6.000	U
RUTHENIUM-103	pCi/L	8.000	U	6.000	U
RUTHENIUM-106	pCi/L	60.000	U	50.000	U
IODINE-131	pCi/L	20.000	U	10.000	U
CESIUM-134	pCi/L	7.000	U	6.000	U
CESIUM-137	pCi/L	7.000	U	6.000	U
BARIUM-140	pCi/L	10.000	U	9.000	U
CERIUM-141	pCi/L	10.000	U	9.000	U
CERIUM-144	pCi/L	40.000	U	30.000	U
EUROPIUM-152	pCi/L	20.000	U	20.000	U
EUROPIUM-154	pCi/L	30.000	U	20.000	U
EUROPIUM-155	pCi/L	20.000	U	20.000	U
RADIUM-226	pCi/L	100.000	U	100.000	U
THORIUM-228	pCi/L	10.000	U	10.000	U
THORIUM-234	pCi/L	100.000	U	100.000	U
TRITIUM	pCi/L	330.000		4500.000	
PLUTONIUM-238	pCi/L	0.090	U	0.080	U
PLUTONIUM-239	pCi/L	0.090	U	0.080	U

9713507.1617

TELEDYNE ISOTOPES

REPORT OF ANALYSIS

RUN DATE 10/15/93

MRS JOSIE EDWARDS WESTON/WESTINGHOUSE/HANFORD 208 WELSH POOL ROAD PICKERING CREEK INDUSTRIAL PARK LIONVILLE PA 19341-1313	WORK ORDER NUMBER 4-3735	CUSTOMER P.O. NUMBER LL-1140-F4	DATE RECEIVED 09/14/93	DELIVERY DATE 10/17/93	PAGE 1
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W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME		VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE			DATE	TIME		
26070	9309L869-001	8094W3	09/08		PH TEST	VERIF IED				3
					TC-99	1.6 +-0.1 E 03		09/24		3
					GR-A	L.T. 2. E 00		09/23		3
					GR-B	8.4 +-0.2 E 02		09/22		3
					SR-90	L.T. 1. E 00		10/08		3
					TOTAL-U	2.6 +-0.4 E 00 UGM/LITER *				3
					<del>TOTAL-U</del>	<del>L.T. 5. E 02 UGM/LITER *</del>				3
					<del>GR-A</del>	<del>9.5 +-15.1E-01</del>		09/23		3
					<del>GR-B</del>	<del>L.T. 2. E 00</del>		09/22		3
					<del>TC-99</del>	<del>L.T. 3. E 00</del>		09/24		3
					<del>SR-90</del>	<del>2.1 +-6.47E-01</del>		10/08		3
					BE-7	L.T. 6. E 01 u		09/30		4
					<del>BE-7</del>	<del>1.9 +-34.9E-00</del>		09/30		4
					K-40	L.T. 1. E 02 u		09/30		4
					<del>K-40</del>	<del>2.4 +-6.5E-01</del>		09/30		4
					MN-54	L.T. 7. E 00 u		09/30		4
					<del>MN-54</del>	<del>1.8 +-3.9E-00</del>		09/30		4
					CO-58	L.T. 6. E 00 u		09/30		4
					<del>CO-58</del>	<del>1.8 +-4.0E-00</del>		09/30		4
					FE-59	L.T. 1. E 01 u		09/30		4
					<del>FE-59</del>	<del>6.8 +-80.4E-01</del>		09/30		4
					CO-60	3.32+-0.61E 01		09/30		4
					<del>CO-60</del>	<del>L.T. 1. E 01</del>		09/30		4
					ZN-65	L.T. 1. E 01 u		09/30		4
					<del>ZN-65</del>	<del>6.5 +-7.7E-00</del>		09/30		4
					ZR-95	L.T. 8. E 00 u		09/30		4
					<del>ZR-95</del>	<del>7.3 +-4.3E-00</del>		09/30		4
					RU-103	L.T. 8. E 00 u		09/30		4
					<del>RU-103</del>	<del>3.3 +-4.5E-00</del>		09/30		4
					RU-106	L.T. 6. E 01 u		09/30		4
					<del>RU-106</del>	<del>2.5 +-3.7E-01</del>		09/30		4
					I-131	L.T. 2. E 01 u		09/30		4

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TELEDYNE ISOTOPES  
REPORT OF ANALYSIS

RUN DATE 10/15/93

WORK ORDER NUMBER 4-3735 CUSTOMER P.O. NUMBER LL-1140-F4 DATE RECEIVED 09/14/93 DELIVERY DATE 10/17/93 PAGE 2

MRS JOSIE EDWARDS  
WESTON/WESTINGHOUSE/HANFORD  
208 WELSH POOL ROAD  
PICKERING CREEK INDUSTRIAL PARK  
LIONVILLE PA 19341-1313

W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME		VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE			DATE	TIME		
26070	9309L869-001	B094W3	09/08		<del>I-131</del>	<del>5.5 + 9.7E 00</del>		09/30		4
					CS-134	L.T. 7. E 00		09/30		4
					<del>CS-134</del>	<del>2.0 + 4.2E 00</del>		09/30		4
					CS-137	L.T. 7. E 00		09/30		4
					<del>CS-137</del>	<del>7.5 + 40.0E 01</del>		09/30		4
					BA-140	L.T. 1. E 01		09/30		4
					<del>BA-140</del>	<del>1.7 + 6.7E 00</del>		09/30		4
					CE-141	L.T. 1. E 01		09/30		4
					<del>CE-141</del>	<del>1.7 + 6.2E 00</del>		09/30		4
					CE-144	L.T. 4. E 01		09/30		4
					<del>CE-144</del>	<del>1.5 + 2.3E 01</del>		09/30		4
					EU-152	L.T. 2. E 01		09/30		4
					<del>EU-152</del>	<del>1.5 + 1.3E 01</del>		09/30		4
					EU-154	L.T. 3. E 01		09/30		4
					<del>EU-154</del>	<del>7.9 + 14.8E 00</del>		09/30		4
					EU-155	L.T. 2. E 01		09/30		4
					<del>EU-155</del>	<del>7.1 + 1.3E 01</del>		09/30		4
					RA-226	L.T. 1. E 02		09/30		4
					<del>RA-226</del>	<del>2.9 + 701.E 01</del>		09/30		4
					TH-228	L.T. 1. E 01		09/30		4
					<del>TH-228</del>	<del>9.1 + 6.6E 00</del>		09/30		4
					TH-234	L.T. 1. E 02		09/30		4
					<del>TH-234</del>	<del>1.9 + 75.2E 00</del>		09/30		4
					H-3	3.3 +-1.0 E 02		09/23		5
					<del>H-3</del>	<del>L.T. 1. E 02</del>		09/23		5
					PU-238	L.T. 9. E-02		09/28		6
					PU-239	L.T. 9. E-02		09/28		6
					<del>PU-238</del>	<del>5.4 + 54.2E-03</del>		09/28		6
					<del>PU-239</del>	<del>5.4 + 54.2E-03</del>		09/28		6

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TELEDYNE ISOTOPES  
REPORT OF ANALYSIS

RUN DATE 10/15/93 **5**

MRS JOSIE EDWARDS WESTON/WESTINGHOUSE/HANFORD 208 WELSH POOL ROAD PICKERING CREEK INDUSTRIAL PARK LIONVILLE PA 19341-1313	WORK ORDER NUMBER 4-3735	CUSTOMER P.O. NUMBER LL-1140-F4	DATE RECEIVED 09/14/93	DELIVERY DATE 10/17/93	PAGE 3
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W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME		VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE			DATE	TIME		
26071	9309L869-001MS B094W3	/			H-3 1.7 +-0.2 E 03		09/23		5	
					<del>H-3 L.T. 1. E 02</del>		09/23		5	
26072	9309L869-001MSDB094W3	/			H-3 1.7 +-0.2 E 03		09/23		5	
					<del>H-3 L.T. 1. E 02</del>		09/23		5	
26073	9309L869-001DUPB094W3	09/08			TC-99 1.7 +-0.1 E 03		09/24		3	
					GR-A L.T. 2. E 00		09/23		3	
					GR-B 7.5 +-0.2 E 02		09/22		3	
					SR-90 L.T. 7. E-01		10/08		3	
					TOTAL-U 2.5 +-0.4 E 00 UGM/LITER *				3	
					<del>TOTAL U L.T. 5. E 02 UGM/LITER *</del>				3	
					<del>GR-A 1.6 +-1.7 E 00</del>		09/23		3	
					<del>GR-B L.T. 2. E 00</del>		09/22		3	
					<del>TC-99 L.T. 3. E 00</del>		09/24		3	
					<del>SR-90 9.1 +-46.6E 02</del>		10/08		3	
					BE-7 L.T. 6. E 01		10/01		4	
					<del>BE-7 7.6 +-39.2E 00</del>		10/01		4	
					K-40 L.T. 1. E 02		10/01		4	
					<del>K-40 6.9 +-6.6E 01</del>		10/01		4	
					MN-54 L.T. 6. E 00		10/01		4	
					<del>MN-54 1.9 +-3.7E 00</del>		10/01		4	
					CO-58 L.T. 7. E 00		10/01		4	
					<del>CO-58 3.5 +-4.4E 00</del>		10/01		4	
					FE-59 L.T. 2. E 01		10/01		4	
					<del>FE-59 7.5 +-9.6E 00</del>		10/01		4	
					CO-60 3.77+-0.60E 01		10/01		4	
					<del>CO-60 L.T. 1. E 01</del>		10/01		4	
					ZN-65 L.T. 1. E 01		10/01		4	
					<del>ZN-65 2.1 +-7.7E 00</del>		10/01		4	
					ZR-95 L.T. 7. E 00		10/01		4	
					<del>ZR-95 2.9 +-4.5E 00</del>		10/01		4	

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TELEDYNE ISOTOPES

REPORT OF ANALYSIS

RUN DATE 10/15/93

WORK ORDER NUMBER 4-3735 CUSTOMER P.O. NUMBER LL-1140-F4 DATE RECEIVED 09/14/93 DELIVERY DATE 10/17/93 PAGE 4

MRS JOSIE EDWARDS  
 WESTON/WESTINGHOUSE/HANFORD  
 208 WELSH POOL ROAD  
 PICKERING CREEK INDUSTRIAL PARK  
 LIONVILLE PA 19341-1313

W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME		VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE			DATE	TIME		
26073	9309L869-001DUPB094W3		09/08							
					RU-103	L.T. 8. E 00		10/01		4
					<del>RU-103</del>	<del>2.5 + 5.3E 00</del>		10/01		4
					RU-106	L.T. 6. E 01		10/01		4
					<del>RU-106</del>	<del>1.7 + 3.6E 01</del>		10/01		4
					I-131	L.T. 4. E 01		10/01		4
					<del>I-131</del>	<del>1.1 + 2.5E 01</del>		10/01		4
					CS-134	L.T. 7. E 00		10/01		4
					<del>CS-134</del>	<del>5.8 + 42.0E 01</del>		10/01		4
					CS-137	L.T. 7. E 00		10/01		4
					<del>CS-137</del>	<del>2.5 + 42.1E 01</del>		10/01		4
					BA-140	L.T. 2. E 01		10/01		4
					<del>BA-140</del>	<del>0.0 + 1.1E 01</del>		10/01		4
					CE-141	L.T. 1. E 01		10/01		4
					<del>CE-141</del>	<del>1.3 + 7.6E 00</del>		10/01		4
					CE-144	L.T. 4. E 01		10/01		4
					<del>CE-144</del>	<del>3.0 + 22.2E 00</del>		10/01		4
					EU-152	L.T. 2. E 01		10/01		4
					<del>EU-152</del>	<del>2.6 + 119.E 01</del>		10/01		4
					EU-154	L.T. 2. E 01		10/01		4
					<del>EU-154</del>	<del>1.1 + 10.0E 00</del>		10/01		4
					EU-155	L.T. 2. E 01		10/01		4
					<del>EU-155</del>	<del>4.6 + 1.1E 01</del>		10/01		4
					RA-226	L.T. 1. E 02		10/01		4
					<del>RA-226</del>	<del>2.3 + 6.6E 01</del>		10/01		4
					TH-228	L.T. 1. E 01		10/01		4
					<del>TH-228</del>	<del>9.4 + 6.3E 00</del>		10/01		4
					TH-234	L.T. 1. E 02		10/01		4
					<del>TH-234</del>	<del>6.1 + 6.8E 01</del>		10/01		4
					H-3	4.0 +-1.1 E 02		09/23		5
					<del>H-3</del>	<del>L.T. 1. E 02</del>		09/23		5
					PU-238	L.T. 8. E-02		09/28		6
					PU-239	L.T. 8. E-02		09/28		6

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TELEDYNE ISOTOPES

REPORT OF ANALYSIS

RUN DATE 10/15/93

MRS JOSIE EDWARDS WESTON/WESTINGHOUSE/HANFORD 208 WELSH POOL ROAD PICKERING CREEK INDUSTRIAL PARK LIONVILLE PA 19341-1313	WORK ORDER NUMBER 4-3735	CUSTOMER P.O. NUMBER LL-1140-F4	DATE RECEIVED 09/14/93	DELIVERY DATE 10/17/93	PAGE 5
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W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME		VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE TIME	STOP DATE TIME			DATE	TIME		
26073	9309L869-001DUP8094W3		09/08		<del>PU-238</del> 5.2 + 52.3E-03		09/28		6	
					<del>PU-239</del> 5.2 + 52.3E-03		09/28		6	
26074	DISTILLED BLANK H2O	/			TC-99 L.T. 5. E 00	u	09/24		3	
					GR-A L.T. 8. E-01	u	09/22		3	
					GR-B L.T. 8. E-01	u	09/22		3	
					SR-90 L.T. 1. E 00	u	10/08		3	
					TOTAL-U L.T. 5. E-02 UGM/LITER u*				3	
					<del>TOTAL-U</del> 3. + 3. E 03 UGM/LITER *				3	
					<del>GR-A</del> 2.5 + 4.30E-01		09/22		3	
					<del>GR-B</del> 7.1 + 5.62E-01		09/22		3	
					<del>TC-99</del> 2.3 + 2.71E-00		09/24		3	
					<del>SR-90</del> 1.8 + 8.20E-01		10/08		3	
					BE-7 L.T. 5. E 01	u	09/30		4	
					<del>BE-7</del> 0.0 + 3.3E-01		09/30		4	
					K-40 L.T. 2. E 02	u	09/30		4	
					<del>K-40</del> 2.0 + 7.9E-01		09/30		4	
					MN-54 L.T. 6. E 00	u	09/30		4	
					<del>MN-54</del> 4.0 + 39.6E-01		09/30		4	
					CO-58 L.T. 7. E 00	u	09/30		4	
					<del>CO-58</del> 2.0 + 4.1E-00		09/30		4	
					FE-59 L.T. 1. E 01	u	09/30		4	
					<del>FE-59</del> 2.4 + 7.3E-00		09/30		4	
					CO-60 L.T. 6. E 00	u	09/30		4	
					<del>CO-60</del> 5.8 + 38.4E-01		09/30		4	
					ZN-65 L.T. 1. E 01	u	09/30		4	
					<del>ZN-65</del> 6.9 + 7.7E-00		09/30		4	
					ZR-95 L.T. 7. E 00	u	09/30		4	
					<del>ZR-95</del> 7.5 + 40.8E-01		09/30		4	
					RU-103 L.T. 7. E 00	u	09/30		4	
					<del>RU-103</del> 1.7 + 4.0E-00		09/30		4	
					RU-106 L.T. 6. E 01	u	09/30		4	

