START

9613476.1455

W0066-ITC-074
5-6

0045261

INTERNATIONAL TECHNOLOGY CORPORATION

JUL 1994
RECEIVED
SDLA

Analytical Data Package Prepared For

Westinghouse Hanford

Radiochemical Analysis By

IT Analytical Services
Richland Laboratory

Sample Delivery Group Number: W0066

WHC IDENTIFICATION NUMBER	ITAS RICHLAND ID NUMBER
B0BS60	40537101

RECORD COPY

SEP 1996
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EDMC

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2800 George Washington Way • Richland, Washington 99352-1613 • 509-375-3131 • FAX: 509-375-5590

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0001

INTERNATIONAL TECHNOLOGY CORPORATION

CERTIFICATE OF ANALYSIS

Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352

July 11, 1994

Attention: J.A.Lerch

SAF Number	:	94-130
Date SDG Closed	:	May 25, 1994
Number of Samples	:	One (1)
Sample Type	:	Water
SDG Number	:	W0066
Data Deliverable	:	Stand Alone

I. Introduction

On May 17, 1994, one water sample was received by ITAS-Richland for radiochemical analysis. Upon receipt, the sample was assigned the following laboratory ID number to correspond with the WHC specific ID:

ITAS-Richland ID	WHC ID	Matrix	Date of Receipt
405371-01A	B0BS60	Water	5/17/94

II. Analytical Results/Methodology

The analytical results for this report are presented by laboratory sample ID. Each set of data includes sample identification information, analytical results and the appropriate associated statistical errors.

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The requested analyses were: **Gamma Spectroscopy**
Gamma Scan by method ITAS-RD-3219
Liquid Scintillation Counting
Technetium-99 by method ITAS-IT-RS-0001

III. Quality Control

The analytical results for each analysis performed under SDG W0066 include a minimum of one Laboratory Control Sample (LCS), one method (reagent) blank, and one duplicate. Any exceptions have been noted in the "Comments" section.

Quality control sample results are reported in the same units as sample results.

IV. Comments

Results from the initial radioactivity screening of this sample classified it as Category I.

Gamma Spectroscopy

Gamma Scan by method ITAS-RD-3219
The batch was recounted due to an error which caused the spike identity to be switched with the sample identity. The recount data is accepted. The Eu-152 detection limit was not met for the blank and the LCS, however, the Eu-152 detection limit was met for the sample and duplicate sample. The LCS Eu-152 achieved detection limit appeared to be elevated because Eu-152 was not "detected" (the abundance criteria was not met according to the ND system), however, the ND calculated result for Eu-152 is acceptable (99.6%). The LCS, batch blank, sample and sample duplicate (duplicate of sample B0BS60) results are accepted and reported.

Liquid Scintillation Counting

Technetium-99 by method ITAS-IT-RS-0001
The matrix spikes, LCS, batch blank, sample and sample duplicate (duplicate of sample B0BS60) results are within contractual requirements.

I certify that this Certificate of Analysis is in compliance with the SOW, 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 a designee, as verified by the following signature.

Reviewed and approved:

Suzanne Gaines

Suzanne Gaines
Project Manager

IT ANALYTICAL SERVICES
RICHLAND, WA
(509) 375-3131

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0066
LAB SAMPLE ID:	40537101	MATRIX:	WATER
WHC ID:	B0BS60	DATE RECEIVED:	5/17/94

ISOTOPE	RESULT	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
CO-58	6.76E+00	6.13E+00	6.16E+00	1.39E+01	pCi/L	N/A	RD3219
CO-60	-5.06E+00	5.74E+00	5.76E+00	8.68E+00	pCi/L	N/A	RD3219
CS-137DA	-4.32E+00	5.06E+00	5.08E+00	7.71E+00	pCi/L	N/A	RD3219
EU-152	3.54E+00	1.80E+01	1.80E+01	3.98E+01	pCi/L	N/A	RD3219
EU-154	4.10E+00	1.01E+01	1.01E+01	2.31E+01	pCi/L	N/A	RD3219
EU-155	2.31E+00	8.92E+00	8.92E+00	1.62E+01	pCi/L	N/A	RD3219
FE-59	4.85E+00	1.88E+01	1.88E+01	3.78E+01	pCi/L	N/A	RD3219
TC-99	2.11E+01	1.29E+00	6.10E+00	2.19E+00	pCi/L	95.10%	ITAS-IT-RS-0001

Number of Results: 8

9613476.1160

SAMPLE ANALYSIS ORDER
BATTELLE, PNL

ITAS

CONTRACT_____
CHAIN OF CUSTODY #: B013C8
SAMPLE ID(S): B0BS60
SAMPLE SCHEDULE DATE: 04/01/94
USER ID BATTM16729

SAF94-130

SAMPLE RECEIVER INITIAL / DATE:
_____ / DATE_____

WATER X SOIL___ OTHER___

INTERNAL TEMPERATURE OF SHIPPING CONTAINER
UPON OPENING IN LABORATORY_____

BOTT#	BOTT TYPE	BOTT SIZE	# of BOTT	PRESERVAT	NOTES	# of SAMP	ANA_1	ANA_2	ANA_3	ANA_4	ANA_5	ANA_6	Filtered
123	P	1000	1	HNO3		8	GAMM						
					4/14/94 98		GAMMA SCAN						
313	P	1000	1	HNO3		2	TC99						
							TC-99						

9613476.1461

Surveyed : Yes ✓ No ____? Less than 200 counts/minute: Yes ✓ No ____? By (initials) [illegible]

Pacific Northwest Laboratories Battelle Boulevard Richland, Washington 99352	**CHAIN OF CUSTODY**	Test User ID: BATTM16729 C-of-C: B013C8 pg. 1 of 1

Company Contact: BE OPITZ Telephone: (509) 372-0069

Samples Collected by: HANREL / HARRISON Date: 5-5-94 Time: 815

ID/Sample No.: B0BS60

Ice Chest No.: ER-10 Field Logbook Page No.: 4/856

Remarks: SAF 94-130

Possible Sample Hazard Identification: ____ Contract No.: ____

Destination: DELIVER TO SIGMA 5 (Westinghouse) Carrier/Waybill No.: ____

Ground-Water X Soil ____ Other ____

Shipping container internal temperature when samples sealed in it ____. Shipping container internal temperature when opened in laboratory ____.

Sample Identification

B0BS60 -(8) 1000mlP-GAMM
B0BS60 -(2) 1000mlP-TC99

4053710)

Chain of Possession

Relinquished by:	Received by:	Date/Time:
[signature]	Kathy L. Farmer PNL	5-5-94 1140
[signature] for KLF	L Sweeney L Sweeney WHC	5/6/94 0700
L Sweeney L Sweeney WHC	[signature] ITAS	5/7/94 1300 5/7/94
Relinquished by: 5/7/94 1300	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:
Disposed by:	Disposal Method:	Date/Time:

019A

PNL-MA-567, AD2 BD-1200-345 (12/92)

9613476.1462

SAMPLE STATUS REPORT FOR E 6017. E-BLANK 2-E32-2 TIME: 5/17/94 8:48
DISPATCHED: 3/30/94 11:44 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 5/ 5/94 15: 3

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

END OF REPORT

BOBQW6
BOBQW7
BOBQW8
BOBQW9
LCS
5/17/94

BOBS60
LCS
5/17/94

9613476.1463

Contractor	OFF-SITE PROPERTY CONTROL	CONTROL NUMBER (To be obtained from PROPERTY MANAGEMENT)
WHC		W94-C-C591-2

PART I – TO BE COMPLETED BY ORIGINATOR

Department	Section	Unit
ER Eng Support	Field & Analytical Supp	ER Field Sampling

The following items are to be shipped from ☒ Contractor ☐ Vendor

Routing ☒ Contractor ☐ Vendor

Shipped to

IT Analytical Services
2800 George Washington Way
Richland, WA 99352

Off-site Custodian

Full Title

Quantity	Description (Include Serial and any Government Tag Numbers)	Original Cost
1 lbs.	Sample #: B0B560 Cooler ID: ER-10 Polycooler with groundwater samples packed in wet ice and vermiculite	N/A
1 lbs.	Sample #: NA Cooler ID: Polycooler with groundwater samples packed in wet ice and vermiculite	N/A

☐ Classified ☒ Unclassified ☐ Shipped Under DOE Contract ☐ Shipped Under Contractor's Use Permit Contract

Necessity for the Off-Site Use of this Property

Sampling supports RI/FS work in the 200 AREA

Bill of lading #_____

CERTIFICATION OF THE RADIATION MONITORING RELEASE MUST BE SECURED THE SAME DAY THAT MATERIAL IS DELIVERED TO SHIPPING.