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TELEDYNE ISOTOPES  
REPORT OF ANALYSIS

RUN DATE 10/15/93

MRS JOSIE EDWARDS WESTON/WESTINGHOUSE/HANFORD 208 WELSH POOL ROAD PICKERING CREEK INDUSTRIAL PARK LIONVILLE PA 19341-1313	WORK ORDER NUMBER 4-3735	CUSTOMER P.O. NUMBER LL-1140-F4	DATE RECEIVED 09/14/93	DELIVERY DATE 10/17/93	PAGE 6
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W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
26074	DISTILLED BLANK H2O	/							
					<del>RU-106</del>	<del>5.4 + 38.4E 00</del>	09/30		4
					<del>I-131</del>	<del>L.T. 7. E 00</del>	09/30		4
					<del>I-131</del>	<del>9.4 + 40.2E 01</del>	09/30		4
					<del>CS-134</del>	<del>L.T. 8. E 00</del>	09/30		4
					<del>CS-134</del>	<del>4.4 + 46.9E 01</del>	09/30		4
					<del>CS-137</del>	<del>L.T. 7. E 00</del>	09/30		4
					<del>CS-137</del>	<del>1.3 + 44.1E 01</del>	09/30		4
					<del>BA-140</del>	<del>L.T. 6. E 00</del>	09/30		4
					<del>BA-140</del>	<del>1.9 + 3.6E 00</del>	09/30		4
					<del>CE-141</del>	<del>L.T. 9. E 00</del>	09/30		4
					<del>CE-141</del>	<del>3.8 + 5.4E 00</del>	09/30		4
					<del>CE-144</del>	<del>L.T. 4. E 01</del>	09/30		4
					<del>CE-144</del>	<del>6.8 + 24.6E 00</del>	09/30		4
					<del>EU-152</del>	<del>L.T. 2. E 01</del>	09/30		4
					<del>EU-152</del>	<del>9.7 + 13.4E 00</del>	09/30		4
					<del>EU-154</del>	<del>L.T. 2. E 01</del>	09/30		4
					<del>EU-154</del>	<del>7.7 + 12.3E 00</del>	09/30		4
					<del>EU-155</del>	<del>L.T. 2. E 01</del>	09/30		4
					<del>EU-155</del>	<del>1.7 + 1.4E 01</del>	09/30		4
					<del>RA-226</del>	<del>L.T. 1. E 02</del>	09/30		4
					<del>RA-226</del>	<del>1.5 + 7.0E 01</del>	09/30		4
					<del>TH-228</del>	<del>L.T. 1. E 01</del>	09/30		4
					<del>TH-228</del>	<del>1.0 + 0.7E 01</del>	09/30		4
					<del>TH-234</del>	<del>L.T. 1. E 02</del>	09/30		4
					<del>TH-234</del>	<del>4.6 + 8.1E 01</del>	09/30		4
					<del>H-3</del>	<del>L.T. 1. E 02</del>	09/23		5
					<del>H-3</del>	<del>7.1 + 88.0E 00</del>	09/23		5
					<del>PU-238</del>	<del>L.T. 9. E-02</del>	10/01		6
					<del>PU-239</del>	<del>L.T. 1. E-01</del>	10/01		6
					<del>PU-238</del>	<del>5.3 + 52.9E 03</del>	10/01		6
					<del>PU-239</del>	<del>2.6 + 6.9 E 02</del>	10/01		6

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TELEDYNE ISOTOPES

REPORT OF ANALYSIS

RUN DATE 10/15/93

MRS JOSIE EDWARDS WESTON/WESTINGHOUSE/HANFORD 208 WELSH POOL ROAD PICKERING CREEK INDUSTRIAL PARK LIONVILLE PA 19341-1313	WORK ORDER NUMBER 4-3735	CUSTOMER P.O. NUMBER LL-1140-F4	DATE RECEIVED 09/14/93	DELIVERY DATE 10/17/93	PAGE 7
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W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE			ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME		VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE	TIME			DATE	TIME		
26075	DISTILLED SPIKED H2O	/									
					TC-99	1.2 +-0.1 E 02			09/24		3
					GR-A	9.3 +-1.6 E 00			09/22		3
					GR-B	2.1 +-0.2 E 01			09/22		3
					SR-90	7.4 +-0.2 E 01			10/10		3
					TOTAL-U	1.7 +-0.3 E 01	UGM/LITER *				3
					<del>TOTAL-U</del>	<del>L.T. 5. E 02</del>	<del>UGM/LITER *</del>				3
					<del>GR-A</del>	<del>L.T. 8. E 01</del>			09/22		3
					<del>GR-B</del>	<del>L.T. 8. E 01</del>			09/22		3
					<del>TC-99</del>	<del>L.T. 4. E 00</del>			09/24		3
					<del>SR-90</del>	<del>L.T. 8. E 01</del>			10/10		3
					BE-7	L.T. 2. E 06			10/05		4
					<del>BE-7</del>	<del>8.6 +-14.3E 05</del>			10/05		4
					K-40	L.T. 5. E 02			10/05		4
					<del>K-40</del>	<del>9.0 +-28.5E 01</del>			10/05		4
					MN-54	L.T. 4. E 02			10/05		4
					<del>MN-54</del>	<del>7.6 +-26.2E 01</del>			10/05		4
					CO-58	L.T. 4. E 04			10/05		4
					<del>CO-58</del>	<del>3.5 +-23.8E 03</del>			10/05		4
					FE-59	L.T. 3. E 06			10/05		4
					<del>FE-59</del>	<del>1.8 +-16.5E 05</del>			10/05		4
					CO-60	2.49+-0.25E 04			10/05		4
					<del>CO-60</del>	<del>L.T. 8. E 02</del>			10/05		4
					ZN-65	L.T. 1. E 03			10/05		4
					<del>ZN-65</del>	<del>3.0 +- 8.5E 02</del>			10/05		4
					ZR-95	L.T. 7. E 04			10/05		4
					<del>ZR-95</del>	<del>2.1 +- 3.9E 04</del>			10/05		4
					RU-103	L.T. 4. E 06			10/05		4
					<del>RU-103</del>	<del>6.2 +-23.7E 05</del>			10/05		4
					RU-106	L.T. 3. E 03			10/05		4
					<del>RU-106</del>	<del>1.7 +-16.7E 01</del>			10/05		4
					CS-134	L.T. 2. E 02			10/05		4
					<del>CS-134</del>	<del>7.1 +-11.9E 01</del>			10/05		4

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TELEDYNE ISOTOPES

REPORT OF ANALYSIS

RUN DATE 10/15/93

MRS JOSIE EDWARDS WESTON/WESTINGHOUSE/HANFORD 208 WELSH POOL ROAD PICKERING CREEK INDUSTRIAL PARK LIONVILLE PA 19341-1313	WORK ORDER NUMBER 4-3735	CUSTOMER P.O. NUMBER LL-1140-F4	DATE RECEIVED 09/14/93	DELIVERY DATE 10/17/93	PAGE 8
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01

W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE STOP DATE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
26075	DISTILLED SPIKED H2O	/		CS-137 2.23+-0.22E 04		10/05		4
				<del>CS-137 L.T. 6. E 02</del>		10/05		4
				CE-141 L.T. 3. E 07	u	10/05		4
				<del>CE-141 L.T. 2.1E 07</del>		10/05		4
				CE-144 L.T. 2. E 03	u	10/05		4
				<del>CE-144 L.T. 11.4E 02</del>		10/05		4
				EU-152 L.T. 3. E 02	u	10/05		4
				<del>EU-152 L.T. 18.4E 01</del>		10/05		4
				EU-154 L.T. 2. E 02	u	10/05		4
				<del>EU-154 L.T. 11.7E 01</del>		10/05		4
				EU-155 L.T. 5. E 02	u	10/05		4
				<del>EU-155 L.T. 0.3E 03</del>		10/05		4
				RA-226 L.T. 1. E 03	u	10/05		4
				<del>RA-226 L.T. 8.6E 02</del>		10/05		4
				TH-228 L.T. 2. E 02	u	10/05		4
				<del>TH-228 L.T. 14.7E 01</del>		10/05		4
				TH-234 L.T. 1. E 03	u	10/05		4
				<del>TH-234 L.T. 0.1E 04</del>		10/05		4
				H-3 1.3 +-0.1 E 03		09/23		5
				<del>H-3 L.T. 1. E 02</del>		09/23		5
				PU-238 L.T. 4. E-02	u	10/01		6
				PU-239 1.2 +-0.2 E 00		10/01		6
				<del>PU-238 L.T. 22.7E 03</del>		10/01		6
				<del>PU-239 L.T. 6. E-02</del>		10/01		6
26076	9309L869-003	8094X1	09/08	PH TEST	VERIF IED			3
				TC-99 2.7 +-0.1 E 02	u	09/24		3
				GR-A 7.5 +-3.0 E 00		09/22		3
				GR-B 1.2 +-0.1 E 02		09/22		3
				SR-90 L.T. 9. E-01	u	10/08		3
				TOTAL-U 2.8 +-0.4 E 01 UGM/LITER *				3
				<del>TOTAL-U L.T. 5. E 02 UGM/LITER *</del>				3

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TELEDYNE ISOTOPES

REPORT OF ANALYSIS

RUN DATE 10/15/93

MRS JOSIE EDWARDS WESTON/WESTINGHOUSE/HANFORD 208 WELSH POOL ROAD PICKERING CREEK INDUSTRIAL PARK LIONVILLE PA 19341-1313	WORK ORDER NUMBER 4-3735	CUSTOMER P.O. NUMBER LL-1140-F4	DATE RECEIVED 09/14/93	DELIVERY DATE 10/17/93	PAGE 9
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W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME		VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE			DATE	TIME		
26076	9309L869-003	B094X1	09/08							
					GR-A	L.T. 2. E 00		09/22		3
					GR-B	L.T. 2. E 00		09/22		3
					TC-99	L.T. 4. E 00		09/24		3
					SR-90	3.3 + 54.6E-02		10/08		3
					BE-7	L.T. 5. E 01	u	09/30		4
					BE-7	3.2 + 29.7E-00		09/30		4
					K-40	L.T. 1. E 02	u	09/30		4
					K-40	1.7 + 6.5E-01		09/30		4
					MN-54	L.T. 5. E 00	u	09/30		4
					MN-54	1.2 + 3.2E-00		09/30		4
					CO-58	L.T. 5. E 00	u	09/30		4
					CO-58	1.4 + 3.4E-00		09/30		4
					FE-59	L.T. 1. E 01	u	09/30		4
					FE-59	1.2 + 7.1E-00		09/30		4
					CO-60	L.T. 5. E 00	u	09/30		4
					CO-60	0.0 + 3.0E-00		09/30		4
					ZN-65	L.T. 1. E 01	u	09/30		4
					ZN-65	1.5 + 6.6E-00		09/30		4
					ZR-95	L.T. 6. E 00	u	09/30		4
					ZR-95	3.7 + 3.6E-00		09/30		4
					RU-103	L.T. 6. E 00	u	09/30		4
					RU-103	2.4 + 3.6E-00		09/30		4
					RU-106	L.T. 5. E 01	u	09/30		4
					RU-106	0.0 + 3.2E-01		09/30		4
					I-131	L.T. 1. E 01	u	09/30		4
					I-131	0.0 + 8.7E-00		09/30		4
					CS-134	L.T. 6. E 00	u	09/30		4
					CS-134	2.2 + 3.7E-00		09/30		4
					CS-137	L.T. 6. E 00	u	09/30		4
					CS-137	2.9 + 3.5E-00		09/30		4
					BA-140	L.T. 9. E 00	u	09/30		4
					BA-140	7.7 + 58.0E-01		09/30		4

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TELEDYNE ISOTOPES

REPORT OF ANALYSIS

RUN DATE 10/15/93

MRS JOSIE EDWARDS WESTON/WESTINGHOUSE/HANFORD 208 WELSH POOL ROAD PICKERING CREEK INDUSTRIAL PARK LIONVILLE PA 19341-1313	WORK ORDER NUMBER 4-3735	CUSTOMER P.O. NUMBER LL-1140-F4	DATE RECEIVED 09/14/93	DELIVERY DATE 10/17/93	PAGE 10
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W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE				ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT		VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE	TIME	TIME			DATE	TIME		
26076	9309L869-003	8094X1	09/08									
						CE-141	L.T. 9. E 00		09/30			4
						<del>CE-141</del>	<del>1.5 +- 5.6E 00</del>		09/30			4
						CE-144	L.T. 3. E 01		09/30			4
						<del>CE-144</del>	<del>9.3 +- 19.7E 00</del>		09/30			4
						EU-152	L.T. 2. E 01		09/30			4
						<del>EU-152</del>	<del>9.0 +- 10.3E 00</del>		09/30			4
						EU-154	L.T. 2. E 01		09/30			4
						<del>EU-154</del>	<del>4.7 +- 100.E 01</del>		09/30			4
						EU-155	L.T. 2. E 01		09/30			4
						<del>EU-155</del>	<del>6.2 +- 1.0E 01</del>		09/30			4
						RA-226	L.T. 1. E 02		09/30			4
						<del>RA-226</del>	<del>2.7 +- 6.3E 01</del>		09/30			4
						TH-228	L.T. 1. E 01		09/30			4
						<del>TH-228</del>	<del>4.3 +- 5.5E 00</del>		09/30			4
						TH-234	L.T. 1. E 02		09/30			4
						<del>TH-234</del>	<del>5.1 +- 6.5E 01</del>		09/30			4
						H-3	4.5 +-0.2 E 03		09/28			5
						<del>H-3</del>	<del>L.T. 2. E 02</del>		09/28			5
						PU-238	L.T. 8. E-02		09/28			6
						PU-239	L.T. 8. E-02		09/28			6
						<del>PU-238</del>	<del>5.0 +- 49.6E-03</del>		09/28			6
						<del>PU-239</del>	<del>5.0 +- 49.6E-03</del>		09/28			6

LAST PAGE OF REPORT

APPROVED BY *J. Guenther* 10/15/93

SEND 1 COPIES TO WE884S MRS JOSIE EDWARDS

2 - GAS LAB.      3 - RADIO CHEMISTRY LAB.      4 - GE(LI) GAMMA SPEC LAB.      5 - TRITIUM GAS/L.S. LAB.      6 - ALPHA SPEC LAB.