RM Clearance for Public Release	RM Survey No.	Date
[illegible]	P3516	5/17/94

Location of Property (Area & Bldg.)	Contact	Phone
200-BP-5	P. H. Butcher	(509) 376-4388

Date Ready for Shipment	Cost Code to be Charged	Approximate Date This Property will be Returned
5/17/94	8B410 PL53A	NA

Originated By	Date	Authorized By	Date
PH Butcher	5/17/94	CH Simpson	5/17/94

Signature and Name of Property Control	Custodian Date	Property Management Approval	Date
		[illegible]	5/17/94

PART II – TO BE COMPLETED BY SHIPPING

Signature of Recipient	Return Order No.	Date Issued	Purchase Order No.	Date Issued
[illegible] ITAS Date 5/17/94 1300			0021	

DISTRIBUTION

By Originator	Shipping Operation – Sign all Copies and Forward to:
White, Green, Yellow, Pink – Property Management Goldenrod – Retain	White – Property Management Yellow – Retain Green – Property Control Custodian (Issuing Office) Pink – Originator

54-3000-479 (09/89)

9613476.1464

INTERNATIONAL TECHNOLOGY CORPORATION

Regional Office
2800 George Washington Way
Richland, Washington 99352

SAMPLE CHECK-IN LIST

(1 Per Shipping Container)

Date/Time Received 5/17/94 1300 Client Name WHC

Project/Client # 94-130 Batch or Case # N/A

Cooler ID (if noted on the outside of cooler) ER-10

1. Condition of shipping container? ok
2. Custody Seals on cooler intact? Yes ☑ No ☐
3. Custody Seals dated and signed? Yes ☑ No ☐
4. Chain of Custody record is taped on inside of cooler lid? Yes ☑ No ☐
5. Vermiculite/packing material is: Wet ☐ Dry ☑
6. Each sample is in a plastic bag? Yes ☐ No ☑
7. Number of sample containers in cooler: 10
8. Samples have: ____ tape ____ hazard labels
   ✓ custody seals ✓ appropriate sample labels
9. Samples are: ✓ in good condition ____ leaking
   ____ broken ____ have air bubbles
   ____ other
10. Coolant present? Yes ☑ No ☐

Sample temperature 3°c

11. The following paperwork should be accounted for (N/A if not applicable):
    Chain of Custody #'(s) B013C8
    Request for analysis #(s) N/A
    Airbill # N/A Carrier N/A
12. Have any anomalies been identified above? Yes ☐ No ☑
13. Memos have been initiated for all anomalies identified above? Yes ☐

Printed Name/Signature Tom Gilmore [signature] Date/Time 5/17/94 1300

FORM NO. LS-042, Rev.0, 2/94

TENNELEC #1

SCREENING CALCULATION SPREADSHEET

O.K. JRH
17 May 94

Customer Code	Recieved Date	Time	Screening Prep Date	Time	Count Date	Mnts. Cntd	BACKGROUND Alpha	Beta	Mnts
WHC	5-17-94		5-17		5-17	10	11	206	240

Customer ID WHC/WATER	pH <2 Rcvd/Relq	Plncht Wght (mGrms)	Vol. Anal. mG mL	Sample Size Gm L	SMPLE CNT DATA Hldr Num.	Total Counts Alpha	Beta	Net Sample Counts/Minute Alpha	Beta	DPM / Aliqout Alpha	Beta	uCi per Sample Alpha	Beta	2 Sigma Error uCi per Sample Alpha	Beta	pCi/(Gm or L) Alpha	Beta	Catagory 1 Yes/No	Aliquot to Cat 1 Gm or Ltr Alpha	Beta
B0BS60		2.5	5	1.0	2	2	17	0.15	0.84	5.93E-01	1.70E+00	5.3E-05	1.5E-04	9.5E-08	1.2E-07	5.3E+01	1.5E+02	Yes	1.9E+02	6.5E+02
B0BXX1		1.7	5	1.0	3	0	33	-0.05	2.44	-2.6E-01	5.24E+00	-2.3E-05	4.7E-04	-5.1E-08	2.0E-07	-2.3E+01	4.7E+02	Yes	-4.3E+02	2.1E+02
TOTAL uCi												3.0E-05	6.3E-04							

0023

9411.9/4/3/96

9613476.1466

DUE 6/29/94 ~~6/21/94~~ 6-15-94

*** GAMMA ***

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

17-May-1994
Page 1

CUSTOMER: WHC

SAMPLE DELIVERY GROUP W0066

MATRIX : WATER

BATCH NUMBER 5-371

	ITAS ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
	L0537110	QCAG 017			
	L0537115	QCAG 018			
1)	40537101		WHC	B0BS60	
	F0537161				

ACTIONS (Initial & Date)

1) INITIATED 5/17/94

2) PREP LAB RECEIVED 6-14-94

3) SAMPLE REMAINDER STORED 6-14-94

4) SEPARATION LAB RECEIVED N/A

5) COUNTING/MEASUREMENT LAB 15 Jun 94

6) DATA REVIEWED AND ANALYTICAL PREP STORED 6-22-94

0024

9613476.1467

INTERNATIONAL TECHNOLOGY CORPORATION

DUE DATE 6/29/94

REANALYSIS / RECOUNT

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

ANALYSIS Gamma

NAME/DATE MK / 6-22-94

CUSTOMER WHC

SAMPLE DELIVERY GROUP W0066

MATRIX Water

BATCH NUMBER

ITAS ID	CUSTOMER ID	COMMENTS
1) L0537118		100 min
2) L0537115		
3) 40537101		
4) F0537101		
5)		
6)		
7)		
8)		
9)		
10)		

REANALYSIS

REFERENCED QC

ITAS ID - BLANK

ITAS ID - SPIKE

CLIENT CODE

ACTIONS (Initial & Date)

PREP LAB RECEIVED

SAMPLE REMAINDER RETURNED TO SCG ☐ (CHECK ONE)

NO SAMPLE REMAINING ☐

SEPARATION LAB

COUNTING/MEASUREMENT

DATA REVIEWED

ANALYTICAL PREP STORED

RECOUNT

ACTIONS (Initial & Date)

COUNTING/MEASUREMENT OD 6/22/94

DATA REVIEWED MK 6-23-94

ANALYTICAL PREP STORED

ADDITIONAL COMMENTS:

Blank, spike, Sample ID Switch MK 6-22-94

RC-048 12/92 REV 2

0025

9613476.1468

6/21/94

*** TC-99 ***

CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

17-May-1994
Page 1

CUSTOMER: WHC

SAMPLE DELIVERY GROUP WO066

MATRIX : WATER

BATCH NUMBER 5-3711 5/17/94

	ITAS ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
	L0537111N L0537112N	L0537111B L0537111M		W0537101 - EQNJ179 - F0537101	100.42 ± 1.2408
1)	40537101		WHC	BOBS60	

ACTIONS (Initial & Date)

1) INITIATED 5/17/94

2) PREP LAB RECEIVED 6/17/94 MM

3) SAMPLE REMAINDER STORED 6/17/94 MM

4) SEPARATION LAB RECEIVED 6/17/94 MM

5) COUNTING/MEASUREMENT LAB 21 Jun 94

6) DATA REVIEWED AND ANALYTICAL PREP STORED 6/23/94 SE

L0537111M - EQNJ180 99.959 ± 1.2352

0026

9613476.1469

0247

INTERNATIONAL TECHNOLOGY CORPORATION

LOG #: RD-94-_____ page 1 of 2

ITAS-Richland
LABORATORY NONCONFORMANCE MEMO (NCM)

PROJECT ID (Name/Number): WHC W0006

NCM INITIATED BY (Name/Date): Joel T Kempema 6-24-94

PARAMETER(S): Gamma

SAMPLE NUMBER(S) AFFECTED: 4053710 1 + 053710 1 + QC

MATRIX: Water

AREA: ☐ SHIP/REC ☒ RADIOCHEM ☐ COUNTING ☐ BIOASSAY ☐ DATA VERIF ☐ REPORTING ☐ OTHER:

NONCONFORMANCE [check appropriate item(s)]:

1. ☐ Not enough sample received for proper analysis.
2. ☐ Holding time exceeded by _____ days due to:
   - 2.1. ☐ CATEGORY I: Out of Laboratory Control
     - ☐ Holding time expired at receipt.
   - 2.2. ☐ CATEGORY II: Laboratory Dependent
     - ☐ work backlog ☐ instrument failure
     - ☐ communication ☐ other (see #10)
   - 2.3 ☒ CATEGORY III: Laboratory Reruns
     - 2.3.1. ☐ QA/QC:
       - ☐ surrogates ☐ internal standards
       - ☐ spike recoveries ☐ blank contamination
     - 2.3.2. ☒ CONFIRMATION:
       - ☐ second column ☐ contamination check
       - ☒ other (see #10)
     - 2.3.3. ☐ DILUTION:
       - ☐ over calibration ☐ under calibration
       - ☐ other (see #10)
     - 2.3.4. ☐ OTHER: (see #10)
3. ☐ Sample lost during extraction/analysis; no re-prep or re-analysis possible.
4. ☐ QC data reported to client outside of:
   - ☐ method limits ☐ internal limits
   - ☐ QAPP limits ☐ contract limits
   - ☐ regulatory limits ☐ blank criteria
5. ☐ Incorrect procedure(s) used. (See #10)
6. ☐ Invalid instrument calibration. (See #10)
7. ☐ Incorrect/incomplete data reported to client. (See #10)
8. ☐ Reported detection limit(s) higher than:
   - ☐ method limits ☐ QAPP limits
   - ☐ contract limits ☐ other (see #10)