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*J. Guenther*  
10/17/93

ATTACHMENT 4

DATA VALIDATION SUPPORTING DOCUMENTATION

9217007 1/28  
**RADIOCHEMISTRY DATA VALIDATION CHECKLIST**

PROJECT: 200-88-1	VALIDATOR: <i>[Signature]</i>	DATE: 12/06/93
LABORATORY: Teledyne	DATA PACKAGE: 26070-WFS-1281	
SAMPLES/MATRIX: B094W3 (TI# 26070)		
waters B094X1 (TI# 26076)		

**1. Completeness**

**1.1 Completeness Checklist** (Complete the appropriate checklist for each analysis type and attach).

**2. Calibration**

**2.1 Initial Calibration**

Was instrument calibrated within specified time period or annually?

Yes  No  N/A

If NO, qualify all associated data as unusable (R).

Was each detector used for the associated data calibrated?

Yes  No  N/A

If NO, qualify all associated data as unusable (R).

Are calibration standards NIST traceable or equivalent?

Yes  No  N/A

If NO, qualify all associated data as unusable (R).

Were calibration standards expired?

Yes  No  N/A

If YES, qualify all associated data as unusable (R).

Comments: \_\_\_\_\_

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RADIOCHEMISTRY DATA VALIDATION CHECKLIST

2.2 Continuing Calibration

Is check source identified by activity and radionuclides?

Yes  No  N/A

If NO, qualify all associated data as estimated (J).

Has check source been counted ~~daily~~ *regularly?*  
*12/6/93*

Yes  No  N/A

If NO, qualify all associated data as unusable (R).

Are check source counts within  $\pm 3S$  control limits?

Yes  No  N/A

If NO, qualify all associated data as unusable (R).

Have background counts been performed at least weekly and before and after all field and QC samples associated with the SDG?

Yes  No  N/A

If NO, qualify all associated results as unusable (R).

Are background counts within  $\pm 3S$  control limits?

Yes  No  N/A

If NO, qualify all associated results as unusable (R).

Comments: No qualification required.

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RADIOCHEMISTRY DATA VALIDATION CHECKLIST

4. Detection Limits and Sample Results

Can LLDs and MDAs be verified?

Yes  No  N/A

If NO, qualify all results as estimated detects (J) or estimated nondetects (UJ).

Do reported results meet the detection limit requirements?

Yes  No  N/A  P  
12/7/93

Note discrepancies in the validation report narrative.

Can reported results be verified?

Yes  No  N/A

If NO, note missing data in the validation report. Correct results on the photocopied report forms and include in the validation report.

Comments:

~~The detection limit requirement for Rn-222 is 3 pCi/L and the reported MDA is 60 pCi/L in sample 809403 and 50 pCi/L in sample 809411. All other detection limit requirements were met.~~

P  
12/7/93

No qualification was required.

The reported MDAs meet the revised detection limit goals.

*[Signature]*  
12/7/93





7. Laboratory Control Samples

Are LCS results within the control limits of 80-120%

Yes  No  N/A

If NO, qualify results as follows:

%R: \_\_\_\_\_ <50% 50-79% >120%

Results < LLD: R UJ R  
Results > LLD: R J R

Has at least one LCS been analyzed with the SDG?

Yes  No  N/A

If NO, qualify all associated results as estimated (J).

Comments:

Blank Sp. Fe

① LCS

11/23/93 ② MS 7R Te-99 = 122% > 120% (J) Reviewer disagrees with control limit for LCS quality as estimated (J) since both the chemical yield and continuing calibration checks are within the specified control limits.

*[Signature]* 1/14/94



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RADIOCHEMISTRY DATA VALIDATION CHECKLIST

9. Method Specific and Other Quality Control

9.1 Gas Proportional Counters

Are field and QC sample preparations outside the range of the self absorption curves?

Yes  No  N/A

If YES, qualify all associated data as estimated (E).

Are initial detector efficiencies <20%?

~~Yes~~  No  N/A

If YES, qualify all associated data as ~~unusable (R)~~ ~~estimated (E)~~

Have statistical tests been performed routinely (at least weekly)?

Yes  No  N/A

If NO, qualify all associated data as estimated (E).

Have stability verifications been performed after each gas change?

Yes  No  N/A

If NO, qualify all associated data as estimated (E).

Comments:

~~The Tc-99 efficiency values for detectors C6 and C7 were 0.18 and 0.19, respectively. Therefore, the associated sample results (B094613 DLP and B0944X1) have been qualified as estimated (E). These results were not qualified as unusable since the chemical yield recoveries and the calibration checks were acceptable.~~

*[Signature]*  
12/16/93  
1/13/94

Initial detector efficiency based on Tc-99 Cs-137 was acceptable  
1/13/94

*[Signature]*  
1/13/94

9.2 Alpha Spectroscopy

Has detector system been calibrated across the energy range of interest?  Yes No N/A

If NO, qualify all results as unusable (R).

Is detector resolution adequate to identify each peak centroid?  Yes No N/A

If NO or if resolution cannot be determined, qualify all results as unusable (R).

Is resolution at least 20 keV FWHM?  Yes No N/A

If NO, qualify all results as estimated (J).

Do check source efficiencies agree within 5% of initial calibration efficiencies or are they within the control limits or  $\pm 3S$  of the mean?  Yes No N/A

If NO, qualify all associated results as unusable (R).

Was each sample spiked with a tracer?  Yes No N/A

If NO, qualify all associated results as unusable (R).

Are tracer recoveries within the control limits of 30 to 105%?  Yes No N/A

If NO, qualify all results as follows:

%R:                      <30% 30-105% >105% >115%

Results <LLD:        R        acceptable    UJ        R

Results >LLD:       R        acceptable    J         R

Comments: No qualification required  
 \_\_\_\_\_  
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9.4 Alpha Emitting Radium Isotopes

Have single radium isotopes (Ra-223, Ra-224, Ra-226) been reported?

Yes No N/A

If YES, qualify all results attributed to a single radium isotope as estimated (J) if the contribution to the total from individual isotopes is unknown.

Can time from sample precipitation to counting be verified?

Yes No N/A

If NO, qualify all associated results >MDA as estimated (J).

Have barium interferences been identified and accounted for?

Yes No N/A

If NO, qualify all associated results with elevated barium levels as estimated (J).

Has counting efficiency for Ra-226 been determined for each SDG?

Yes No N/A

If NO, qualify all associated results as unusable (R).

Have blanks been analyzed with each group to check for possible radium contamination in the reagents?

Yes No N/A

If NO, qualify all associated results as estimated (J).

If sample was preserved at collection has analysis been completed within 180 days or 5 half-lives?

Yes No N/A

If NO, qualify results >LLD as estimated detects (J) and results < LLD as estimated non-detects (UJ).

If samples were not preserved, were samples received within 5 days of sampling?

Yes No N/A

• Were samples preserved at the laboratory upon receipt?

Yes No N/A

• Were samples held after preservation for at least 16 days?

Yes No N/A

If NO, to any of the above, qualify associated sample results as estimated (J).

Comments: This analysis was not performed.

\_\_\_\_\_  
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9713507-1641  
RADIOCHEMISTRY DATA VALIDATION CHECKLIST

9.5 Radium 226 Analysis using Scintillation (Lucas) Cell Counting

Is calibration data present and can it be associated with the samples?

Yes No N/A

If NO, qualify associated sample results as unusable (R).

Was the counting system calibrated each day that samples were analyzed?

Yes No N/A

If NO, qualify associated results as estimated (J).

Was the counting system calibrated after replacing the scintillation cell?

Yes No N/A

If NO, qualify associated results as estimated (J) if the cell has a previously determined calibration constant and unusable (R) if no constant is available for the replacement cell.

Were blanks analyzed with each sample group to check for radium contamination in reagents?

Yes No N/A

If NO, qualify associated results as estimated (J).

If sample was preserved at collection has analysis been completed within 180 days or 5 half-lives?

Yes No N/A

If NO, qualify results >LLD as estimated detects (J) and results < LLD as estimated non-detects (UJ).

If samples were not preserved, were samples received within 5 days of sampling?

Yes No N/A

• Were samples preserved at the laboratory upon receipt?

Yes No N/A

• Were samples held after preservation for at least 16 days?

Yes No N/A

If NO, to any of the above, qualify associated sample results as estimated (J).

Comments: This analysis was not performed.  
\_\_\_\_\_  
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9.7 Fluorometric Analysis of Uranium

Has the laboratory provided evidence that cation and anion interferences are negligible for the matrix or that matrix interferences have been accounted for?

Yes No  N/A

If NO, qualify associated results as estimated ( ).

Has the laboratory provided a description of the method of fusion standardization or provided data supporting fusion standardization?

Yes No  N/A

If NO, qualify associated results as estimated ( ).

Was calibration performed immediately prior to sample analysis?

Yes No  N/A  
See comments

If NO, qualify associated results as estimated ( ).

Comments:

Calibration check sample was analyzed before each run, therefore, qualification is not necessary.

FILENAME: 26070-QC.WK1

SDG NO.: 26070-WES-1281

SAMPLE ID: BLANK (LAB NO. 26074)

MS SAMPLE ID: BLANK SPIKE (LAB NO. 26075)

PARAMETER	SPIKED AMOUNT	BLANK RESULT	SPIKE RESULT	SPIKE %R
TECHNETIUM-99	98.5	0	120	122
GROSS ALPHA	11.2	0	9.3	83
GROSS BETA	22	0	21	95
STRONTIUM-90	80	0	74	93
TOTAL URANIUM	18.6	0	17	91
COBALT-60	25000	0	24900	100
CESIUM-137	21600	0	22300	103
TRITIUM	1400	0	1300	93
PLUTONIUM-239	1.09	0	1.2	110

SAMPLE ID: B094W3

MS SAMPLE ID: B094W3 MS

MSD SAMPLE ID: B094W3 MSD

PARAMETER	SPIKED AMOUNT	SAMPLE RESULT	MS RESULT	MS %R	MSD RESULT	MSD %R	MS/MSD RPD
TRITIUM	1400	330	1700	98	1700	98	0

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LABORATORY DUPLICATE RELATIVE PERCENT DIFFERENCE

19-Nov-93

PAGE 1 OF 1

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FILENAME: 26070-LD.WK1

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SDG NO.: 26070-WES-1281

SAMPLE ID: B094W3

DUPLICATE SAMPLE ID: B094W3 DUP

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PARAMETER	SAMPLE RESULT	DUPLCIATE RESULT	LAB DUP RPD
TECHNETIUM-99	1600	1700	6
GROSS BETA	840	750	11
TOTAL URANIUM	2.6	2.5	4
COBALT-60	33.2	37.7	13
TRITIUM	330	400	19

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FILENAME: 8QW-TC.WK1

SDG	HEIS	Lab No.	Date Analyzed	Det. ID	Spl Amt.	Yield	Gross cnts	Count Time	Bkg. cpm	Det. Eff.	Tc99 Result Calc.	Result Rptd	MDA Calc.	MDA Rptd.
25651	B094Z5	25651	10/05/93	C3	0.3	0.543	227	100	0.21	0.21	27	27	3	3
	B094Z5 DUP	26564	10/05/93	C4	0.3	0.5	269	100	0.21	0.224	33	33	3	3
	BLANK	26555	10/05/93	E4	0.2	0.387	9	100	0.11	0.232	-0.50	-0.50	4	4
	BLANK SPIKE	26556	10/05/93	E5	0.2	0.29	369	100	0.15	0.251	110	110	6	6
26070	B094W3	26070	09/24/93	C4	0.3	0.5	11890	100	0.22	0.224	1591	1600	3	3
	B094W3 DUP	26073	09/24/93	C6	0.3	0.446	10290	100	0.19	0.204	1695	1700	3	3
	BLANK	26062	09/24/93	E9	0.2	0.435	13	100	0.23	0.229	-2	<5	5	5
	BLANK SPIKE	26063	09/24/93	E10	0.2	0.408	551	100	0.14	0.243	122	120	4	4
	B094X1	26076	09/24/93	C1	0.3	0.376	1509	100	0.22	0.221	269	270	4	4

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FILENAME: 8QW-A.WK1

SDG	HEIS#	Lab No.	Det.	Spl. Amt.	Date Alpha Counted	GROSS ALPHA				Result Calc	Result Rptd	MDA Calc	MDA Rptd
						Gross Counts	Count Time	Bkg. cpm	Eff.				
26561	B094Z5	26561	T3	0.5	09/28/93	33	100	0.16	0.071	2.2	<2	2	2
	B094Z5 DUP	26564	T3	0.5	09/28/93	29	100	0.16	0.072	1.6	<2	2	2
	BLANK	26565	T3	1	09/27/93	11	50	0.16	0.172	0.16	<0.7	0.7	0.7
	BLANK SPIKE	26566	T3	1	10/08/93	245	50	0.16	0.174	12.27	13	0.7	0.7
26070	B094W3	26070	T3	0.5	09/23/93	7	50	0.06	0.076	0.95	<2	2	2
	B094W3 DUP	26073	T3	0.5	09/23/93	10	50	0.06	0.078	1.62	<2	2	2
	BLANK	26074	T3	1	09/22/93	4	50	0.16	0.145	-0.25	<0.8	0.8	0.8
	BLANK SPIKE	26075	T3	1	09/22/93	156	50	0.16	0.143	9.32	9.3	0.8	0.8
	B094X1	26076	T3	0.5	09/23/93	33	50	0.06	0.072	7.51	7.5	2.0	2

FILENAME: 8QW-B.WK1

SDG	HEIS#	Lab No.	Det.	Date Beta Counted	GROSS BETA				Spl. Amt.	Result Calc	Result Rptd	MDA Calc	MDA Rptd
					Gross Counts	Count Time	Bkg. cpm	Eff.					
26561	B094Z5	25661	T3	09/27/93	456	50	0.92	0.282	0.5	26	26	2	2
	B094Z5 DUP	26564	T3	09/27/93	435	50	0.92	0.283	0.5	25	25	2	2
	BLANK	26565	T3	09/27/93	61	50	0.92	0.386	1	0.35	<0.7	0.7	0.7
	BLANK SPIKE	26566	T3	09/27/93	1103	50	0.92	0.387	1	25	25	0.7	0.7
26070	B094W3	26070	T3	09/22/93	9874	36.68	1.02	0.289	0.5	836	840	2	2
	B094W3 DUP	26073	T3	09/22/93	9851	40.07	1.02	0.293	0.5	753	750	2	2
	BLANK	26074	T3	09/22/93	80	50	1.02	0.367	1	0.7	<0.8	0.8	0.8
	BLANK SPIKE	26075	T3	09/22/93	908	50	1.02	0.366	1	21	21	0.8	0.8
	B094X1	26076	T3	09/22/93	1935	50	1.02	0.284	0.5	120	120	2	2