   Due to:
   - ☐ sample matrix ☐ insufficient sample
   - ☐ instrumentation ☐ other (see #10)
9. ☒ Other (specify): Apparent spike-sample I D Switch
10. ☒ Comments/Explanation: Recount data identity correct

NOTIFICATION [check appropriate item(s)]:

1. ☐ Client notified by (name and date): _____
   - ☐ in writing ☐ by FAX
   - ☐ by phone ☐ Other (explain)
2. ☐ Client's name _____ and response:
   - ☐ process "as is" ☐ resample
   - ☐ on hold til ____ ☐ Other (explain)

PROJECT MANAGER (signature & date): Suzy Davies 6/30/94

FURTHER ACTION REQUIRED, SEE PAGE 2 OF 2

0013

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0247

IT CORPORATION

LOG #: RD-94-_____ page 2 of 2

CORRECTIVE ACTION

☒ ROOT CAUSE: INITIALS/DATE TK 6-24-94

apparant ID switch at counting

☒ CORRECTIVE ACTION: INITIALS/DATE TK 6-24-94

Recount data accepted

☐ RESPONSIBILITY FOR PERFORMING CORRECTIVE ACTION ASSIGNED TO:

☐ ACTIONS TO PREVENT RECURRENCE: INITIALS/DATE

FIRST LEVEL SUPERVISOR: [signature] DATE: 6-24-94

RESPONSIBLE MANAGER: [signature] DATE: 7/8/94

QC REVIEW

☐ NONCONFORMANCE ☐ DEFICIENCY ☒ RERUN

☐ FURTHER ACTION REQUIRED:

ASSIGNED TO:

QC COORDINATOR: Jodie Gr DATE: 7/11/94

CORRECTIVE ACTION VERIFICATION

☒ VERIFIED ☐ CANNOT VERIFY (specify reason)

REASON:

NCM CLOSURE

QC COORDINATOR: Jodie Gr DATE: 7/11/94

0014

SIGNED ORIGINAL MUST BE RETAINED IN FILE: ☐ QUALITY/OPERATIONS FILE ☒ PROJECT FILE

9613476.1471

INTERNATIONAL TECHNOLOGY CORPORATION

0511

LOG #: RD-94-_____ page 1 of 2

ITAS-Richland
LABORATORY NONCONFORMANCE MEMO (NCM)

PROJECT ID (Name/Number): WHC W0066

NCM INITIATED BY (Name/Date): Joe T Kempema 6-24-94

PARAMETER(S): Gamma

SAMPLE NUMBER(S) AFFECTED: L053711B L053711S

MATRIX: Water

AREA: ☐ SHIP/REC ☒ RADIOCHEM ☐ COUNTING ☐ BIOASSAY ☐ DATA VERIF ☐ REPORTING ☐ OTHER:

NONCONFORMANCE [check appropriate item(s)]:

1. ☐ Not enough sample received for proper analysis.
2. ☐ Holding time exceeded by _____ days due to:
   - 2.1 ☐ CATEGORY I: Out of Laboratory Control
     - ☐ Holding time expired at receipt.
   - 2.2 ☐ CATEGORY II: Laboratory Dependent
     - ☐ work backlog ☐ instrument failure
     - ☐ communication ☐ other (see #10)
   - 2.3 ☐ CATEGORY III: Laboratory Reruns
     - 2.3.1. ☐ QA/QC:
       - ☐ surrogates ☐ internal standards
       - ☐ spike recoveries ☐ blank contamination
     - 2.3.2. ☐ CONFIRMATION:
       - ☐ second column ☐ contamination check
       - ☐ other (see #10)
     - 2.3.3. ☐ DILUTION:
       - ☐ over calibration ☐ under calibration
       - ☐ other (see #10)
     - 2.3.4. ☐ OTHER: (see #10)
3. ☐ Sample lost during extraction/analysis: no re-prep or re-analysis possible.
4. ☐ QC data reported to client outside of:
   - ☐ method limits ☐ internal limits
   - ☐ QAPP limits ☐ contract limits
   - ☐ regulatory limits ☐ blank criteria
5. ☐ Incorrect procedure(s) used. (See #10)
6. ☐ Invalid instrument calibration. (See #10)
7. ☐ Incorrect/incomplete data reported to client. (See #10)
8. ☒ Reported detection limit(s) higher than:
   - ☐ method limits ☐ QAPP limits
   - ☒ contract limits ☐ other (see #10)

   Due to:
   - ☐ sample matrix ☐ insufficient sample
   - ☐ instrumentation ☐ other (see #10)
9. ☒ Other (specify): Eu 152 MDA Blank 51.34 CL=50pCi/L
   Eu 152 MDA Spike 91.99 CL=50pCi/L
10. ☒ Comments/Explanation: for ~~spike~~ ppt 6-24-94 samples MDA's < C.L

NOTIFICATION [check appropriate item(s)]:

1. ☐ Client notified by (name and date): _____
   - ☐ in writing ☐ by FAX
   - ☐ by phone ☐ Other (explain)
2. ☐ Client's name _____ and response:
   - ☐ process "as is" ☐ resample
   - ☐ on hold til ____ ☐ Other (explain)

PROJECT MANAGER (signature & date): Suzy Haines 6/30/94

FURTHER ACTION REQUIRED, SEE PAGE 2 OF 2

9613476.1472

0511

IT CORPORATION

LOG #: RD-94-_____ page 2 of 2

CORRECTIVE ACTION

☒ **ROOT CAUSE:** INITIALS/DATE JTK 6-24-94

Spike - failed abundance test for minor lines & not reported as detected due to keyline not found

☒ **CORRECTIVE ACTION:** INITIALS/DATE JTK 6-24-94

data accepted

☐ RESPONSIBILITY FOR PERFORMING CORRECTIVE ACTION ASSIGNED TO:

☐ **ACTIONS TO PREVENT RECURRENCE:** INITIALS/DATE

FIRST LEVEL SUPERVISOR: [signature] DATE: 6-24-94

RESPONSIBLE MANAGER: [signature] DATE: 7/8/94

QC REVIEW

☐ NONCONFORMANCE ☒ DEFICIENCY ☐ RERUN

☐ FURTHER ACTION REQUIRED:

ASSIGNED TO:

QC COORDINATOR: [signature] DATE: 7/11/94

CORRECTIVE ACTION VERIFICATION

☒ VERIFIED ☐ CANNOT VERIFY (specify reason)

REASON:

NCM CLOSURE

QC COORDINATOR: [signature] DATE: 7/11/94

SIGNED ORIGINAL MUST BE RETAINED IN FILE: ☐ QUALITY/OPERATIONS FILE ☒ PROJECT FILE

0016

9613476.1473

Los Alamos Technical Associates, Inc.

8633 Gage Blvd. / Kennewick, WA 99336 / Telephone (509) 783-4369 / FAX (509) 783-9661

AUG 1994
RECEIVED
TQO

August 16, 1994

Karl Pool
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352

Dear Karl,

Attached is the data validation report for analytical results for 200BP-5 Groundwater Operable Unit (SDG W0066-ITC-074). The package was received by Los Alamos Technical Associates on July 27, 1994. Validation of this package began on August 15, and was completed on August 16, 1994.

If you have any questions, please let me know.

Sincerely,

Janet Jones
Senior Environmental Engineer

cc: Chris Haecker, LATA
VW402.55 file

RECEIVED
aug PKR
~~JUL~~ 17 1994
VALIDATION DOCUMENTATION
SDLA

9613476.1474

AUG 1994
RECEIVED
TQO

DATA VALIDATION REPORT
for
200-BP-5 Groundwater Operable Unit
SDG W0066-ITC-074
LATA VW402.55

RECEIVED
Aug PKR
JUL 17 1994
VALIDATION DOCUMENTATION
SDLA

Westinghouse Hanford Company
P.O. Box 1970
Richland, Washington 99352

August 16, 1994

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200-BP-5 Groundwater Operable Unit
Data Validation Narrative

INTRODUCTION

All samples in Sample Delivery Group (SDG) W0066-ITC-074 were validated at level "D" as defined in the Data Validation Procedures for Radiochemical Analyses (WHC-SD-EN-SPP-001).

The data package was received by Los Alamos Technical Associates (LATA) on July 27, 1994. Validation began on August 15, 1994 and was completed on August 16, 1994.

The radiochemical analyses were performed by International Technology Corporation, ITAS.

ANALYSES REQUESTED

One (1) water sample numbered BOBS60 was collected on May 5, 1994 by WHC and transferred to International Technology Corporation (ITC) for analysis. The following determinations were conducted on the sample in this SDG:

Technetium-99	Method ITAS-IT-RS-0001
Gamma Spectrometry	Method ITAS-RD-3219

DATA QUALITY OBJECTIVES

The data quality objectives for 200-BP-5 Groundwater Operable Unit are specified in the *Quality Assurance Program Plan for the 200-BP-5 Groundwater Operable Unit* (DOE/RL 88-32, Rev. 1). Precision, accuracy, and detection limit requirements for the project have been derived from *USEPA Contract Laboratory Program Statement of Work for Inorganic Analyses* (EPA 1989a).

The primary objective of the data validation effort was to ensure these data quality objectives were met, and that the data are usable and defensible. This was accomplished through a detailed examination of the data package to recreate the analytical process and verify that proper and acceptable analytical techniques had been applied. The data package was checked for correct submission of required deliverables, correct transcription of raw data to the summary forms, and for proper calculation of a number of parameters.

Precision. Goals for precision were met.

Accuracy. Goals for accuracy were met.

DATA QUALITY OBJECTIVES (cont.)

Sample Result Verification. All sample results were supported in the raw data with the exception of the matrix spike recovery on page 11 of the package. The spike recoveries for Co60, Cs137, and Eu152 on page 10 were also reported incorrectly. The expected values entered were in DPM rather than pCi.

Detection Limits. Detection limit goals were met for all samples with the exception of those listed in the "**COMMENTS**" section of this report.

Completness. No results were rejected, the data is 100% complete.

Data qualifiers are assigned to any results that have been determined to be deficient. These are discussed below.

MAJOR DEFICIENCIES (REJECTED DATA)

* No major deficiencies were identified during validation which required qualification of data as unusable.

MINOR DEFICIENCIES

* No minor deficiencies were identified during validation which required qualification of data.

COMMENTS

* The matrix spike recovery for technetium-99 was reported incorrectly on page 11 of the package. The spike result entered had not been corrected for the sample activity.

* The spike recoveries for Co60, Cs137, and Eu152 were reported incorrectly on page 10 of the package. The expected values entered were in DPM instead of pCi. Values are corrected and recalculated.

* The MDAs for Eu152 were >RDL in the gamma spike and blank. The MDAs for Fe59 were >RDL in the gamma analysis of BOBS60 and its duplicate.

* There was no evidence that the pH is being checked before the analysis of the samples.

* There is no VEDD (Validation Electronic Data Deliverable) included with this package due to the fact that no qualifications were made or changed by the validator.

9613476.1478

REFERENCES

EPA *USEPA Contract Laboratory Program Statement of Work for Inorganic Analyses*, EPA 1989a, U.S. Environmental Protection Agency, Washington, D.C.

WHC 1993, *Data Validation Procedures for Radiochemical Analyses*, WHC-SD-EN-SPP-001, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

WHC 1994, *Quality Assurance Program Plan for the 200-BP-5 Groundwater Operable Unit*, DOE/RL 88-32, Rev. 1, Department of Energy-Hanford, Richland, Washington.

DATA VALIDATION APPLIED QUALIFIERS

Qualifiers which may be applied by data validators in compliance with the procedures herein are as follows.

U- Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ- Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during data validation, the associated quantitation limit is an estimate.

J- Indicates the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are usable for decision making purposes.

BJ- Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.

R- Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency the data are unusable.

UR- Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data are unusable due to an identified QC deficiency.

JN- Indicates a tentatively identified compound (TIC) that has been determined to be valid in terms of identification and quantitation.

UJN- Indicates a tentatively identified compound (TIC) that has been determined to be presumptive and valid (JN) in terms of identification and quantitation and has been qualified as undetected (U) due to associated blank contamination.

NJ- Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific application (i.e., usable for decision making purposes).

N- Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision making purposes).

LABORATORY APPLIED QUALIFIERS

Qualifiers which may be applied by the laboratory in compliance with applicable requirements are as follows.

Organic Data Qualifiers

U- Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

J- Indicates an estimated value. This flag is used when estimating concentrations of tentatively identified compounds (TICs) or when the presence of a TCL compound is confirmed at a concentration of less than the CRQL but greater than the IDL.

N- Indicates presumptive evidence of a compound. This flag is used only by the laboratory for TIC results when the identification is based on a mass spectral library search.

P- This flag is used for pesticide/Aroclor target analytes when there is greater than 25% difference for detected values between the quantitation and confirmation GC columns. The lower of the two concentrations is reported on the report form and the result is flagged with a "P".

C- This flag applies to pesticide results where the identification has been confirmed by GC/MS. This flag should not be used by the laboratory if GC/MS confirmation was attempted but unsuccessful, in which case, the laboratory should use an "X" flag as defined below. The "X" flag is then defined in the SDG narrative.

B- This flag applies to results in which the analyte was detected in both the sample and the associated blank. The combination of the "B" flag with the "U" flag ("BU" or "UB") is expressly prohibited in the analytical SOW.

E- This flag identifies compounds whose concentrations exceed the calibrated range of the GC/MS instrument.

D- This flag identifies compounds identified in an analysis at a secondary dilution factor.

A- Indicates a TIC which is a suspected aldol-condensate product.

X- This is a non-specific flag used to properly define the results. If used, this flag must be properly defined within the body of the SDG.

LABORATORY APPLIED QUALIFIERS

Inorganic Qualifiers

U- Indicates the analyte was analyzed for but not detected in the sample.

B- Indicates the analyte concentration is less than the CRDL but greater than the IDL.

E- Indicates the value reported is estimated due to the presence of interference.

M- Indicates duplicate injection precision criteria were not met during graphite furnace (GFAA) analysis.

N- Indicates spiked sample recovery was not within the control limits.

S- Indicates the reported value was determined by the Method of Standard Additions (MSA).

W- Indicates post-digestion spike for GFAA analysis is outside control limits and the sample absorbance is less than 50% of the spike absorbance.

*- Indicates duplicate analysis was not within control limits.

+- Indicates the correlation coefficient (r) for the MSA was less than 0.995.

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Data Qualification Summary

000008

Validator	Date	SDG
MC Webb	8-16-94	W0066-ITC-074

DATA VALIDATION SUMMARY

Analyte	Qualifier	Sample	Reason
GEA	None	BOBS60	N/A
Tc99	None	BOBS60	N/A

9613476.1484

Data Summary Tables

008810

9613476.1485

RADCHEMISTRY DATA SUMMARY

FILE #:VW402.55		HEIS #:	B0BS60		
		Date:	5-May-94		
		Matrix:	WATER		
Constituent	CAS #	Units	Results	Q	MDA
Cobalt-58	13981-38-9	pCi/L	6.76	U	13.9
Cobalt-60	10198-40-0	pCi/L	-5.06	U	8.68
Cesium-137DA	10045-97-3	pCi/L	-4.32	U	7.71
Europium-152	14683-23-9	pCi/L	3.54	U	39.8
Europium-154	15585-10-1	pCi/L	4.1	U	23.1
Europium-155	14391-16-3	pCi/L	2.31	U	16.2
Iron-59	14596-12-4	pCi/L	4.85	U	37.8
Technetium-99	15133-76-7	pCi/L	21.1		2.19

entered by: C.S.
date: 8/16/94

Shaded areas indicate changes by the validator
ITC074

checked by: MJ
date: 8/16/9

9613476.1486

Sample Results (Form I's)

9613476.1487

IT ANALYTICAL SERVICES
RICHLAND, WA
(509) 375-3131

SAMPLE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0066
LAB SAMPLE ID:	40537101	MATRIX:	WATER
WHC ID:	B0BS60	DATE RECEIVED:	5/17/94

ISOTOPE	RESULT	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	METHOD NUMBER
CO-58	6.76E+00 U	6.13E+00	6.16E+00	1.39E+01	pCi/L	N/A	RD3219
CO-60	-5.06E+00 U	5.74E+00	5.76E+00	8.68E+00	pCi/L	N/A	RD3219
CS-137DA	-4.32E+00 U	5.06E+00	5.08E+00	7.71E+00	pCi/L	N/A	RD3219
EU-152	3.54E+00 U	1.80E+01	1.80E+01	3.98E+01	pCi/L	N/A	RD3219
EU-154	4.10E+00 U	1.01E+01	1.01E+01	2.31E+01	pCi/L	N/A	RD3219
EU-155	2.31E+00 U	8.92E+00	8.92E+00	1.62E+01	pCi/L	N/A	RD3219
FE-59	4.85E+00 U	1.88E+01	1.88E+01	3.78E+01	pCi/L	N/A	RD3219
TC-99	2.11E+01	1.29E+00	6.10E+00	2.19E+00	pCi/L	95.10%	ITAS-IT-RS-0001

Number of Results: 8

gm 8-16-94
mw 8-16-94

9613476.1488

Checklists

9613476.1489

LATA RADIOCHEMISTRY DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	(D)	E

PROJECT: 200-BP-5	SDG: W0066-ITC-074	
VALIDATOR: MWebb	LATA NO.: VW401. 402.55	DATE: 8-16-94
SAF NO.: 94-130	LAB: ITC	CASE: -
QAPP REFERENCE:	SAP REFERENCE:	

If there is no QAPP or SAP reference, contact the WHC Technical Representative.
If the document(s) are not provided, default to the Method acceptance criteria.