039

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FILENAME: 8QW-SR2.WK1

SDG	HEIS	Lab No.	Date Analyzed	Det. ID	Spl Amt.	Y-90 Yield	SR-89 Yield	Ingrowth	Decay	Gross Cnts	Count Time	Bkg. cpm
25651	B094Z5	25651	10/08/93	E2	0.5	0.974	0.494	0.872	0.753	26	200	0.13
	B094Z5 DUP	26564	10/08/93	C9	0.5	1	0.711	0.872	0.789	23	100	0.21
	BLANK	26068	10/08/93	C10	0.5	0.988	0.668	0.872	0.789	19	100	0.22
	BLANK SPIKE	26069	10/10/93	B10	0.5	0.983	0.639	0.872	0.429	6648	800	0.25
26070	B094W3	26070	10/08/93	C4	0.5	1	0.78	0.872	0.789	21	100	0.17
	B094W3 DUP	26073	10/08/93	E5	0.5	0.986	0.717	0.872	0.753	31	200	0.14
	BLANK	26068	10/08/93	C10	0.5	0.988	0.668	0.872	0.789	19	100	0.22
	BLANK SPIKE	26069	10/08/93	B10	0.5	0.983	0.639	0.872	0.429	6648	800	0.25
	B094X1	26076	10/08/93	E4	0.5	0.986	0.575	0.872	0.753	21	200	0.11

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FILENAME: 8QW-SR2.WK1

SDG	HEIS	Lab No.	Det. Eff.	Sr90 Result Calc.	Result Rptd	MDA Calc.	MDA Rptd.
25651	B094Z5	25651	0.28	-0.00	0	1	1
	B094Z5 DUP	26564	0.32	0.12	0.12	1	1
	BLANK	26068	0.31	-0.19	-0.19	1	1
	BLANK SPIKE	26069	0.42	73.58	74	0.8	0.8
26070	B094W3	26070	0.32	0.21	<1	1.0	1
	B094W3 DUP	26073	0.32	0.09	<0.7	0.7	0.7
	BLANK	26068	0.31	-0.19	<1	1	1
	BLANK SPIKE	26069	0.42	73.58	74	0.8	0.8
	B094X1	26076	0.29	-0.04	<0.9	0.9	0.9

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FILENAME: 8QW-U.WK1

SDG	HEIS#	TELEDYNE LAB ID	DATE ANALYZE	SAMPLE AMOUNT	DILUTION FACTOR	WF	WU	R	TOTAL URANIUM CALC. UG/L	TOTAL URANIUM RPTD. UG/L
26561	B094Z5	26561	10/01/93	6	2	0.337	0.515	0.686	2.6	2.6
	B094Z5 DUP	26564	10/01/93	6	2	0.33	0.51	0.686	2.5	2.5
	BLANK	26565	10/01/93	6	1	0.001	0.257	0.686	0.0	<0.05
	BLANK SPIKE	26566	10/01/93	6	10	0.61	0.855	0.686	17.1	17
26070	B094W3	26070	10/01/93	6	2	0.379	0.581	0.686	2.6	2.6
	B094W3 DUP	26073	10/01/93	6	2	0.379	0.583	0.686	2.5	2.5
	BLANK	26074	10/01/93	6	1	0.001	0.257	0.686	0.00	<0.05
	BLANK SPIKE	26075	10/01/93	6	10	0.61	0.855	0.686	17.1	17
	B094X1	26076	10/01/93	6	20	0.403	0.605	0.686	27.4	28

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FILENAME: 8QW-H3.WK1

SDG	HEIS#	Lab No.	Date Analyzed	Gross Counts	Count Time	Sample Amount	Bkgnd cpm	Detect Eff.	Result Calc.	Result Rptd	MDA Calc	MDA Rptd
26561	B094Z5	26561	09/25/93	1230	100	0.01	1.88	0.19	2470	2500	151	200
	B094Z5 MS	26562	09/25/93	1654	100	0.01	1.88	0.19	3476	3500	151	200
	B094Z5 MSD	26563	09/25/93	1689	100	0.01	1.88	0.19	3559	3600	151	200
	B094Z5 DUP	26564	09/25/93	1189	100	0.01	1.88	0.19	2373	2400	151	200
	BLANK	26565	09/25/93	190	100	0.01	1.88	0.19	5	<200	151	200
	BLANK SPIKE	26566	09/25/93	785	100	0.01	1.88	0.19	1415	1400	151	200
26070	B094W3	26070	09/25/93	315	100	0.01	1.74	0.19	334	330	146	100
	B094W3 MS	26071	09/25/93	891	100	0.01	1.74	0.19	1700	1700	146	100
	B094W3 MSD	26072	09/25/93	905	100	0.01	1.74	0.19	1733	1700	146	100
	B094W3 DUP	26073	09/25/93	344	100	0.01	1.74	0.19	403	400	146	100
	BLANK	26074	09/25/93	177	100	0.01	1.74	0.19	7	<100	146	100
	BLANK SPIKE	26075	09/25/93	717	100	0.01	1.74	0.19	1287	1300	146	100
	B094X1	26076	09/28/93	2068	100	0.01	1.87	0.19	4459	4500	151	200

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FILENAME: 8QW-PU.WK1

SDG	HEIS No.	Lab No.	Spl. Amt.	Date Analyzed	Det.	Eff.	Pu239 Cnts	Pu238 Cnts	Time Secs	Spike Cnts	Spike Act.	Bkg Pu239	Bkg Pu238	Time secs	Spike %R
26561	B094Z5	26561	0.15	09/28/93	43	0.1982	2	1	60000	1452	4.03	2	1	80000	0.8180
	B094Z5 DUP	26564	0.15	09/28/93	44	0.1715	1	1	60000	1093	4.03	4	1	80000	0.7104
	BLANK	26565	0.15	10/06/93	31	0.2018	2	1	60000	1242	4.03	1	1	80000	0.6875
	BLANK SPIKE	26566	0.3	10/06/93	32	0.1772	96	1	60000	1274	4.03	2	1	80000	0.8026
26070	B094W3	26070	0.15	09/28/93	47	0.1908	1	1	60000	1239	4.03	1	1	80000	0.7253
	B094W3 DUP	26073	0.15	09/28/93	48	0.1837	1	1	60000	1284	4.03	1	1	80000	0.7808
	BLANK	26074	0.15	10/01/93	47	0.1908	1	1	60000	1271	4.03	3	1	80000	0.7432
	BLANK SPIKE	26075	0.3	10/01/93	48	0.1837	133	1	60000	1477	4.03	3	1	80000	0.8973
	B094X1	26076	0.15	09/28/93	46	0.1845	1	1	60000	1355	4.03	1	1	80000	0.8204

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FILENAME: 8QW-PU.WK1

SDG	HEIS No.	Lab No.	Pu239 Calc.	Pu239		Pu238		Pu238		
				Pu239 Rptd	MDA Calc	MDA Rptd	Pu238 Calc.	Pu238 Rptd.	MDA Calc	MDA Rptd
26561	B094Z5	26561	0.0093	0.0093	0.1	0.1	0.0046	0.0046	0.07	0.07
	B094Z5 DUP	26564	-0.0493	-0.049	0.2	0.2	0.0062	0.0061	0.1	0.1
	BLANK	26565	0.0271	0.027	0.09	0.09	0.0054	0.0054	0.09	0.09
	BLANK SPIKE	26566	1	1	0.06	0.06	0.0026	0.0026	0.04	0.04
26070	B094W3	26070	0.0054	<0.09	0.09	0.09	0.0054	<0.09	0.09	0.09
	B094W3 DUP	26073	0.0052	<0.08	0.08	0.08	0.0052	<0.08	0.08	0.08
	BLANK	26074	-0.0265	<0.1	0.1	0.1	0.0053	<0.09	0.09	0.09
	BLANK SPIKE	26075	1.2	1.2	0.06	0.06	0.0023	<0.04	0.04	0.04
	B094X1	26076	0.0050	<0.08	0.08	0.08	0.0050	<0.08	0.08	0.08

045

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9309L869-WES-286

Westinghouse  
Hanford Company

CHAIN OF CUSTODY SOG 26070-WES-12E

Custody Form Initiator KD LEE/GG HAMILTON

Company Contact: PH BUTCHER

Project Designation/Sampling Locations 200-BP-1

Ice Chest No. GWS013

Bill of Lading/Airbill No. 2536955-993

Method of Shipment WESTON EMERY

Shipped to WESTON LES 2/1/93

Possible Sample Hazards/Remarks

Telephone (509) 376-5045

Collection Date 7/9/93

Field Logbook No. EFL-1020

Offsite Property No. W73-0-0718-2

9309L869-

Sample Identification

BO 94W3

- 1. 1L, P, WATER; METALS-CLP TAL (Ca, Mg, Na, K, Fe, Mn, Si, Al, Bi), SELENIUM (HNO3 pH<2) UNFILTERED
- 1. 500ml, G, WATER; IC ANIONS (F, Cl, SO4, NO2, PO4)
- 1. 500ml, P, WATER; NO2/NO3 (H2SO4 pH<2)
- 1. 250ml, P, WATER; ALKALINITY
- 1. 250ml, P, WATER; TDS
- 1. 250ml, P, WATER; SULFATE
- 1. 1L, P, WATER; CYANIDE (NaOH pH>12)
- 3. 2L, P, WATER; GROSS ALPHA/BETA, GAMMA SPEC (Cs-137, Co-60, Ru-106), Pu-238, Pu-239/240, Sr-90, TOTAL URANIUM (HNO3 pH<2)
- 1. 250ml, Gs, WATER; TRITIUM
- 1. 1L, G/P, WATER; Tc-99 (HCl pH<2)

002 BO 94W4

- 1. 1L, P, WATER; METALS-CLP TAL (Ca, Mg, Na, K, Fe, Mn, Si, Al, Bi), SELENIUM (HNO3 pH<2) FILTERED

Field Transfer of Custody		Chain of Possession		(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time
K. Trapp / G. Trapp	9/9/93	1242	William L. Swann	9/9/93	1:50
J. Swann / H. Swann	9/9/93	05:20			
<del>Emery</del>	<del>9-10-93</del>				
Emery	9-10-93	11:50	B. Burnett	9-10-93	11:50

Final Sample Disposition

Disposal Method: \_\_\_\_\_ Disposed by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Comments:

Get in Frig 3 on 7/9/93 at 1242

Temp = 4.8°C

11/4/94  
8

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SDC 26070-WES-1281



Westinghouse  
Hanford Company

SAMPLE ANALYSIS REQUEST

PART I: FIELD SECTION

Collector KD LEE/GG HAMILTON

Date Sampled 9/9/93 Time 1020 hours

Company Contact PH BUTCHER

Telephone (509) 376-5045

Sample Number	Number and Type of Sample Containers	Type of Sample*	Analysis Requested
BO 94W3	1. 1L P	WATER	METALS-CLP TAL(Ca, Mg, Na, K, Fe, Mn, Si, Al, Bi), SELENIUM (HNO3 pH < 2)
	1. 500ml. G	WATER	IC ANIONS(F, Cl, SO4, NO2, PO4)
	1. 500ml. P	WATER	NO2/NO3(H2SO4 pH < 2)
	1. 250ml. P	WATER	ALKALINITY
	1. 250ml. P	WATER	TDS
	1. 250ml. P	WATER	SULFATE
	1. 1L. P	WATER	CYANIDE (NaOH pH > 12)
	3. 2L. P	WATER	GROSS ALPHA/BETA, GAMMA SPEC(Cs-137, Co-60, Ru-106), Pu-238, Pu-239/240, Sr-90, TOTAL URANIUM (HNO3 pH < 2)
	1. 250ml. Gs	WATER	TRITIUM
	1. 1L. G/P	WATER	Tc-99 (HCl pH < 2)
BO 94W4	1. 1L. P	WATER	METALS-CLP TAL(Ca, Mg, Na, K, Fe, Mn, Si, Al, Bi), SELENIUM (HNO3 pH < 2)
			TASK #: 93-265
			OPC #: W93-G-0718-25
			BOL #: 253695593

Field Information \_\_\_\_\_

Special Handling and/or Storage \_\_\_\_\_

Possible Sample Hazards \_\_\_\_\_

PART II: LABORATORY SECTION

Received by \_\_\_\_\_ Title \_\_\_\_\_ Date \_\_\_\_\_

Analysis Required \_\_\_\_\_

\*Indicate whether sample is soil, sludge, water, etc.  
\*\*Use back of page for additional information relative to sample location.