ANALYSES PERFORMED

☐ Gross Alpha ☐ Gross Beta	☐ Strontium-89 ☐ Strontium-90	☒ Technetium-99	☐ Isotopic Anal. Alpha Spec.	☒ Gamma Spectroscopy	☐ Iodine-129
☐ Total Uranium (KPA)	☐ Radium-226 ☐ Radium-228	☐ (LSC) Liquid Scintillation	☐	☐	☐

SAMPLES/MATRIX B0BS60 (Water)

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Technical verification forms present? . . . . . (Yes) No N/A

Compliance screening form present? . . . . . (Yes) No N/A

Is a case narrative present? . . . . . (Yes) No N/A

Were all analyses requested reported? . . . . . (Yes) No N/A

Are all results supported in the raw data? . . . . . (Yes) No N/A

Comments:

2. CHAIN-OF-CUSTODY/HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Are samples preserved correctly? . . . . . (Yes) No N/A

Was the pH of the sample checked prior to analysis? . . . . . Yes (No) ~~N/A~~ MW 8-16-94

Comments: There is no evidence that pH was checked prior to analysis.

8/16/94 MW

LATA RADIOCHEMISTRY DATA VALIDATION CHECKLIST

3. INITIAL CALIBRATION

Instruments/detectors calibrated within one year of sample analysis? . . . . . Yes (No) N/A

Initial calibration acceptable? . . . . . (Yes) No N/A

Standards NIST traceable? . . . . . (Yes) No N/A

Standards Expired? . . . . . Yes (No) N/A

Comments: ~~The G.~~ MW 8-24-94 See RCR for comment The gamma detector (other than Ger 1) were calibrated > 1 year ago. Continuing calibration is acceptable. The lack of a yearly re-calibration does not affect the data. MW 9-8-94

4. CONTINUING CALIBRATION

Background checked at proper frequency? . . . . . (Yes) No N/A

Background check acceptable? . . . . . (Yes) No N/A

Efficiency checked at proper frequency? . . . . . (Yes) No N/A

Efficiency check acceptable? . . . . . (Yes) No N/A

Calibration check standards NIST traceable? . . . . . (Yes) No N/A

Calibration check standards expired? . . . . . Yes (No) N/A

Comments:

5. BLANKS *(see BLANK AND SAMPLE DATA SUMMARY form)*

Method blank analyzed? . . . . . (Yes) No N/A

Method blank results acceptable? . . . . . (Yes) No N/A

Analytes detected in method blank? . . . . . Yes (No) N/A

Transcription/Calculation Errors? . . . . . Yes (No) N/A

Comments:

8/16/94 MWP

LATA RADIOCHEMISTRY DATA VALIDATION CHECKLIST

6. MATRIX SPIKES *(see ACCURACY DATA SUMMARY form)*

Matrix spike analyzed? . . . . . Yes No N/A

Spike recoveries acceptable? . . . . . Yes No N/A

Spike source traceable? . . . . . Yes No N/A

Spike source expired? . . . . . Yes No N/A

Transcription/Calculation Errors? . . . . . Yes No N/A

★

Spike Recovery

$$\%R = \frac{SSR - SR}{SA} \times 100$$

where:
SSR = spiked sample result
SR = sample result
SA = spike added

Comments: Spike reported incorrectly (pg 11) Spk result * represents spike result corrected for sample result. See attached sheets.

7. LABORATORY CONTROL SAMPLES *(see ACCURACY DATA SUMMARY form)*

LCS analyzed? . . . . . Yes No N/A

LCS recoveries acceptable? . . . . . Yes No N/A

LCS traceable? . . . . . Yes No N/A

Transcription/Calculation Errors? . . . . . Yes No N/A

★

Recovery

$$\%R = \frac{\text{observed value}}{\text{true value}} \times 100$$

Comments: The expected values for γ spike are entered on pg 10 as DPM while the results are pCi/L

The pCi/L expected are Co60 49.6779 %R = 106%
Cs137 125.297 100%
Eu152 99.292 99.6%

8/16/94 MJP

LATA RADIOCHEMISTRY DATA VALIDATION CHECKLIST

8. CHEMICAL RECOVERY *(see ACCURACY DATA SUMMARY form)*

Chemical carrier added? . . . . . Yes No N/A

Chemical recovery acceptable? . . . . . Yes No N/A

Tracer added? . . . . . Yes No N/A

Tracer recovery acceptable? . . . . . Yes No N/A

Standards traceable? . . . . . Yes No N/A

Standards expired? . . . . . Yes No N/A

Transcription/Calculation errors? . . . . . Yes No N/A

★

Alpha Spec Tracer Recovery

$$\frac{A.1 - B.1}{(2.22)(E.1)(T.1)}$$

where:
- A.1 = gross counts per minute
- B.1 = background counts per minute of tracer
- 2.22 = conversion factor, dpm/pCi
- E.1 = detector efficiency
- T.1 = activity (pCi) of tracer added to sample (can be determined by taking dpm of tracer added divided by 2.22)

Comments:

9. DUPLICATES *(see PRECISION DATA SUMMARY form)*

Duplicates Analyzed? . . . . . Yes No N/A

RPD Values Acceptable? . . . . . Yes No N/A

Transcription/Calculation Errors? . . . . . Yes No N/A

★

mw 8-16-94

Relative Percent Difference

$$RPD = \frac{|OS - D|}{\left(\frac{OS + D}{2}\right)} \times 100$$

where:
- OS = sample concentration (original sample/MS)
- D = duplicate concentration (duplicate sample/MSD)

Comments: Duplicate RPD's not reported by the lab. Had to be calculated by Validation (RPD calc.) Opps found it reported on pg 7 - different Format 8/16/94 MW

LATA RADIOCHEMISTRY DATA VALIDATION CHECKLIST

10. FIELD QC SAMPLES

Field blank(s) identified? . . . . . Yes (No) N/A

Field blank results acceptable? . . . . . Yes No (N/A)

Analytes detected in field blank(s)? . . . . . Yes No (N/A)

Field duplicate sample(s) identified? . . . . . Yes (No) N/A

Field duplicate RPD values acceptable? . . . . . Yes No (N/A)

Field split sample(s) identified? . . . . . Yes (No) N/A

Field split RPD values acceptable? . . . . . Yes No (N/A)

Performance audit sample(s) identified? . . . . . Yes (No) N/A

Performance audit sample results acceptable? . . . . . Yes No (N/A)

Comments:

11. DETECTION LIMITS (LEVELS D & E)

MDA's meet required detection limits? . . . . . Yes (No) N/A

Transcription/calculation errors? . . . . . Yes (No) N/A

★

Minimum Detectable Activity (MDA)

$$\frac{4.66 \times \sqrt{(B.2)(T.2)}}{2.22(E.2)(I.2)(R.2)(D.2)(V.2)(Y.2)(T.2)}$$

where:

- B.2 = background counts per minute (cpm) or the reported standard deviation of the background (S) cpm
- T.2 = counting time for associated sample
- 2.22 = conversion dpm/pCi
- E.2 = detector efficiency
- I.2 = ingrowth correction factor (if applicable or 1)
- R.2 = carrier recovery factor (if applicable or 1)
- D.2 = decay factor (if applicable or 1)
- Y.2 = chemical yield factor (if applicable or 1)
- V.2 = sample volume in liters or grams

Comments: MDA for EU152 was not met for the blank or the LCS in the γ analysis. Fe55 MDA > ROL for both the sample B0BS60 and its duplicate.

8/16/94 MG

LATA RADIOCHEMISTRY DATA VALIDATION CHECKLIST

Results Calculation Equations

Gross α/β and Tritium

$$\frac{(A.3 - B.3) \times C.3}{(2.22)(E.3)(V.3)}$$

where:

A.3 = gross counts per minute
B.3 = background counts per minute
C.3 = activity of α fraction in β channel*
2.22 = conversion factor, dpm/pCi
E.3 = detector efficiency
V.3 = sample volume, liters or grams

*if for calculation of gross β, otherwise substitute 1

Strontium (total)

$$\frac{A.4 - B.4}{(2.22)(E.4)(I.4)(D.4)(R.4)(V.4)}$$

where:

A.4 = gross counts per minute
B.4 = background counts per minute
2.22 = conversion factor, dpm/pCi
E.4 = detector efficiency
I.4 = ingrowth correction factor
R.4 = carrier recovery factor
D.4 = strontium decay factor
V.4 = sample volume, liters or grams

Strontium-90 (corrected for Sr-89)

$$\frac{A.5 - B.5}{(2.22)(Y.5)(E.5)(I.5)(D.5)(R.5)(V.5)}$$

where:

A.5 = gross counts per minute
B.5 = background counts per minute
Y.5 = yttrium-90 yield factor
2.22 = conversion factor, dpm/pCi
E.5 = detector efficiency
I.5 = ingrowth correction factor
R.5 = strontium-89 yield factor
D.5 = strontium decay factor
V.5 = sample volume, liters or grams