Handwritten initials and signature

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SOG 26070-WES-1281

Westinghouse  
Hanford Company

### CHAIN OF CUSTODY

Custody Form Initiator KD LEE/GG HAMILTON

Company Contact PH BUTCHER

Telephone (509) 376-5045

Project Designation/Sampling Locations 200-6A-1

Collection Date 7/8/93

Ice Chest No. GWS013

Field Logbook No. EFL-1020

Bill of Lading/Airbill No. 2536955793

Offsite Property No. W93-0-0718-25

Method of Shipment WESTON EMERY

Shipped to WESTON LCS 7/9/93

Possible Sample Hazards/Remarks

9309L869

#### Sample Identification

003 BO 94X1

- 1. 1L, P, WATER; METALS-CLP TAL (Ca, Mg, Na, K, Fe, Mn, Si, Al, Bi), SELENIUM (HNO3 pH<2) UNFILTERED
- 1. 500ml, G, WATER; IC ANIONS (F, Cl, SO4, NO2, PO4)
- 1. 500ml, P, WATER; NO2/NO3 (H2SO4 pH<2)
- 1. 250ml, P, WATER; ALKALINITY
- 1. 250ml, P, WATER; TDS
- 1. 250ml, P, WATER; SULFATE
- 1. 1L, P, WATER; CYANIDE (NaOH pH>12)
- 3. 2L, P, WATER; GROSS ALPHA/BETA, GAMMA SPEC (Cs-137, Co-60, Ru-106), Pu-238, Pu-239/240, Sr-90, TOTAL URANIUM (HNO3 pH<2)
- 1. 250ml, Gs, WATER; TRITIUM
- 1. 1L, G/P, WATER; Tc-99 (HCl pH<2)

004 BO 94X2

- 1. 1L, P, WATER; METALS-CLP TAL (Ca, Mg, Na, K, Fe, Mn, Si, Al, Bi), SELENIUM (HNO3 pH<2) FILTERED

Field Transfer of Custody		Chain of Possession		(Sign and Print Names)	
Relinquished By	Date	Time	Received By	Date	Time
F. J. Hagg / A. Trapp	9/9/93	1242	F. J. Hagg / A. Trapp	9/9/93	0750
J. Emery / L. Swanson	9/9/93	0838	J. Emery / L. Swanson		
Emery	9-10-93	11:50	R. Butcher	9-10-93	11:50

Final Sample Disposition		
Disposal Method:	Disposed by:	Date/Time:
Comments: see in Fig 3 on 7/8/93 or 1242		

Temp = 4.8°C

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048  
9/11/94  
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SDG 26070-WES-1281



Westinghouse  
Hanford Company

SAMPLE ANALYSIS REQUEST

PART I: FIELD SECTION

Collector KD LEE/GG HAMILTON Date Sampled 7/9/93 Time 1:30 hours  
Company Contact PH BUTCHER Telephone (509) 376-5045

Sample Number	Number and Type of Sample Containers	Type of Sample	Analysis Requested
8094X1	1. 1L. P	WATER	METALS-CLP TAL(Ca, Mg, Na, K, Fe, Mn, Si, Al, Bi), SELENIUM (HNO3 pH < 2)
	1. 500ml. G	WATER	IC ANIONS (F, Cl, SO4, NO2, PO4)
	1. 500ml. P	WATER	NO2/NO3 (H2SO4 pH < 2)
	1. 250ml. P	WATER	ALKALINITY
	1. 250ml. P	WATER	TDS
	1. 250ml. P	WATER	SULFATE
	1. 1L. P	WATER	CYANIDE (NaOH pH > 12)
	3. 2L. P	WATER	GROSS ALPHA/BETA, GAMMA SPEC (Cs-137, Co-60, Ru-106), Pu-238, Pu-239/240, Sr-90, TOTAL URANIUM (HNO3 pH < 2)
	1. 250ml. Gs	WATER	TRITIUM
	1. 1L. G/P	WATER	Tc-99 (HCl pH < 2)
8094X2	1. 1L. P	WATER	METALS-CLP TAL(Ca, Mg, Na, K, Fe, Mn, Si, Al, Bi), SELENIUM (HNO3 pH < 2)
			TASK #: 93-268
			OPC #: W93-0-0718-25
			BOL #: 2536955993

Field Information \_\_\_\_\_

Special Handling and/or Storage \_\_\_\_\_

Possible Sample Hazards \_\_\_\_\_

PART II: LABORATORY SECTION

Received by \_\_\_\_\_ Title \_\_\_\_\_ Date \_\_\_\_\_

Analysis Required \_\_\_\_\_

\* Indicate whether sample is soil, sludge, water, etc.  
\*\* Use back of page for additional information relative to sample location.

## MEMORANDUM

TO: 200-BP-1 Project QA Record

December 7, 1993

FR: Susan Winter, Golder Associates Inc. *Susan Winter*RE: RADIOCHEMISTRY ANALYSIS DATA VALIDATION SUMMARY FOR DATA  
PACKAGE 26070-WES-1281 (913-1719)

## INTRODUCTION

This memo presents the results of data validation on data package 26070-WES-1281 consisting of two (2) water samples submitted for radiochemistry analysis which was performed by the Teledyne Isotopes laboratory. Information concerning the sample validated is provided in the following table.

SAMPLE ID	SAMPLE DATE	MEDIA
B094W3	09/08/93	WATER
B094X1	09/08/93	WATER

Data validation was conducted in accordance with the revised WHC statement of work (WHC 1993) and validation procedures (Bechtold 1992). Attachments 1 through 4 to this memo provide the data validation supporting documentation and a summary of the validated results.

## DATA QUALITY OBJECTIVES

**Precision.** Goals for precision were met.

**Accuracy.** Goals for accuracy were met with the exception of the blank spike recovery for technetium-99 as summarized under "Minor Deficiencies".

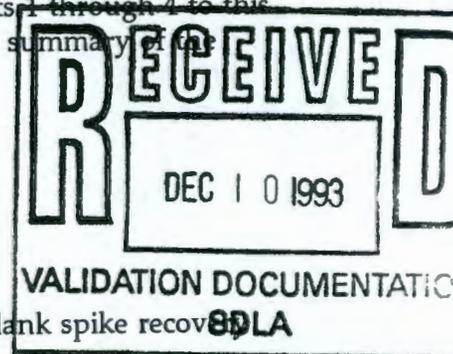
**Sample Result Verification.** All sample results were supported in the raw data.

**Detection Limits.** Detection limit goals were met.

**Completeness.** The data package was complete for all requested analyses. Two (2) samples were validated in this data set with a total of 60 determinations reported, all of which were deemed valid. This results in a completeness of 100 percent which meets the work plan objectives of 90%.

## MAJOR DEFICIENCIES

No deficiencies were identified for the radiochemistry fraction which required rejection of data.



**MINOR DEFICIENCIES**

The following qualifications were required as a result of the data validation.

The technetium-99 initial calibration efficiency values for detectors C-1 and C-6 are 0.19 and 0.18, respectively. Therefore, the technetium-99 results for the associated samples, B094X1 and B094W3Dup, have been qualified as estimated (J).

The blank spike percent recovery for technetium-99 was 122%, greater than the upper control limit of 120%. Therefore, all associated positive results have been qualified as estimated (J).

**REFERENCES**

WHC, 1993, Westinghouse Hanford Company, Validation of 200-BP-1 Data, Statement of Work, Revision F, April 1993. Westinghouse Hanford Company, Richland, Washington.

Bechtold, 1992, Westinghouse Hanford Company, Data Validation Procedures for Radiochemical Analyses, WHC-SD-EN-SPP-001, Rev. 0, 1992. Westinghouse Hanford Company, Richland, Washington.

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ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

## GLOSSARY OF RADIOCHEMISTRY DATA REPORTING QUALIFIERS

- U - The constituent was analyzed for, but was not detected above the minimum detectable activity (MDA). The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory. The data are usable for decision making purposes.
- UJ - The constituent was analyzed for and was not detected. Due to a quality control deficiency identified during data validation the value reported may not accurately reflect the sample quantitation limit. The data are usable for decision making purposes.
- J - Indicates the constituent was analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation. The data are usable for decision making purposes.
- UR - Indicates the constituent was analyzed for and not detected; however, due to an identified quality control deficiency the data are unusable.
- R - Indicates the constituent was analyzed for and detected; however, due to an identified quality control deficiency the data are unusable.

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ATTACHMENT 2  
SUMMARY OF DATA QUALIFICATIONS



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ATTACHMENT 3  
AS QUALIFIED DATA SUMMARY

Validated Radiochemistry Results for SDG: 26070-WES-1281

Parameter	Samp#	B094W3		B094X1	
	Date	09/08/93		09/08/93	
	Type	Water		Water	
	Units	Result	Q	Result	Q
TECHNETIUM-99	pCi/L	1600.000	J	270.000	J
GROSS ALPHA SCAN	pCi/L	2.000	U	7.500	
GROSS BETA SCAN	pCi/L	840.000		120.000	
STRONTIUM-90	pCi/L	1.000	U	0.900	U
TOTAL URANIUM	UGM/L	2.600		28.000	
BERYLLIUM-7	pCi/L	60.000	U	50.000	U
POTASSIUM-40	pCi/L	100.000	U	100.000	U
MANGANESE-54	pCi/L	7.000	U	5.000	U
COBALT-58	pCi/L	6.000	U	5.000	U
IRON-59	pCi/L	10.000	U	10.000	U
COBALT-60	pCi/L	33.200		5.000	U
ZINC-65	pCi/L	10.000	U	10.000	U
ZIRCONIUM-95	pCi/L	8.000	U	6.000	U
RUTHENIUM-103	pCi/L	8.000	U	6.000	U
RUTHENIUM-106	pCi/L	60.000	U	50.000	U
IODINE-131	pCi/L	20.000	U	10.000	U
CESIUM-134	pCi/L	7.000	U	6.000	U
CESIUM-137	pCi/L	7.000	U	6.000	U
BARIUM-140	pCi/L	10.000	U	9.000	U
CERIUM-141	pCi/L	10.000	U	9.000	U
CERIUM-144	pCi/L	40.000	U	30.000	U
EUROPIUM-152	pCi/L	20.000	U	20.000	U
EUROPIUM-154	pCi/L	30.000	U	20.000	U
EUROPIUM-155	pCi/L	20.000	U	20.000	U
RADIUM-226	pCi/L	100.000	U	100.000	U
THORIUM-228	pCi/L	10.000	U	10.000	U
THORIUM-234	pCi/L	100.000	U	100.000	U
TRITIUM	pCi/L	330.000		4500.000	
PLUTONIUM-238	pCi/L	0.090	U	0.080	U
PLUTONIUM-239	pCi/L	0.090	U	0.080	U

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TELEDYNE ISOTOPES

REPORT OF ANALYSIS

RUN DATE 10/15/93

MRS JOSIE EDWARDS WESTON/WESTINGHOUSE/HANFORD 208 WELSH POOL ROAD PICKERING CREEK INDUSTRIAL PARK LIONVILLE PA 19341-1313	WORK ORDER NUMBER 4-3735	CUSTOMER P.O. NUMBER LL-1140-F4	DATE RECEIVED 09/14/93	DELIVERY DATE 10/17/93	PAGE 1
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W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE				ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME		VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE	TIME	TIME			DATE	TIME		
26070	9309L869-001	B094W3	09/08			PH TEST	VERIF IED					3
						TC-99	1.6 +-0.1 E 03			09/24		3
						GR-A	L.T. 2. E 00			09/23		3
						GR-B	8.4 +-0.2 E 02			09/22		3
						SR-90	L.T. 1. E 00			10/08		3
						TOTAL-U	2.6 +-0.4 E 00 UGM/LITER *					3
						<del>TOTAL-U</del>	<del>L.T. 5. E 02 UGM/LITER *</del>					3
						<del>GR-A</del>	<del>9.5 +-15.1E 01</del>			09/23		3
						<del>GR-B</del>	<del>L.T. 2. E 00</del>			09/22		3
						<del>TC-99</del>	<del>L.T. 3. E 00</del>			09/24		3
						<del>SR-90</del>	<del>2.1 +-6.47E 01</del>			10/08		3
						BE-7	L.T. 6. E 01			09/30		4
						<del>BE-7</del>	<del>1.9 +-34.9E 00</del>			09/30		4
						K-40	L.T. 1. E 02			09/30		4
						<del>K-40</del>	<del>2.4 +-6.5E 01</del>			09/30		4
						MN-54	L.T. 7. E 00			09/30		4
						<del>MN-54</del>	<del>1.8 +-3.9E 00</del>			09/30		4
						CO-58	L.T. 6. E 00			09/30		4
						<del>CO-58</del>	<del>1.8 +-4.0E 00</del>			09/30		4
						FE-59	L.T. 1. E 01			09/30		4
						<del>FE-59</del>	<del>6.8 +-80.4E 01</del>			09/30		4
						CO-60	3.32+-0.61E 01			09/30		4
						<del>CO-60</del>	<del>L.T. 1. E 01</del>			09/30		4
						ZN-65	L.T. 1. E 01			09/30		4
						<del>ZN-65</del>	<del>6.5 +-7.7E 00</del>			09/30		4
						ZR-95	L.T. 8. E 00			09/30		4
						<del>ZR-95</del>	<del>7.3 +-4.3E 00</del>			09/30		4
						RU-103	L.T. 8. E 00			09/30		4
						<del>RU-103</del>	<del>3.3 +-4.5E 00</del>			09/30		4
						RU-106	L.T. 6. E 01			09/30		4
						<del>RU-106</del>	<del>2.5 +-3.7E 01</del>			09/30		4
						I-131	L.T. 2. E 01			09/30		4

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TELEDYNE ISOTOPES

REPORT OF ANALYSIS

RUN DATE 10/15/93

MRS JOSIE EDWARDS WESTON/WESTINGHOUSE/HANFORD 208 WELSH POOL ROAD PICKERING CREEK INDUSTRIAL PARK LIONVILLE PA 19341-1313	WORK ORDER NUMBER 4-3735	CUSTOMER P.O. NUMBER LL-1140-F4	DATE RECEIVED 09/14/93	DELIVERY DATE 10/17/93	PAGE 2
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W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME		VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE TIME	STOP DATE TIME				DATE	TIME		
26070	9309L869-001	B094W3	09/08		<del>I-131</del>	<del>5.5 ± 9.7E-00</del>	<del>u</del>	09/30			4
					CS-134	L.T. 7. E 00	u	09/30			4
					<del>CS-134</del>	<del>2.0 ± 4.2E-00</del>		09/30			4
					CS-137	L.T. 7. E 00	u	09/30			4
					<del>CS-137</del>	<del>7.5 ± 40.0E-01</del>		09/30			4
					BA-140	L.T. 1. E 01	u	09/30			4
					<del>BA-140</del>	<del>1.7 ± 6.7E-00</del>		09/30			4
					CE-141	L.T. 1. E 01	u	09/30			4
					<del>CE-141</del>	<del>1.7 ± 6.2E-00</del>		09/30			4
					CE-144	L.T. 4. E 01	u	09/30			4
					<del>CE-144</del>	<del>1.5 ± 2.3E-01</del>		09/30			4
					EU-152	L.T. 2. E 01	u	09/30			4
					<del>EU-152</del>	<del>1.5 ± 1.3E-01</del>		09/30			4
					EU-154	L.T. 3. E 01	u	09/30			4
					<del>EU-154</del>	<del>7.9 ± 14.8E-00</del>		09/30			4
					EU-155	L.T. 2. E 01	u	09/30			4
					<del>EU-155</del>	<del>7.1 ± 1.3E-01</del>		09/30			4
					RA-226	L.T. 1. E 02	u	09/30			4
					<del>RA-226</del>	<del>2.9 ± 701.E-01</del>		09/30			4
					TH-228	L.T. 1. E 01	u	09/30			4
					<del>TH-228</del>	<del>9.1 ± 6.6E-00</del>		09/30			4
					TH-234	L.T. 1. E 02	u	09/30			4
					<del>TH-234</del>	<del>1.9 ± 75.2E-00</del>		09/30			4
					H-3	3.3 ± 1.0 E 02		09/23			5
					<del>H-3</del>	<del>L.T. 1. E 02</del>		09/23			5
					PU-238	L.T. 9. E-02	u	09/28			6
					PU-239	L.T. 9. E-02	u	09/28			6
					<del>PU-238</del>	<del>5.4 ± 54.2E-03</del>		09/28			6
					<del>PU-239</del>	<del>5.4 ± 54.2E-03</del>		09/28			6