8/16/94 MW

LATA RADIOCHEMISTRY DATA VALIDATION CHECKLIST

Results Calculation Equations, continued

Technetium-99

$$\frac{A.6 - B.6}{(2.22)(E.6)(R.6)(V.6)}$$

where:

A.6 = gross counts per minute
B.6 = background counts per minute
2.22 = conversion factor, dpm/pCi
E.6 = detector efficiency
R.6 = carrier recovery factor
V.6 = sample volume, liters or grams

Alpha Spec Isotopes

$$\frac{A.7 - B.7}{(2.22)(E.7)(R.7)(V.7)}$$

where:

A.7 = gross counts per minute for isotope
B.7 = background counts per minute for detector
2.22 = conversion factor, dpm/pCi
E.7 = detector efficiency
R.7 = tracer recovery factor
V.7 = sample amount, liters or grams

Gamma Spec Isotopes

$$\frac{A.8}{(2.22)(B.8)(D.8)(E.8)(V.8)(T.8)}$$

where:

A.8 = peak area for isotope
D.8 = decay factor for isotope
2.22 = conversion factor, dpm/pCi
B.8 = abundance factor for isotope
E.8 = efficiency factor for isotope
V.8 = sample amount, liters or grams
T.8 = live time (minutes)

8/16/96 MS

Results Calculation Equations, continued

Total Uranium by Laser Fluorometry

$$\frac{(W.9 - I.9)(R.9)(D.9)}{U.9 - W.9}$$

where:

W.9 = sample reading with Fluran
I.9 = initial sample reading
R.9 = concentration of uranium standard after dilution with sample (µg/L)
D.9 = dilution factor
U.9 = sample reading with uranium standard

Radium-226 by Radon Emanation

$$D = \frac{COUNT}{(2.22)(CAL)(VOL)} \times \frac{1}{1 - e^{-\lambda t_1}} \times \frac{1}{e^{-\lambda t_2}} \times \frac{t_3}{1 - e^{-\lambda t_3}}$$

where:

COUNT = net count rate, cpm
CAL = calibration constant of the de-emanation system and the scintillation cell in counts per minutes/disintigrations per minute of radon-222
VOL = sample aliquot in liters
t_1 = the elapsed time in days between the first and second de-emanations, and λ is the decay constant for radon-222 (0.181 d^{-1})
t_2 = the time interval in hours between the second de-emanation and counting, and λ is the decay constant of radon-222 (0.00755hr^{-1})
t_3 = the counting time in minutes, and λ is the decay constant of radon-222 (1.26×10^{-4} min^{-1})
2.22 = conversion factor, dpm/pCi

8/16/94 MJP

Validator	Date	SDG
MC Webb	8-16-94	W0066-ITC-074

DATA VALIDATION SUMMARY

MAJOR DEFICIENCIES:

1. None

MINOR DEFICIENCIES:

1. None

COMMENTS:

1. The matrix spike recovery for Tc99 was reported incorrectly on page 11 of the package. The spike result entered had not been corrected for the sample activity.
2. The spike recoveries for Co60, Cs137, and Eu152 were reported incorrectly on page 10 of the package. The expected values entered were in DPM instead of pCi. Values are corrected and recalculated.
3. The MDAs for Eu152 were > RDL in the gamma spike and blank. The MDAs for Fe59 were > RDL in the gamma analysis of BOBS60 and its duplicate.
4. There is no evidence that the pH was checked prior to analysis.

MATRIX SPIKE RECOVERY (MS)

Analysis: Radiochemistry
SDG: W0066-ITC-074

Date: 16-Aug-94
Validator: MC Webb

Constituent	Spike Sample Result SSR	Sample Result SR	Spike Added SA	%R
Tc99 BOBS60	104.00	21.10	90.50	91.6%
				#DIV/0!
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PERCENT RECOVERY (LCS)

Analysis: Radiochemistry
SDG: W0066-ITC-074

Date: 16-Aug-94
Validator: MC Webb

Constituent	Observed value	True value	%R
	OLCS	ALCS	
Tc99	87.15	90.05	96.8%
GEA Co-60	52.70	49.68	106.1%
GEA Cs137	125.80	125.30	100.4%
GEA Eu152	98.95	99.29	99.7%
			#DIV/0!
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96 3476.1099

RELATIVE PERCENT DIFFERENCE

Analysis: Radiochemistry
SDG: W0066-ITC-074

Date: 16-Aug-94
Validator: MC Webb

Constituent		Original (Sample) concentration OS	Duplicate concentration D	RPD
Tc99	BOBS60	21.07	19.15	9.5%
GEA	BOBS60	All nuclides undetected	All nuclides undetected	NC
				#DIV/0!
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MINIMUM DETECTABLE ACTIVITY (MDA)

Analysis: Radiochemistry
SDG: W0066-ITC-074

Date: 16-Aug-94
Validator: MC Webb

Constituent	Background counts per minute (cpm) or Standard Deviation of background (cpm)	Counting time for associated sample	Detector Efficiency	Ingrowth correction factor	Carrier recovery factor	Decay factor	Chemical yield factor	Sample volume (L or g)	MDA
	B.2	T.2	E.2	I.2	R.2	D.2	Y.2	V.2	
Tc99 BOBS60	27.490	125.000	1.051	1.000	1.000	1.000	0.951	0.500	2.193
									#DIV/0!
									#DIV/0!
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RESULTS CALCULATION TECHNETIUM-99

Analysis: Radiochemistry
SDG: W0066-ITC-074

Date: 16-Aug-94
Validator: MC Webb

Constituent	DPM of the sample	DPM of the blank	Decay Factor	Yield	Sample volume (L or g)	Result
	A.6	B.6	E.6	R.6	V.6	
BOBS60	51.130	28.890	1.000	0.95	0.500	21.0684
						#DIV/0!
						#DIV/0!
						#DIV/0!
						#DIV/0!
						#DIV/0!
						#DIV/0!
						#DIV/0!
						#DIV/0!
						#DIV/0!
						#DIV/0!
						#DIV/0!
						#DIV/0!

26134764.1502

9613476.1503

IT ANALYTICAL SERVICES
RICHLAND, WA
(509) 375-3131

MATRIX SPIKE RESULTS

LAB NAME:	ITAS-RICHLAND	SDG:	W0066
LAB SAMPLE ID:	W0537101	MATRIX:	WATER

ISOTOPE	SPIKE RESULT*	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	SAMPLE RESULT	EXPECTED	RECOVERY
TC-99	1.04E+02	2.09E+00	1.46E+01	2.19E+00	pCi/L	2.11E+01	9.05E+01	~~114.82%~~ 91.6

Number of Results: 1

$$100 \times \frac{104 - 21.1}{90.5} = 91.6\%$$

8-16-94

8/16/94 MS

~~0011~~ 000029

682A-6-93

*Spike Result Corrected For Sample Result

9613476.1504

DATE 23-Jun-94 CALCULATED RESULTS SUMMARY dir$era_caldat:405371-TC99 PAGE 1

(NUM)	IT #	ISOTOPE	RESULT	ERROR*	COUNT ERROR*	YIELD	CALC MDA	UNITS	COMMENTS	DIAGNOSTICS
(1)	L053711N	TC99	-7.957E+01	2.122E+02	4.600E+01	0.951		PCI/L		No Contr Values
(2)	L053711N	TC99	-7.957E+01	2.122E+02	4.600E+01	0.951		PCI/L	AVER	No Contr Values
(3)	L053712N	TC99	2.737E+03	1.562E+02	4.669E+01	0.951		PCI/L		No Contr Values
(4)	L053712N	TC99	2.737E+03	1.562E+02	4.669E+01	0.951		PCI/L	AVER	No Contr Values
(5)	L053711B	TC99	-2.188E+00	2.073E+00	4.507E-01	0.951		PCI/L		No Contr Values
(6)	L053711B	TC99	-2.188E+00	2.073E+00	4.507E-01	0.951		PCI/L	AVER	No Contr Values
(7)	L053711M	TC99	8.715E+01	6.401E+00	9.738E-01	0.951		PCI/L		No Contr Values
(8)	L053711M	TC99	8.715E+01	6.401E+00	9.738E-01	0.951		PCI/L	AVER 96.8 %	No Contr Values
			90.0532 ± 1.1128 EQn 180							
(9)	W0537101	TC99	1.044E+02	7.315E+00	1.044E+00	0.951		PCI/L		No Contr Values
			104.4 - 21.07 = 83.33							
(10)	W0537101	TC99	1.044E+02	7.315E+00	1.044E+00	0.951		PCI/L	AVER 92.1 %	No Contr Values
			90.4685 ± 1.1178 EQn 179							
(11)	40537101	TC99	2.107E+01	3.050E+00	6.423E-01	0.951		PCI/L		No Contr Values
(12)	40537101	TC99	2.107E+01	3.050E+00	6.423E-01	0.951		PCI/L	AVER	No Contr Values
(13)	F0537101	TC99	1.915E+01	2.958E+00	6.171E-01	0.951		PCI/L		No Contr Values
(14)	F0537101	TC99	1.915E+01	2.958E+00	6.171E-01	0.951		PCI/L	AVER	No Contr Values

SEC 6/23/94

```
************************* MDA, Uncertainty Calculations **************************
*     Calculations are based on the average background counts (bkg) and          *
*     average sample count times (Ts).  Results are in Act/Unit.                 *
*                                                                                *
*          MDA = [(4.65 * sqrt((bkg c/m)/Ts)) + 2.71/Ts] * K,                    *
*                where K is the factor that converts the                         *
*                associated result from CPM/Aliquot to Act/Unit.                 *
*                                                                                *
*     The calculated MDA value may be lower than the True MDA.                   *
*     The MDA is the activity level that can be detected above the mean blank    *
*     value, Xo (Xo is not included)!  In addition, only the Poisson counting    *
*     uncertainty is used to estimated the background variability!               *
*                                                                                *
*      * Uncertainty estimates (errors) are one standard deviation (1s) !        *
*                                                                                *
*     The average error is calculated as follows:                                *
*     SQR(SUM(Random var) / N + SUM(Sym var) / N)                                *
**********************************************************************************
```

MW 8-16-94

JM 6/23/94

$$MDA = \frac{(4.65\sqrt{27.49 \times 125} + 2.71)(1.051)}{2.22(.5)(125)(.951)} = 2.193$$

8/16/94

000030

9613476.1505

IT ANALYTICAL SERVICES
RICHLAND, WA
(509) 375-3131

LABORATORY CONTROL SAMPLE

LAB NAME:	ITAS-RICHLAND	SDG:	W0066
LAB SAMPLE ID:	L053711S	MATRIX:	WATER

ISOTOPE	RESULT	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA	REPORT UNIT	YIELD	EXPECTED	RECOVERY
CO-60	5.27E+01	1.18E+01	1.29E+01	N/A	pCi/L	N/A 49.68	~~1.10E+02~~	~~47.91%~~ 10
CS-137DA	1.26E+02	1.57E+01	2.01E+01	N/A	pCi/L	N/A 125.30	~~2.78E+02~~	~~45.32%~~ 100
EU-152	9.90E+01	4.10E+01	4.21E+01	9.20E+01	pCi/L	N/A 99.29	~~2.20E+02~~	~~45.00%~~ 99

Number of Results: 3

8-16-94

8/16/94

0010

9613476.1506

IT-RD #	ISO	CUSTOMER ID	RECEIVE DATE	DUE DATE
L0537115	998	WHC	14 JUN 94	-

SA TYPE:	RPT UNITS:	STORAGE
103	(PCI) DPM ____ G (L) CM SA ____	

PROC	VIAL

GA GB CO CS

WATER GAMMA

REQUESTED COUNTING TIME	REQ'D BY	SAMPLE DATE/ON DATE	SAMPLE DATE/ON TIME	SAMPLE DATE/OFF DATE	SAMPLE DATE/OFF TIME	COUNTING DATE DAY MON YR	TIME
100				6-10-94		23 JUN 94 / 16 JUN 94	1024 / 1305

TOTAL SAMPLE WEIGHT OR VOLUME	UNIT	SUGGESTED ALIQUOT	SAMPLE ANALYZED WEIGHT OR VOLUME	UNIT	GEOMETRY CIRCLE ONE
1000	mL		1000	mL	25 50 (100) 200 300 400 500 MA · MB

TRACER ISOTOPE	TRACER UST NUMBER	TRACER VOLUME/WEIGHT	TRACER CONCENTRATE	TRACER REF DATE DAY MON YR	COST CODE CIRCLE ONE	OTHER
					14 44 64 83 108 208	

COUNTING INSTRUMENT CHECK ONE										OTHER	DETECTOR NUMBER	ACTUAL COUNT TIME	COUNT TECH
NAI	3	5	9		X GER		ASPEC	LEPD	AGC	BGC	4	100	KC
											CCR1	100	KC

SPIKE #	TECH	COMMENTS
BLANK #		

QCAG017
PR. 6/10/94 EX. 6/10/95
ABFI
QCAG018
PR. 6/10/94 EX. 6/10/95

QCAG017

Co 60	55.085	± .33220
Cs 137	138.96	± 2.3314
Eu 152	110.08	± 4.4166

QCAG018

Co 60	55.200	± .33289
Cs 137	139.20	± 2.3355
Eu 152	110.35	± 4.4273

mo
8-16-94

Expected:

DPM

Co 60 =	110.285	± .47029	
Cs 137 =	278.16	± 3.299998	= (278.16 ± 3.3000)
Eu 152 =	220.43	± 6.2536	

8/16/94 mo

9613426 1507

NUCLIDE SUMMARY REPORT (REV 31-May-94)

Sample ID : L053711S
Detector : GER1 1
Acquire Date : 23-JUN-1994 08:43:59
Report Date : 23-Jun-94 10:25 AM
Configuration: DKA200:[GER1.SAMPLE]L053711S_230640843.CNF;1

Sample Title : WHC WATER
Variable peak width : 3.00
MDA confidence level: 5.00
System error : 5.00

Processing Flags

Fit singlets = no
Variable dead time correction = no
Collection time decay = no
Critical level test = no
Propagate all errors = yes
Library based efficiency = no

NUCLIDE	PCI /LITE	SAMPLE PCI /LITE	1-SIGMA ERROR	% ERROR
BE-7	< 9.061E+01	3.718E+01	2.412E+01	64.87
NA-22	< 9.608E+00	-.495E+01	3.138E+00	63.44
NA-24		--------	HALF LIFE TOO SHORT	
K-40	< 1.684E+02	1.726E+02	3.738E+01	21.66
AR-41		--------	HALF LIFE TOO SHORT	
SC-46	< 1.310E+01	5.712E-01	3.626E+00	634.73
CR-51	< 7.798E+01	-.249E+02	2.355E+01	94.41
MN-54	< 9.144E+00	-.703E+00	2.584E+00	367.46
CO-57	DETECTED	--------	KEY LINE NOT FOUND	
CO-58	< 1.038E+01	3.030E+00	2.682E+00	88.53
FE-59	< 1.985E+01	4.216E+00	4.918E+00	116.64
CO-60	DETECTED ✓	5.270E+01	6.469E+00	12.27
ZN-65	< 2.144E+01	-.488E+02	9.565E+00	19.58
SE-75	< 9.252E+00	3.903E+00	2.595E+00	66.48
AS-76		--------	HALF LIFE TOO SHORT	
RB-83	< 1.584E+01	-.862E+01	5.108E+00	59.29
SR-85	< 1.047E+01	-.113E+02	3.653E+00	32.42
KRRB-88		--------	HALF LIFE TOO SHORT	
Y-88	< 7.021E+00	-.117E+02	3.442E+00	29.36
ZR-89	< 1.475E+02	7.810E+01	3.420E+01	43.80
SR-91		--------	HALF LIFE TOO SHORT	
NB-94	< 8.658E+00	-.214E+01	2.525E+00	117.96
NB-95	< 1.136E+01	-.203E+00	3.206E+00	% 1581.15
ZR-95	< 1.788E+01	3.545E+00	4.762E+00	134.32
ZRNB-95	< 2.031E+01	-.361E+00	5.709E+00	% 1581.15
NB-96		--------	HALF LIFE TOO SHORT	
TC-96	< 1.010E+02	9.287E+01	2.518E+01	27.11
ZRNB-97		--------	HALF LIFE TOO SHORT	
MO-99	< 2.693E+03	4.601E+02	7.881E+02	171.30
RU-103	< 1.016E+01	1.546E-01	2.860E+00	% 1849.33
RU-106DA	< 7.777E+01	6.303E+00	2.189E+01	347.33
CD-109	< 1.343E+02	5.627E+00	3.979E+01	707.12
AG-110M	< 1.268E+01	5.172E-01	3.391E+00	655.76
SN-113DA	< 9.512E+00	-.425E+01	3.006E+00	70.68
SB-122	< 2.968E+02	-.321E+02	8.902E+01	277.17
I-124	< 1.108E+02	2.730E+01	2.927E+01	107.20
SB-124	< 9.122E+00	2.249E+00	2.411E+00	107.20
SB-125	< 2.298E+01	2.404E+00	6.370E+00	264.93
SB-126	< 1.517E+01	-.385E+01	4.468E+00	116.11
I-131	< 2.320E+01	7.969E+00	6.500E+00	81.57
XE-131M	< 4.283E+02	-.459E+02	1.308E+02	285.06
I-132		--------	HALF LIFE TOO SHORT	
BA-133	< 1.043E+01	5.341E+00	2.865E+00	53.64
I-133		--------	HALF LIFE TOO SHORT	