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TELEDYNE ISOTOPES

REPORT OF ANALYSIS

RUN DATE 10/15/93 **5**

MPS JOSIE EDWARDS WESTON/WESTINGHOUSE/HANFORD 208 WELSH POOL ROAD PICKERING CREEK INDUSTRIAL PARK LIONVILLE PA 19341-1313	WORK ORDER NUMBER 4-3735	CUSTOMER P.O. NUMBER LL-1140-F4	DATE RECEIVED 09/14/93	DELIVERY DATE 10/17/93	PAGE 3
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W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE				NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME		VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE	TIME	TIME				DATE	TIME		
26071	9309L869-001MS B094W3	/				H-3	1.7 +-0.2 E 03		09/23			5	
						<del>H-3</del>	<del>L.T. 1. E 02</del>		09/23			5	
26072	9309L869-001MSDB094W3	/				H-3	1.7 +-0.2 E 03		09/23			5	
						<del>H-3</del>	<del>L.T. 1. E 02</del>		09/23			5	
26073	9309L869-001DUPB094W3	09/08				TC-99	1.7 +-0.1 E 03		09/24			3	
						GR-A	L.T. 2. E 00		09/23			3	
						GR-B	7.5 +-0.2 E 02		09/22			3	
						SR-90	L.T. 7. E-01		10/08			3	
						TOTAL-U	2.5 +-0.4 E 00 UGM/LITER *					3	
						<del>TOTAL-U</del>	<del>L.T. 5. E-02 UGM/LITER *</del>					3	
						<del>GR-A</del>	<del>1.6 +-1.7 E 00</del>		09/23			3	
						<del>GR-B</del>	<del>L.T. 2. E 00</del>		09/22			3	
						<del>TC-99</del>	<del>L.T. 3. E 00</del>		09/24			3	
						<del>SR-90</del>	<del>9.1 +-46.6E 02</del>		10/08			3	
						BE-7	L.T. 6. E 01		10/01			4	
						<del>BE-7</del>	<del>7.6 +-39.2E 00</del>		10/01			4	
						K-40	L.T. 1. E 02		10/01			4	
						<del>K-40</del>	<del>6.9 +- 6.6E 01</del>		10/01			4	
						MN-54	L.T. 6. E 00		10/01			4	
						<del>MN-54</del>	<del>1.9 +- 3.7E 00</del>		10/01			4	
						CO-58	L.T. 7. E 00		10/01			4	
						<del>CO-58</del>	<del>3.5 +- 4.4E 00</del>		10/01			4	
						FE-59	L.T. 2. E 01		10/01			4	
						<del>FE-59</del>	<del>7.5 +- 9.6E 00</del>		10/01			4	
						CO-60	3.77+-0.60E 01		10/01			4	
						<del>CO-60</del>	<del>L.T. 1. E 01</del>		10/01			4	
						ZN-65	L.T. 1. E 01		10/01			4	
						<del>ZN-65</del>	<del>2.1 +- 7.7E 00</del>		10/01			4	
						ZR-95	L.T. 7. E 00		10/01			4	
						<del>ZR-95</del>	<del>2.9 +- 4.5E 00</del>		10/01			4	

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TELEDYNE ISOTOPES

REPORT OF ANALYSIS

RUN DATE 10/15/93

MRS JOSIE EDWARDS  
 WFSTON/WESTINGHOUSE/HANFORD  
 208 WELSH POOL ROAD  
 PICKERING CREEK INDUSTRIAL PARK  
 LIONVILLE PA 19341-1313

WORK ORDER NUMBER 4-3735  
 CUSTOMER P.O. NUMBER LL-1140-F4  
 DATE RECEIVED 09/14/93  
 DELIVERY DATE 10/17/93  
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W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME		VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE TIME	STOP DATE TIME				DATE	TIME		
26073	9309L869-001DUPB094W3		09/08		RU-103	L.T. 8. E 00	u	10/01			4
					<del>RU-103</del>	<del>2.5 + 5.3E 00</del>		10/01			4
					RU-106	L.T. 6. E 01	u	10/01			4
					<del>RU-106</del>	<del>1.7 + 3.6E 01</del>		10/01			4
					I-131	L.T. 4. E 01	u	10/01			4
					<del>I-131</del>	<del>1.1 + 2.5E 01</del>		10/01			4
					CS-134	L.T. 7. E 00	u	10/01			4
					<del>CS-134</del>	<del>5.8 + 42.0E 01</del>		10/01			4
					CS-137	L.T. 7. E 00	u	10/01			4
					<del>CS-137</del>	<del>2.5 + 42.1E 01</del>		10/01			4
					BA-140	L.T. 2. E 01	u	10/01			4
					<del>BA-140</del>	<del>0.0 + 1.1E 01</del>		10/01			4
					CE-141	L.T. 1. E 01	u	10/01			4
					<del>CE-141</del>	<del>1.3 + 7.6E 00</del>		10/01			4
					CE-144	L.T. 4. E 01	u	10/01			4
					<del>CE-144</del>	<del>3.0 + 22.2E 00</del>		10/01			4
					EU-152	L.T. 2. E 01	u	10/01			4
					<del>EU-152</del>	<del>2.6 + 119.E 01</del>		10/01			4
					EU-154	L.T. 2. E 01	u	10/01			4
					<del>EU-154</del>	<del>1.1 + 10.0E 00</del>		10/01			4
					EU-155	L.T. 2. E 01	u	10/01			4
					<del>EU-155</del>	<del>4.6 + 1.1E 01</del>		10/01			4
					RA-226	L.T. 1. E 02	u	10/01			4
					<del>RA-226</del>	<del>2.3 + 6.6E 01</del>		10/01			4
					TH-228	L.T. 1. E 01	u	10/01			4
					<del>TH-228</del>	<del>9.4 + 6.3E 00</del>		10/01			4
					TH-234	L.T. 1. E 02	u	10/01			4
					<del>TH-234</del>	<del>6.1 + 6.8E 01</del>		10/01			4
					H-3	4.0 + -1.1 E 02		09/23			5
					<del>H-3</del>	<del>L.T. 1. E 02</del>		09/23			5
					PU-238	L.T. 8. E-02	u	09/28			6
					PU-239	L.T. 8. E-02	u	09/28			6

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TELEDYNE ISOTOPES

REPORT OF ANALYSIS

RUN DATE 10/15/93

MRS JOSIE EDWARDS WESTON/WESTINGHOUSE/HANFORD 208 WELSH POOL ROAD PICKERING CREEK INDUSTRIAL PARK LIONVILLE PA 19341-1313	WORK ORDER NUMBER 4-3735	CUSTOMER P.O. NUMBER LL-1140-F4	DATE RECEIVED 09/14/93	DELIVERY DATE 10/17/93	PAGE 5
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W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME		VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE			DATE	TIME		
26073	9309L869-001DUPB094W3		09/08		<del>PU-238</del> 5.2 + 52.3E-03		09/28			6
					<del>PU-239</del> 5.2 + 52.3E-03		09/28			6
26074	DISTILLED BLANK H2O	/			TC-99 L.T. 5. E 00 U		09/24			3
					GR-A L.T. 8. E-01 U		09/22			3
					GR-B L.T. 8. E-01 U		09/22			3
					SR-90 L.T. 1. E 00 U		10/08			3
					TOTAL-U L.T. 5. E-02 UGM/LITER U*					3
					<del>TOTAL-U</del> 3. + 3. E 03 UGM/LITER *					3
					<del>GR-A</del> 2.5 + 4.30E-01		09/22			3
					<del>GR-B</del> 7.1 + 5.62E-01		09/22			3
					<del>TC-99</del> 2.3 + 2.71E-00		09/24			3
					<del>SR-90</del> 1.9 + 8.20E-01		10/08			3
					BE-7 L.T. 5. E 01 U		09/30			4
					<del>BE-7</del> 0.0 + 3.3E-01		09/30			4
					K-40 L.T. 2. E 02 U		09/30			4
					<del>K-40</del> 2.0 + 7.9E-01		09/30			4
					MN-54 L.T. 6. E 00 U		09/30			4
					<del>MN-54</del> 4.0 + 39.6E-01		09/30			4
					CO-58 L.T. 7. E 00 U		09/30			4
					<del>CO-58</del> 2.0 + 4.1E-00		09/30			4
					FE-59 L.T. 1. E 01 U		09/30			4
					<del>FE-59</del> 2.4 + 7.3E-00		09/30			4
					CO-60 L.T. 6. E 00 U		09/30			4
					<del>CO-60</del> 5.8 + 38.4E-01		09/30			4
					ZN-65 L.T. 1. E 01 U		09/30			4
					<del>ZN-65</del> 6.9 + 7.7E-00		09/30			4
					ZR-95 L.T. 7. E 00 U		09/30			4
					<del>ZR-95</del> 7.5 + 40.8E-01		09/30			4
					RU-103 L.T. 7. E 00 U		09/30			4
					<del>RU-103</del> 1.7 + 4.0E-00		09/30			4
					RU-106 L.T. 6. E 01 U		09/30			4

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TELEDYNE ISOTOPES

REPORT OF ANALYSIS

RUN DATE 10/15/93

MRS JOSIE EDWARDS WESTON/WESTINGHOUSE/HANFORD 208 WELSH POOL ROAD PICKERING CREEK INDUSTRIAL PARK LIONVILLE PA	WORK ORDER NUMBER 4-3735	CUSTOMER P.O. NUMBER LL-1140-F4	DATE RECEIVED 09/14/93	DELIVERY DATE 10/17/93	PAGE 6
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W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	TIME	VOLUME - UNITS ASH-WGHT-% *	LAB.
26074	DISTILLED BLANK H2O	/										
						<del>RU-106</del>	<del>5.4 + 38.4E 00</del>			09/30		4
						I-131	L.T. 7. E 00	u		09/30		4
						<del>I-131</del>	<del>9.4 + 40.2E 01</del>			09/30		4
						CS-134	L.T. 8. E 00	u		09/30		4
						<del>CS-134</del>	<del>4.4 + 46.9E 01</del>			09/30		4
						CS-137	L.T. 7. E 00	u		09/30		4
						<del>CS-137</del>	<del>1.3 + 44.1E 01</del>			09/30		4
						BA-140	L.T. 6. E 00	u		09/30		4
						<del>BA-140</del>	<del>1.9 + 3.6E 00</del>			09/30		4
						CE-141	L.T. 9. E 00	u		09/30		4
						<del>CE-141</del>	<del>3.8 + 5.4E 00</del>			09/30		4
						CE-144	L.T. 4. E 01	u		09/30		4
						<del>CE-144</del>	<del>6.8 + 24.6E 00</del>			09/30		4
						EU-152	L.T. 2. E 01	u		09/30		4
						<del>EU-152</del>	<del>9.7 + 13.4E 00</del>			09/30		4
						EU-154	L.T. 2. E 01	u		09/30		4
						<del>EU-154</del>	<del>7.7 + 12.3E 00</del>			09/30		4
						EU-155	L.T. 2. E 01	u		09/30		4
						<del>EU-155</del>	<del>1.7 + 1.4E 01</del>			09/30		4
						RA-226	L.T. 1. E 02	u		09/30		4
						<del>RA-226</del>	<del>1.5 + 7.0E 01</del>			09/30		4
						TH-228	L.T. 1. E 01	u		09/30		4
						<del>TH-228</del>	<del>1.0 + 0.7E 01</del>			09/30		4
						TH-234	L.T. 1. E 02	u		09/30		4
						<del>TH-234</del>	<del>4.6 + 8.1E 01</del>			09/30		4
						H-3	L.T. 1. E 02	u		09/23		5
						<del>H-3</del>	<del>7.1 + 88.8E 00</del>			09/23		5
						PU-238	L.T. 9. E-02	u		10/01		6
						PU-239	L.T. 1. E-01	u		10/01		6
						<del>PU-238</del>	<del>5.3 + 52.9E 03</del>			10/01		6
						<del>PU-239</del>	<del>2.6 + 6.9 E 02</del>			10/01		6

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TELEDYNE ISOTOPES

REPORT OF ANALYSIS

RUN DATE 10/15/93

MRS JOSIE EDWARDS  
 WESTON/WESTINGHOUSE/HANFORD  
 208 WELSH POOL ROAD  
 PICKERING CREEK INDUSTRIAL PARK  
 LIONVILLE PA 19341-1313

WORK ORDER NUMBER 4-3735  
 CUSTOMER P.O. NUMBER LL-1140-F4  
 DATE RECEIVED 09/14/93  
 DELIVERY DATE 10/17/93  
 PAGE 7

W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
26075	DISTILLED SPIKED H2O	/				TC-99	1.2 +-0.1 E 02	<u>5</u>	09/24		3
						GR-A	9.3 +-1.6 E 00		09/22		3
						GR-B	2.1 +-0.2 E 01		09/22		3
						SR-90	7.4 +-0.2 E 01		10/10		3
						TOTAL-U	1.7 +-0.3 E 01	UGM/LITER *			3
						<del>TOTAL-U</del>	<del>L.T. 5. E 02</del>	<del>UGM/LITER *</del>			3
						<del>GR-A</del>	<del>L.T. 8. E 01</del>		09/22		3
						<del>GR-B</del>	<del>L.T. 8. E 01</del>		09/22		3
						<del>TC-99</del>	<del>L.T. 4. E 00</del>		09/24		3
						<del>SR-90</del>	<del>L.T. 8. E 01</del>		10/10		3
						BE-7	L.T. 2. E 06	u	10/05		4
						<del>BE-7</del>	<del>8.6 +-14.3E 05</del>		10/05		4
						K-40	L.T. 5. E 02	u	10/05		4
						<del>K-40</del>	<del>9.0 +-28.5E 01</del>		10/05		4
						MN-54	L.T. 4. E 02	u	10/05		4
						<del>MN-54</del>	<del>7.6 +-26.2E 01</del>		10/05		4
						CO-58	L.T. 4. E 04	u	10/05		4
						<del>CO-58</del>	<del>3.5 +-23.8E 03</del>		10/05		4
						FE-59	L.T. 3. E 06	u	10/05		4
						<del>FE-59</del>	<del>1.8 +-16.5E 05</del>		10/05		4
						CO-60	2.49+-0.25E 04		10/05		4
						<del>CO-60</del>	<del>L.T. 8. E 02</del>		10/05		4
						ZN-65	L.T. 1. E 03	u	10/05		4
						<del>ZN-65</del>	<del>3.0 +-8.5E 02</del>		10/05		4
						ZR-95	L.T. 7. E 04	u	10/05		4
						<del>ZR-95</del>	<del>2.1 +-3.9E 04</del>		10/05		4
						RU-103	L.T. 4. E 06	u	10/05		4
						<del>RU-103</del>	<del>6.2 +-23.7E 05</del>		10/05		4
						RU-106	L.T. 3. E 03	u	10/05		4
						<del>RU-106</del>	<del>1.7 +-16.7E 01</del>		10/05		4
						CS-134	L.T. 2. E 02	u	10/05		4
						<del>CS-134</del>	<del>7.1 +-11.9E 01</del>		10/05		4