TTC 6-24-94

52.70 / 110.285 = 2.72

52.70 / 49.68 error = 106%

pw 8-16-94

8/16/94 mj

NUCLIDE	PCI /LITE	SAMPLE PCI /LITE	1-SIGMA ERROR	% ERROR
XE-133	< 7.573E+01	-.194E+02	2.291E+01	118.27
XE-133M	< 2.538E+03	-.274E+04	8.800E+02	32.06
CS-134	< 8.443E+00	-.613E+00	2.442E+00	398.24
CS-136	< 2.373E+01	1.171E+01	5.366E+00	45.84
CS-137DA	DETECTED	1.258E+02	1.004E+01	7.98
CE-139	< 5.508E+00	-.502E+00	1.675E+00	333.58
BA-140	< 5.102E+01	2.822E+00	1.439E+01	509.93
BALA-140	< 3.922E+01	-.247E+01	1.020E+01	412.34
LA-140	< 2.028E+03	0.000E+00	5.410E+02	------
CE-141	< 9.656E+00	-.785E+01	3.320E+00	42.29
CE-144	< 3.185E+01	-.114E+02	1.058E+01	92.59
CEPR-144	< 6.357E+01	-.229E+02	2.117E+01	92.59
ND-147	< 1.088E+02	2.729E+01	2.860E+01	104.80
EU-152	< 9.199E+01	9.895E+01	2.107E+01	21.29
EU-154	< 2.659E+01	-.138E+02	8.775E+00	63.44
EU-155	< 1.877E+01	6.791E+00	5.130E+00	75.54
W-187		--------	HALF LIFE TOO SHORT	
IR-192	< 7.024E+00	-.429E+01	2.227E+00	51.93
HG-203	< 7.879E+00	4.140E-01	2.287E+00	552.29
BI-207	< 7.180E+00	-.749E+00	2.132E+00	284.84
TL-208	< 1.109E+01	7.398E+00	2.886E+00	39.02
BI-212	< 5.478E+01	-.517E+02	1.915E+01	37.01
PB-212	< 1.266E+01	3.616E+00	3.682E+00	101.82
BI-214	< 1.621E+01	-.688E+01	5.010E+00	72.84
PB-214	< 1.487E+01	-.289E+00	4.594E+00	% 1592.17
RA-224DA	< 1.282E+01	3.663E+00	3.730E+00	101.82
RA-226DA	< 1.622E+01	-.688E+01	5.011E+00	72.84
AC-228	< 3.769E+01	1.680E+01	9.298E+00	55.36
RA-228DA	< 3.786E+01	1.687E+01	9.338E+00	55.36
TH-228	< 2.185E+03	1.256E+03	6.057E+02	48.22
TH-232DA	< 3.769E+01	1.680E+01	9.298E+00	55.36
TH-234	< 2.813E+03	1.364E+03	7.152E+02	52.43
U-235	< 3.565E+01	0.000E+00	1.058E+01	------
NP-237	< 1.401E+01	1.142E+01	3.510E+00	30.73
NP-237DA	< 1.401E+01	1.142E+01	3.510E+00	30.73
U-238DA	< 1.487E+01	-.289E+00	4.594E+00	% 1592.17
U-238DLP	< 2.378E+02	5.630E+01	7.112E+01	126.32
NP-239	< 6.685E+02	-.700E+03	2.229E+02	31.82
AM-241	< 2.394E+01	1.610E+00	7.522E+00	467.15

END OF SUMMARY REPORT

125.8 / 278.16 / 2.22 — 125.8/125.3 x100 = 100%

98.95 / 91.99 / 220.43 / 2.22 x100 — MK 6-24-94

MK 6-24-94 — 98.95/99.29 x100 = 99.6%

Expected's ~ pCi/L

CoGO = 49.6779 ± 0.21184

Cs137 = 125.297 ± 1.4865

Eu152 = 99.2928 ± 2.8169

MW 8-16-94

8/16/94

96 13476.1509

Laboratory Case Narratives

INTERNATIONAL TECHNOLOGY CORPORATION

CERTIFICATE OF ANALYSIS

Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352

July 11, 1994

Attention: J.A.Lerch

SAF Number	:	94-130
Date SDG Closed	:	May 25, 1994
Number of Samples	:	One (1)
Sample Type	:	Water
SDG Number	:	W0066
Data Deliverable	:	Stand Alone

I. Introduction

On May 17, 1994, one water sample was received by ITAS-Richland for radiochemical analysis. Upon receipt, the sample was assigned the following laboratory ID number to correspond with the WHC specific ID:

ITAS-Richland ID	WHC ID	Matrix	Date of Receipt
405371-01A	B0BS60	Water	5/17/94

II. Analytical Results/Methodology

The analytical results for this report are presented by laboratory sample ID. Each set of data includes sample identification information, analytical results and the appropriate associated statistical errors.

Regional Office
2800 George Washington Way • Richland, Washington 99352-1613 • 509-375-3131 • FAX: 509-375-5590

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The requested analyses were:

Gamma Spectroscopy
Gamma Scan by method ITAS-RD-3219
Liquid Scintillation Counting
Technetium-99 by method ITAS-IT-RS-0001

III. Quality Control

The analytical results for each analysis performed under SDG W0066 include a minimum of one Laboratory Control Sample (LCS), one method (reagent) blank, and one duplicate. Any exceptions have been noted in the "Comments" section.

Quality control sample results are reported in the same units as sample results.

IV. Comments

Results from the initial radioactivity screening of this sample classified it as Category I.

Gamma Spectroscopy

Gamma Scan by method ITAS-RD-3219
The batch was recounted due to an error which caused the spike identity to be switched with the sample identity. The recount data is accepted. The Eu-152 detection limit was not met for the blank and the LCS, however, the Eu-152 detection limit was met for the sample and duplicate sample. The LCS Eu-152 achieved detection limit appeared to be elevated because Eu-152 was not "detected" (the abundance criteria was not met according to the ND system), however, the ND calculated result for Eu-152 is acceptable (99.6%). The LCS, batch blank, sample and sample duplicate (duplicate of sample B0BS60) results are accepted and reported.

Liquid Scintillation Counting

Technetium-99 by method ITAS-IT-RS-0001
The matrix spikes, LCS, batch blank, sample and sample duplicate (duplicate of sample B0BS60) results are within contractual requirements.

I certify that this Certificate of Analysis is in compliance with the SOW, 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 a designee, as verified by the following signature.

Reviewed and approved:

Suzanne Gaines

Suzanne Gaines
Project Manager

8/16/94

9613476.1513

Chain-of-Custody Information

9613476.1514

Surveyed : Yes ✓ No ____? Less than 200 counts/minute: Yes ✓ No ____? By (initials) [illegible]

Pacific Northwest Laboratories Battelle Boulevard Richland, Washington 99352	**CHAIN OF CUSTODY**	Test User ID: BATTM16729 C-of-C: B013C8 pg. 1 of 1

Company Contact: BE OPITZ Telephone: (509) 372-0069

Samples Collected by: HANREL / HARRISON Date: 5-5-94 Time: 815

ID/Sample No.: B0BS60

Ice Chest No.: ER-10 Field Logbook Page No.: 4/856

Remarks: SAF 94-130

Possible Sample Hazard Identification: ____ Contract No.: ____

Destination: DELIVER TO SIGMA 5 (Westinghouse) Carrier/Waybill No.: ____

Ground-Water X Soil ____ Other ____

Shipping container internal temperature when samples sealed in it ____. Shipping container internal temperature when opened in laboratory ____.

Sample Identification

B0BS60 -(8) 1000mlP-GAMM
B0BS60 -(2) 1000mlP-TC99 4053710)

Chain of Possession

Relinquished by:	Received by:	Date/Time:
[signature]	Kathy L. Farmer PNL	5-5-94 1140
[signature] for KLF	[signature] WHC	5/6/94 0700
[signature] WHC	[signature] ITAS	5/7/94 1300 5/7/94
Relinquished by: 5/17/94 1300	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:
Disposed by:	Disposal Method:	Date/Time: [signature]

D19A

PNL-MA-567, AD2 BB-1200-34 (12/92)

9613476.1515

SAMPLE ANALYSIS ORDER
BATTELLE, PNL

ITAS

CONTRACT_____
CHAIN OF CUSTODY #: B013C8
SAMPLE ID(S): B0BS60
SAMPLE SCHEDULE DATE: 04/01/94
USER ID BATTM16729

SAF94-130

SAMPLE RECEIVER INITIAL / DATE:
_____ / DATE_____

WATER_X_ SOIL___ OTHER___

INTERNAL TEMPERATURE OF SHIPPING CONTAINER
UPON OPENING IN LABORATORY_____

BOTT#	BOTT TYPE	BOTT SIZE	# of BOTT	PRESERVAT	NOTES	# of SAMP	ANA_1	ANA_2	ANA_3	ANA_4	ANA_5	ANA_6	Filtered
123	P	1000	1	HNO3		8	GAMM						
					4/14/94 gs		GAMMA SCAN						
313	P	1000	1	HNO3		2	TC99						
							TC-99						

8/16/94 MLJ

9613476.1516

END OF PACKAGE