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12/17/93

TELEDYNE ISOTOPES

REPORT OF ANALYSIS

RUN DATE 10/15/93

MRS JOSIE EDWARDS WESTON/WESTINGHOUSE/HANFORD 208 WELSH POOL ROAD PICKERING CREEK INDUSTRIAL PARK LIONVILLE PA 19341-1313	WORK ORDER NUMBER 4-3735	CUSTOMER P.O. NUMBER LL-1140-F4	DATE RECEIVED 09/14/93	DELIVERY DATE 10/17/93	PAGE 8
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W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE				ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME		VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE	TIME	TIME			DATE	TIME		
26075	DISTILLED SPIKED H2O	/				CS-137	2.23+-0.22E 04		10/05		4	
						<del>CS-137</del>	<del>L.T. 6. E 02</del>		10/05		4	
						CE-141	L.T. 3. E 07	u	10/05		4	
						<del>CE-141</del>	<del>1.0 +- 2.1E 07</del>		10/05		4	
						CE-144	L.T. 2. E 03	u	10/05		4	
						<del>CE-144</del>	<del>6.5 +- 11.4E 02</del>		10/05		4	
						EU-152	L.T. 3. E 02	u	10/05		4	
						<del>EU-152</del>	<del>6.1 +- 18.4E 01</del>		10/05		4	
						EU-154	L.T. 2. E 02	u	10/05		4	
						<del>EU-154</del>	<del>6.8 +- 11.7E 01</del>		10/05		4	
						EU-155	L.T. 5. E 02	u	10/05		4	
						<del>EU-155</del>	<del>7.6 +- 0.3E 03</del>		10/05		4	
						RA-226	L.T. 1. E 03	u	10/05		4	
						<del>RA-226</del>	<del>8.2 +- 8.6E 02</del>		10/05		4	
						TH-228	L.T. 2. E 02	u	10/05		4	
						<del>TH-228</del>	<del>7.8 +- 14.7E 01</del>		10/05		4	
						TH-234	L.T. 1. E 03	u	10/05		4	
						<del>TH-234</del>	<del>2.0 +- 0.1E 04</del>		10/05		4	
						H-3	1.3 +-0.1 E 03		09/23		5	
						<del>H-3</del>	<del>L.T. 1. E 02</del>		09/23		5	
						PU-238	L.T. 4. E-02	u	10/01		6	
						PU-239	1.2 +-0.2 E 00		10/01		6	
						<del>PU-238</del>	<del>2.3 +- 22.7E 03</del>		10/01		6	
						<del>PU-239</del>	<del>L.T. 6. E-02</del>		10/01		6	
26076	9309L869-003	8094X1	09/08			PH TEST	VERIF IED				3	
						TC-99	2.7 +-0.1 E 02	J	09/24		3	
						GR-A	7.5 +-3.0 E 00		09/22		3	
						GR-B	1.2 +-0.1 E 02		09/22		3	
						SR-90	L.T. 9. E-01	u	10/08		3	
						TOTAL-U	2.8 +-0.4 E 01 UGM/LITER *				3	
						<del>TOTAL-U</del>	<del>L.T. 5. E 02 UGM/LITER *</del>				3	

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TELEDYNE ISOTOPES

REPORT OF ANALYSIS

RUN DATE 10/15/93

MRS JOSIE EDWARDS WESTON/WESTINGHOUSE/HANFORD 208 WELSH POOL ROAD PICKERING CREEK INDUSTRIAL PARK LIONVILLE PA 19341-1313	WORK ORDER NUMBER 4-3735	CUSTOMER P.O. NUMBER LL-1140-F4	DATE RECEIVED 09/14/93	DELIVERY DATE 10/17/93	PAGE 9
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W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
26076	9309L869-003	B094X1	09/08		<del>GR-A</del>	<del>L.T. 2. E 00</del>		09/22		3
					<del>GR-B</del>	<del>L.T. 2. E 00</del>		09/22		3
					<del>TC-99</del>	<del>L.T. 4. E 00</del>		09/24		3
					<del>SR-90</del>	<del>3.3 +- 54.6E-02</del>		10/08		3
					<del>BE-7</del>	<del>L.T. 5. E 01</del>	u	09/30		4
					<del>BE-7</del>	<del>3.2 +- 29.7E-00</del>		09/30		4
					<del>K-40</del>	<del>L.T. 1. E 02</del>	u	09/30		4
					<del>K-40</del>	<del>1.7 +- 6.5E-01</del>		09/30		4
					<del>MN-54</del>	<del>L.T. 5. E 00</del>	u	09/30		4
					<del>MN-54</del>	<del>1.2 +- 3.2E-00</del>		09/30		4
					<del>CO-58</del>	<del>L.T. 5. E 00</del>	u	09/30		4
					<del>CO-58</del>	<del>1.4 +- 3.4E-00</del>		09/30		4
					<del>FE-59</del>	<del>L.T. 1. E 01</del>	u	09/30		4
					<del>FE-59</del>	<del>1.2 +- 7.1E-00</del>		09/30		4
					<del>CO-60</del>	<del>L.T. 5. E 00</del>	u	09/30		4
					<del>CO-60</del>	<del>0.0 +- 3.0E-00</del>		09/30		4
					<del>ZN-65</del>	<del>L.T. 1. E 01</del>	u	09/30		4
					<del>ZN-65</del>	<del>1.5 +- 6.6E-00</del>		09/30		4
					<del>ZR-95</del>	<del>L.T. 6. E 00</del>	u	09/30		4
					<del>ZR-95</del>	<del>3.7 +- 3.6E-00</del>		09/30		4
					<del>RU-103</del>	<del>L.T. 6. E 00</del>	u	09/30		4
					<del>RU-103</del>	<del>2.4 +- 3.6E-00</del>		09/30		4
					<del>RU-106</del>	<del>L.T. 5. E 01</del>	u	09/30		4
					<del>RU-106</del>	<del>0.0 +- 3.2E-01</del>		09/30		4
					<del>I-131</del>	<del>L.T. 1. E 01</del>	u	09/30		4
					<del>I-131</del>	<del>0.0 +- 8.7E-00</del>		09/30		4
					<del>CS-134</del>	<del>L.T. 6. E 00</del>	u	09/30		4
					<del>CS-134</del>	<del>2.2 +- 3.7E-00</del>		09/30		4
					<del>CS-137</del>	<del>L.T. 6. E 00</del>	u	09/30		4
					<del>CS-137</del>	<del>2.9 +- 3.5E-00</del>		09/30		4
					<del>BA-140</del>	<del>L.T. 9. E 00</del>	u	09/30		4
					<del>BA-140</del>	<del>7.7 +- 58.0E-01</del>		09/30		4

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12/7/93

TELEDYNE ISOTOPES

REPORT OF ANALYSIS

RUN DATE 10/15/93

WORK ORDER NUMBER 4-3735 CUSTOMER P.O. NUMBER LL-1140-F4 DATE RECEIVED 09/14/93 DELIVERY DATE 10/17/93 PAGE 10

MRS JOSIE EDWARDS  
 WESTON/WESTINGHOUSE/HANFORD  
 208 WELSH POOL ROAD  
 PICKERING CREEK INDUSTRIAL PARK  
 LIONVILLE PA 19341-1313

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W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME		VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE TIME	STOP DATE TIME			DATE	TIME		
26076	9309L869-003	B094X1	09/08		CE-141	L.T. 9. E 00		09/30		4
					<del>CE-141</del>	<del>1.5 +- 5.6E 00</del>		09/30		4
					CE-144	L.T. 3. E 01		09/30		4
					<del>CE-144</del>	<del>9.3 +- 19.7E 00</del>		09/30		4
					EU-152	L.T. 2. E 01		09/30		4
					<del>EU-152</del>	<del>8.0 +- 10.3E 00</del>		09/30		4
					EU-154	L.T. 2. E 01		09/30		4
					<del>EU-154</del>	<del>4.7 +- 100.E 01</del>		09/30		4
					EU-155	L.T. 2. E 01		09/30		4
					<del>EU-155</del>	<del>6.2 +- 1.0E 01</del>		09/30		4
					RA-226	L.T. 1. E 02		09/30		4
					<del>RA-226</del>	<del>2.7 +- 6.3E 01</del>		09/30		4
					TH-228	L.T. 1. E 01		09/30		4
					<del>TH-228</del>	<del>4.3 +- 5.5E 00</del>		09/30		4
					TH-234	L.T. 1. E 02		09/30		4
					<del>TH-234</del>	<del>5.1 +- 6.5E 01</del>		09/30		4
					H-3	4.5 +-0.2 E 03		09/28		5
					<del>H-3</del>	<del>L.T. 2. E 02</del>		09/28		5
					PU-238	L.T. 8. E-02		09/28		6
					PU-239	L.T. 8. E-02		09/28		6
					<del>PU-238</del>	<del>5.0 +- 49.6E 03</del>		09/28		6
					<del>PU-239</del>	<del>5.0 +- 49.6E 03</del>		09/28		6

LAST PAGE OF REPORT

APPROVED BY J. GUENTHER 10/15/93

*J. Guenther*

SEND 1 COPIES TO WE884S MRS JOSIE EDWARDS

2 - GAS LAB. 3 - RADIO CHEMISTRY LAB. 4 - GE(LI) GAMMA SPEC LAB. 5 - TRITIUM GAS/L.S. LAB. 6 - ALPHA SPEC LAB.

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*J. Guenther*  
10/17/93

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ATTACHMENT 4  
DATA VALIDATION SUPPORTING DOCUMENTATION

9213507 1678  
RADIOCHEMISTRY DATA VALIDATION CHECKLIST

PROJECT: 200-BE-1	VALIDATOR: <i>[Signature]</i>	DATE: 12/06/93
LABORATORY: Teledyne	DATA PACKAGE: 26070-WFS-1281	
SAMPLES/MATRIX: B094W3 (TI# 26070)		
waters B094X1 (TI# 26076)		

1. Completeness

1.1 Completeness Checklist (Complete the appropriate checklist for each analysis type and attach).

2. Calibration

2.1 Initial Calibration

Was instrument calibrated within specified time period or annually?

Yes  No  N/A

If NO, qualify all associated data as unusable (R).

Was each detector used for the associated data calibrated?

Yes  No  N/A

If NO, qualify all associated data as unusable (R).

Are calibration standards NIST traceable or equivalent?

Yes  No  N/A

If NO, qualify all associated data as unusable (R).

Were calibration standards expired?

Yes  No  N/A

If YES, qualify all associated data as unusable (R).

Comments: \_\_\_\_\_

\_\_\_\_\_

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RADIOCHEMISTRY DATA VALIDATION CHECKLIST

4. Detection Limits and Sample Results

Can LLDs and MDAs be verified?

Yes  No  N/A

If NO, qualify all results as estimated detects (J) or estimated nondetects (U).

Do reported results meet the detection limit requirements?

Yes  No  N/A (P) 12/7/93

Note discrepancies in the validation report narrative.

Can reported results be verified?

Yes  No  N/A

If NO, note missing data in the validation report. Correct results on the photocopied report forms and include in the validation report.

Comments:

~~The detection limit requirement for Ru-106 is 3 pCi/L and the reported MDA is 60 pCi/L in sample B094W3 and 50 pCi/L in sample B094X1. All other detection limit requirements were met.~~

(P) 12/7/93

No qualification was required.

The reported MDAs meet the revised detection limit goals.

*[Signature]*  
12/7/93





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RADIOCHEMISTRY DATA VALIDATION CHECKLIST

7. Laboratory Control Samples

Are LCS results within the control limits  
of 80-120%

Yes  No  N/A

If NO, qualify results as follows:

%R: \_\_\_\_\_ <50% 50-79% >120%

Results < LLD:    R    UJ    R  
Results > LLD:    R    J    R

Has at least one LCS been analyzed with the SDG?

Yes  No  N/A

If NO, qualify all associated results as estimated (J).

Comments:

Blank Sp. Fe  
LCS  
MS 2R Tc-99 = 122% > 120% (J)



RADIOCHEMISTRY DATA VALIDATION CHECKLIST

9. Method Specific and Other Quality Control

9.1 Gas Proportional Counters

Are field and QC sample preparations outside the range of the self absorption curves?

Yes  No  N/A

If YES, qualify all associated data as estimated (J).

Are initial detector efficiencies <20%?

Yes  No  N/A

12/16/93

If YES, qualify all associated data as ~~unusable (R)~~ estimated (J).

Have statistical tests been performed routinely (at least weekly)?

Yes  No  N/A

If NO, qualify all associated data as estimated (J).

Have stability verifications been performed after each gas change?

Yes  No  N/A

If NO, qualify all associated data as estimated (J).

Comments:

The Tc-99 efficiency values for detectors C6 and C1 were 0.18 and 0.19, respectively. Therefore, the associated sample results (B094W13 Dup and B094X1) have been qualified as estimated (J). These results were not qualified as unusable since the chemical yield recoveries and the calibration checks were acceptable.

*[Signature]*  
12/16/93





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RADIOCHEMISTRY DATA VALIDATION CHECKLIST

9.4 Alpha Emitting Radium Isotopes

Have single radium isotopes (Ra-223, Ra-224, Ra-226) been reported?

Yes No N/A

If YES, qualify all results attributed to a single radium isotope as estimated (J) if the contribution to the total from individual isotopes is unknown.

Can time from sample precipitation to counting be verified?

Yes No N/A

If NO, qualify all associated results >MDA as estimated (J).

Have barium interferences been identified and accounted for?

Yes No N/A

If NO, qualify all associated results with elevated barium levels as estimated (J).

Has counting efficiency for Ra-226 been determined for each SDG?

Yes No N/A

If NO, qualify all associated results as unusable (R).

Have blanks been analyzed with each group to check for possible radium contamination in the reagents?

Yes No N/A

If NO, qualify all associated results as estimated (J).

If sample was preserved at collection has analysis been completed within 180 days or 5 half-lives?

Yes No N/A

If NO, qualify results >LLD as estimated detects (J) and results < LLD as estimated non-detects (UJ).

If samples were not preserved, were samples received within 5 days of sampling?

Yes No N/A

• Were samples preserved at the laboratory upon receipt?

Yes No N/A

• Were samples held after preservation for at least 16 days?

Yes No N/A

If NO, to any of the above, qualify associated sample results as estimated (J).

Comments: This analysis was not performed.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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RADIOCHEMISTRY DATA VALIDATION CHECKLIST

9.5 Radium 226 Analysis using Scintillation (Lucas) Cell Counting

Is calibration data present and can it be associated with the samples?

Yes No N/A

If NO, qualify associated sample results as unusable (R).

Was the counting system calibrated each day that samples were analyzed?

Yes No N/A

If NO, qualify associated results as estimated (J).

Was the counting system calibrated after replacing the scintillation cell?

Yes No N/A

If NO, qualify associated results as estimated (J) if the cell has a previously determined calibration constant and unusable (R) if no constant is available for the replacement cell.

Were blanks analyzed with each sample group to check for radium contamination in reagents?

Yes No N/A

If NO, qualify associated results as estimated (J).

If sample was preserved at collection has analysis been completed within 180 days or 5 half-lives?

Yes No N/A

If NO, qualify results >LLD as estimated detects (J) and results < LLD as estimated non-detects (U).

If samples were not preserved, were samples received within 5 days of sampling?

Yes No N/A

• Were samples preserved at the laboratory upon receipt?

Yes No N/A

• Were samples held after preservation for at least 16 days?

Yes No N/A

If NO, to any of the above, qualify associated sample results as estimated (J).

Comments: This analysis was not performed.

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9.7 Fluorometric Analysis of Uranium

Has the laboratory provided evidence that cation and anion interferences are negligible for the matrix or that matrix interferences have been accounted for?

Yes No N/A

If NO, qualify associated results as estimated ( ).

Has the laboratory provided a description of the method of fusion standardization or provided data supporting fusion standardization?

Yes No  N/A

If NO, qualify associated results as estimated ( ).

Was calibration performed immediately prior to sample analysis?

Yes No N/A  
See comments

If NO, qualify associated results as estimated ( ).

Comments: \_\_\_\_\_  
Calibration check sample was analyzed  
before each run, therefore, qualification  
is not necessary.  
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FILENAME: 26070-QC.WK1

SDG NO.: 26070-WES-1281

SAMPLE ID: BLANK (LAB NO. 26074)

MS SAMPLE ID: BLANK SPIKE (LAB NO. 26075)

PARAMETER	SPIKED AMOUNT	BLANK RESULT	SPIKE RESULT	SPIKE %R
TECHNETIUM-99	98.5	0	120	122
GROSS ALPHA	11.2	0	9.3	83
GROSS BETA	22	0	21	95
STRONTIUM-90	80	0	74	93
TOTAL URANIUM	18.6	0	17	91
COBALT-60	25000	0	24900	100
CESIUM-137	21600	0	22300	103
TRITIUM	1400	0	1300	93
PLUTONIUM-239	1.09	0	1.2	110

SAMPLE ID: B094W3

MS SAMPLE ID: B094W3 MS

MSD SAMPLE ID: B094W3 MSD

PARAMETER	SPIKED AMOUNT	SAMPLE RESULT	MS RESULT	MS %R	MSD RESULT	MSD %R	MS/MSD RPD
TRITIUM	1400	330	1700	98	1700	98	0

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FILENAME: 26070-LD.WK1

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SDG NO.: 26070-WES-1281

SAMPLE ID: B094W3

DUPLICATE SAMPLE ID: B094W3 DUP

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PARAMETER	SAMPLE RESULT	DUPLCIATE RESULT	LAB DUP RPD
TECHNETIUM-99	1600	1700	6
GROSS BETA	840	750	11
TOTAL URANIUM	2.6	2.5	4
COBALT-60	33.2	37.7	13
TRITIUM	330	400	19

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FILENAME: 8QW-TC.WK1

SDG	HEIS	Lab No.	Date Analyzed	Det. ID	Spl Amt.	Yield	Gross cnts	Count Time	Bkg. cpm	Det. Eff.	Tc99		MDA Calc.	MDA Rptd.
											Result Calc.	Result Rptd.		
25651	B094Z5	25651	10/05/93	C3	0.3	0.543	227	100	0.21	0.21	27	27	3	3
	B094Z5 DUP	26564	10/05/93	C4	0.3	0.5	269	100	0.21	0.224	33	33	3	3
	BLANK	26555	10/05/93	E4	0.2	0.387	9	100	0.11	0.232	-0.50	-0.50	4	4
	BLANK SPIKE	26556	10/05/93	E5	0.2	0.29	369	100	0.15	0.251	110	110	6	6
26070	B094W3	26070	09/24/93	C4	0.3	0.5	11890	100	0.22	0.224	1591	1600	3	3
	B094W3 DUP	26073	09/24/93	C6	0.3	0.446	10290	100	0.19	0.204	1695	1700	3	3
	BLANK	26062	09/24/93	E9	0.2	0.435	13	100	0.23	0.229	-2	<5	5	5
	BLANK SPIKE	26063	09/24/93	E10	0.2	0.408	551	100	0.14	0.243	122	120	4	4
	B094X1	26076	09/24/93	C1	0.3	0.376	1509	100	0.22	0.221	269	270	4	4

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FILENAME: 8QW-A.WK1

SDG	HEIS#	Lab No.	Det.	Spl. Amt.	Date Alpha Counted	GROSS ALPHA				Result Calc	Result Rptd	MDA Calc	MDA Rptd
						Gross Counts	Count Time	Bkg. cpm	Eff.				
26561	B094Z5	26561	T3	0.5	09/28/93	33	100	0.16	0.071	2.2	<2	2	2
	B094Z5 DUP	26564	T3	0.5	09/28/93	29	100	0.16	0.072	1.6	<2	2	2
	BLANK	26565	T3	1	09/27/93	11	50	0.16	0.172	0.16	<0.7	0.7	0.7
	BLANK SPIKE	26566	T3	1	10/08/93	245	50	0.16	0.174	12.27	13	0.7	0.7
26070	B094W3	26070	T3	0.5	09/23/93	7	50	0.06	0.076	0.95	<2	2	2
	B094W3 DUP	26073	T3	0.5	09/23/93	10	50	0.06	0.078	1.62	<2	2	2
	BLANK	26074	T3	1	09/22/93	4	50	0.16	0.145	-0.25	<0.8	0.8	0.8
	BLANK SPIKE	26075	T3	1	09/22/93	156	50	0.16	0.143	9.32	9.3	0.8	0.8
	B094X1	26076	T3	0.5	09/23/93	33	50	0.06	0.072	7.51	7.5	2.0	2

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FILENAME: 8QW-B.WK1

SDG	HEIS#	Lab No.	Det.	Date Beta Counted	GROSS BETA				Spl. Amt.	Result Calc	Result Rptd	MDA Calc	MDA Rptd
					Gross Counts	Count Time	Bkg. cpm	Eff.					
26561	B094Z5	25661	T3	09/27/93	456	50	0.92	0.282	0.5	26	26	2	2
	B094Z5 DUP	26564	T3	09/27/93	435	50	0.92	0.283	0.5	25	25	2	2
	BLANK	26565	T3	09/27/93	61	50	0.92	0.386	1	0.35	<0.7	0.7	0.7
	BLANK SPIKE	26566	T3	09/27/93	1103	50	0.92	0.387	1	25	25	0.7	0.7
26070	B094W3	26070	T3	09/22/93	9874	36.68	1.02	0.289	0.5	836	840	2	2
	B094W3 DUP	26073	T3	09/22/93	9851	40.07	1.02	0.293	0.5	753	750	2	2
	BLANK	26074	T3	09/22/93	80	50	1.02	0.367	1	0.7	<0.8	0.8	0.8
	BLANK SPIKE	26075	T3	09/22/93	908	50	1.02	0.366	1	21	21	0.8	0.8
	B094X1	26076	T3	09/22/93	1935	50	1.02	0.284	0.5	120	120	2	2

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FILENAME: 8QW-SR2.WK1

SDG	HEIS	Lab No.	Date Analyzed	Det. ID	Spl Amt.	Y-90 Yield	SR-89 Yield	Ingrowth	Decay	Gross Cnts	Count Time	Bkg. cpm
25651	B094Z5	25651	10/08/93	E2	0.5	0.974	0.494	0.872	0.753	26	200	0.13
	B094Z5 DUP	26564	10/08/93	C9	0.5	1	0.711	0.872	0.789	23	100	0.21
	BLANK	26068	10/08/93	C10	0.5	0.988	0.668	0.872	0.789	19	100	0.22
	BLANK SPIKE	26069	10/10/93	B10	0.5	0.983	0.639	0.872	0.429	6648	800	0.25
26070	B094W3	26070	10/08/93	C4	0.5	1	0.78	0.872	0.789	21	100	0.17
	B094W3 DUP	26073	10/08/93	E5	0.5	0.986	0.717	0.872	0.753	31	200	0.14
	BLANK	26068	10/08/93	C10	0.5	0.988	0.668	0.872	0.789	19	100	0.22
	BLANK SPIKE	26069	10/08/93	B10	0.5	0.983	0.639	0.872	0.429	6648	800	0.25
	B094X1	26076	10/08/93	E4	0.5	0.986	0.575	0.872	0.753	21	200	0.11

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FILENAME: 8QW-SR2.WK1

SDG	HEIS	Lab No.	Det. Eff.	Sr90 Result Calc.	Result Rptd	MDA Calc.	MDA Rptd.
25651	B094Z5	25651	0.28	-0.00	0	1	1
	B094Z5 DUP	26564	0.32	0.12	0.12	1	1
	BLANK	26068	0.31	-0.19	-0.19	1	1
	BLANK SPIKE	26069	0.42	73.58	74	0.8	0.8
26070	B094W3	26070	0.32	0.21	<1	1.0	1
	B094W3 DUP	26073	0.32	0.09	<0.7	0.7	0.7
	BLANK	26068	0.31	-0.19	<1	1	1
	BLANK SPIKE	26069	0.42	73.58	74	0.8	0.8
	B094X1	26076	0.29	-0.04	<0.9	0.9	0.9

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FILENAME: 8QW-U.WK1

SDG	HEIS#	TELEDYNE LAB ID	DATE ANALYZE	SAMPLE AMOUNT	DILUTION FACTOR	WF	WU	R	TOTAL	TOTAL
									URANIUM CALC. UG/L	URANIUM RPTD. UG/L
26561	B094Z5	26561	10/01/93	6	2	0.337	0.515	0.686	2.6	2.6
	B094Z5 DUP	26564	10/01/93	6	2	0.33	0.51	0.686	2.5	2.5
	BLANK	26565	10/01/93	6	1	0.001	0.257	0.686	0.0	<0.05
	BLANK SPIKE	26566	10/01/93	6	10	0.61	0.855	0.686	17.1	17
26070	B094W3	26070	10/01/93	6	2	0.379	0.581	0.686	2.6	2.6
	B094W3 DUP	26073	10/01/93	6	2	0.379	0.583	0.686	2.5	2.5
	BLANK	26074	10/01/93	6	1	0.001	0.257	0.686	0.00	<0.05
	BLANK SPIKE	26075	10/01/93	6	10	0.61	0.855	0.686	17.1	17
	B094X1	26076	10/01/93	6	20	0.403	0.605	0.686	27.4	28

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FILENAME: 8QW-H3.WK1

SDG	HEIS#	Lab No.	Date Analyzed	Gross Counts	Count Time	Sample Amount	Bkgnd cpm	Detect Eff.	Result Calc.	Result Rptd	MDA Calc	MDA Rptd
26561	B094Z5	26561	09/25/93	1230	100	0.01	1.88	0.19	2470	2500	151	200
	B094Z5 MS	26562	09/25/93	1654	100	0.01	1.88	0.19	3476	3500	151	200
	B094Z5 MSD	26563	09/25/93	1689	100	0.01	1.88	0.19	3559	3600	151	200
	B094Z5 DUP	26564	09/25/93	1189	100	0.01	1.88	0.19	2373	2400	151	200
	BLANK	26565	09/25/93	190	100	0.01	1.88	0.19	5	<200	151	200
	BLANK SPIKE	26566	09/25/93	785	100	0.01	1.88	0.19	1415	1400	151	200
26070	B094W3	26070	09/25/93	315	100	0.01	1.74	0.19	334	330	146	100
	B094W3 MS	26071	09/25/93	891	100	0.01	1.74	0.19	1700	1700	146	100
	B094W3 MSD	26072	09/25/93	905	100	0.01	1.74	0.19	1733	1700	146	100
	B094W3 DUP	26073	09/25/93	344	100	0.01	1.74	0.19	403	400	146	100
	BLANK	26074	09/25/93	177	100	0.01	1.74	0.19	7	<100	146	100
	BLANK SPIKE	26075	09/25/93	717	100	0.01	1.74	0.19	1287	1300	146	100
	B094X1	26076	09/28/93	2068	100	0.01	1.87	0.19	4459	4500	151	200

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FILENAME: 8QW-PU.WK1

SDG	HEIS No.	Lab No.	Spl. Amt.	Date Analyzed	Det.	Eff.	Pu239 Cnts	Pu238 Cnts	Time Secs	Spike Cnts	Spike Act.	Bkg Pu239	Bkg Pu238	Time secs	Spike %R
26561	B094Z5	26561	0.15	09/28/93	43	0.1982	2	1	60000	1452	4.03	2	1	80000	0.8180
	B094Z5 DUP	26564	0.15	09/28/93	44	0.1715	1	1	60000	1093	4.03	4	1	80000	0.7104
	BLANK	26565	0.15	10/06/93	31	0.2018	2	1	60000	1242	4.03	1	1	80000	0.6875
	BLANK SPIKE	26566	0.3	10/06/93	32	0.1772	96	1	60000	1274	4.03	2	1	80000	0.8026
26070	B094W3	26070	0.15	09/28/93	47	0.1908	1	1	60000	1239	4.03	1	1	80000	0.7253
	B094W3 DUP	26073	0.15	09/28/93	48	0.1837	1	1	60000	1284	4.03	1	1	80000	0.7808
	BLANK	26074	0.15	10/01/93	47	0.1908	1	1	60000	1271	4.03	3	1	80000	0.7432
	BLANK SPIKE	26075	0.3	10/01/93	48	0.1837	133	1	60000	1477	4.03	3	1	80000	0.8973
	B094X1	26076	0.15	09/28/93	46	0.1845	1	1	60000	1355	4.03	1	1	80000	0.8204

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FILENAME: 8QW-PU.WK1

SDG	HEIS No.	Lab No.	Pu239				Pu238			
			Pu239 Calc.	Pu239 Rptd	MDA Calc	MDA Rptd	Pu238 Calc.	Pu238 Rptd.	MDA Calc	MDA Rptd
26561	B094Z5	26561	0.0093	0.0093	0.1	0.1	0.0046	0.0046	0.07	0.07
	B094Z5 DUP	26564	-0.0493	-0.049	0.2	0.2	0.0062	0.0061	0.1	0.1
	BLANK	26565	0.0271	0.027	0.09	0.09	0.0054	0.0054	0.09	0.09
	BLANK SPIKE	26566	1	1	0.06	0.06	0.0026	0.0026	0.04	0.04
26070	B094W3	26070	0.0054	<0.09	0.09	0.09	0.0054	<0.09	0.09	0.09
	B094W3 DUP	26073	0.0052	<0.08	0.08	0.08	0.0052	<0.08	0.08	0.08
	BLANK	26074	-0.0265	<0.1	0.1	0.1	0.0053	<0.09	0.09	0.09
	BLANK SPIKE	26075	1.2	1.2	0.06	0.06	0.0023	<0.04	0.04	0.04
	B094X1	26076	0.0050	<0.08	0.08	0.08	0.0050	<0.08	0.08	0.08

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