# Document Type: Decommissioning Plan/Supporting Documentation

August, 24, 2009 Steve McCamy, POB 2A-SQN

# SEQUOYAH NUCLEAR PLANT - RECORDS OF SPILLS AND UNUSUAL OCCURENCES IMPORTANT TO DECOMMISSIONING. Memorandum for inclusion in 10CFR50.75(g)(1) required decommissioning file.

This memorandum documents the identification and evaluation of a radioactive spill and unusual occurrence to outdoor environs of the plant site. The time frame of the evaluation involves the spread of contamination from the unit 1 Refueling Water Storage Tank (RWST) moat to the ground immediately outside of the moat.

The following information is relevant to decommissioning and is contained in an appendix to this report.

Event Log:

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1. Unit 1 RWST moat drain

Time of Occurrence July 30, 2009 at 0755

Event: The Unit 1 and Unit 2 RWST Moats are not protected from rain water intrusion. Prior moat spills and moat samples have indicated that the moats are sources of radioactive contamination to include tritium. To keep radioactive material from getting into the environment the bottom drains were capped and sump pumps were installed to pump the rain water to the Auxiliary Building Sump. The overflow drain was left unplugged to prevent water from damaging equipment. A catch containment was installed at the out fall of the overflow drain to catch any water that might exit the drain. Another sump pump was installed in the catch containment to pump out any water that collected in the catch containment to the Auxiliary Building Sump.

Sometime prior to July 30 the ground fault interrupters that connect the sump pumps to the plant electrical system tripped shutting off power to the sump pumps. Since the pumps were not working when it started raining on July 30 the moat filled with water. At 0755 the moat was full of water and water started flowing out the overflow drain and into the catch containment. The sump pump in the catch containment could not keep up with the water flowing from the overflow drain and water started backing up in the catch containment. When the water reached the top of the containment it started flowing onto the ground. Approximately ten gallons of rain water flowed out of the catch containment onto the ground before the event stopped. Chemistry and Radiation Protection sampled the water from in the catch containment. The results of the samples from the catch container are Tritium at 6.64E-4 micro Curie/ ml and Total Gamma emitter's at 1.13E-6 micro Curie /ml.

 $\frac{uci}{me} = \frac{1000 me}{l} = \frac{10^{+6} pci}{pci} = \frac{3}{10^{9} pci} = \frac{3}{l} = \frac{10^{9} pci}{l} = \frac{3}{l} = \frac{3}{$ 

The Unit 2 RWST Moat did not experience this because the sump pumps worked correctly.

The following specifics are provided to characterize the spill data thus far:

- Chemistry, Operations, and Radiation Protection logs were reviewed. From this log information the volume of water transferred from the moat to the ground was estimated to be approximately ten gallons.
- Spill Water Principal gamma emitters: (See attached analysis sheets)
- Spill water Tritium; (See attached analysis sheets)

SPP-5.14, Guide for Communicating Inadvertent Radiological Spills/Leaks to Outside Agencies, Section 3.2A States that any spill greater then 100 gallons or any spill containing greater than 20,000 picoCuries/liter has to be reported to outside agencies. This incident does not meet either on of theses criteria this event does not have to be reported to any outside agencies.

Remediation performed: No soil excavation performed. Area included in Radiation Protection quarterly surveys of outside environs. RMD-FO-035.

Documentation: See attached appendix's of documentation.

Appendix 1, Spill water principal gamma emitters and tritium analysis.

Michael F. Halter Radiation Protection Support Manager. SB2A-SQN

PAGE

1 OF

REPORT NAME : QA CHECK (V9.3) REPORT DATE : 30-JUL-2009 13:51 REQUESTOR : CAS

# TENNÉSSEE VALLEY AUTHORITY SEQUOYAH NUCLEAR PLANT

# POST NID OA ANALYSIS

TITLE : U1 - RWST MOAT 08:10 07/30

SAMPLE NO. SAMPLE TYPE COUNT TIME SAMPLE TIME	::	8092111022 LIQUID 30-JUL-2009	13:34:38	OPERATOR NAME SAMPLE GEOMETRY SAMPLE QUANTITY DETECTOR	1	CAS Account LM1 7.55000E+02 ADC1
LIBRARY	:	LIQUID	00.10.00	DETECIÓR	•	

isotope	GRP	Peak Energy	ENERGY DIFF (KEV)	DECAY CORR uCi/ml	COMMENTS	
	~~~~				······································	
CO-58	AP .	810.76	0.22	5.716E-07	QA Results	OK
CO-60	Ap	1332.49	-0.10	5.322 <b>E</b> ~07	QA Results	ok
<b>CS-13</b> 7	FP	661.64	0.25	6.754 <b>5-0</b> 8	QA Results	OK ·
		•. 1				
AVG	ENER	GY DIFF :	= 0.12	1.171E-06 =	TOTAL GAMMA ACTIV	TTY
			•	6.754E-08 =	Total FP Activity	
•			×	1.104E-06 ·	Total AP Activity	

# UNIDENTIFIED/REJECTED PEAKS

ENERGY	NET	area	FWHM	GAMMA/SEC	GAMMA/SEC /ml	¥	ERROR	flag	POTENTIAL ID	ACTIVITY
	-		 7 7/		0 A760.04	7	EE 2			2 060B-07
4.J.) · 6 /		<b>2</b> 0.	<i>4.3</i>	6.09/E-01	0.0/25-04	ί	ぞ.リ	к. В	τ_174	2,000B-07
							· · · · ·	R	N-197	2.7008-07
428.05		19.	1.82	1.132E+00	1.500E-03		27.0		<b>9B-125</b>	1.382E-07
511.04		65.	2.95)	4.611E+00	6.107E-03		24.0	The second se	C-11	1,335E-02
•		And	J		•			บ	F-18	6.986E-07
			an and the second		•		• ·	U	ZN - 65	5.837E+06
								υ	I-133	1.097E-05
			•					υ.	TL-208	7.644E-07

Total Unidentified/Rejected Peaks = 3 % Unidentified/Rejected Peaks = 42.86

Flags: U - Unknown Line

R - Rejected During Analysis P - Positively Identified (line not in analysis library)

PERFORMED BY :

DATE : 97 /30 /09

HIG-04-5000 12:50

PAGE

1 OF

REPORT NAME : QA CHECK (V9.3) REPORT DATE : 30-JUL-2009 13:31 REQUESTOR : CAS

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# TENNESSEE VALLEY AUTHORITY SEQUOYAH NUCLEAR PLANT

# POST NID QA ANALYSIS

TITLE : U1 - RWST MOAT 08:10 07/30

SAMPLE NO.	1	8092111019	OPERATOR NAME	:	CAS Account
SAMPLE TYPE	:	SI-421 LIQUID	Sample Geometry	:	LM1
COUNT TIME	:	30-JUL-2009 13:14:17	SAMPLE QUANTITY	2	7.55000E+02
SAMPLE TIME	:	30-JUL-2009 08:10:00	DETECTOR	;	ADC1
LIBRARY	:	LIQUID			•

Isotope	grp	peak Energy	entergy DIFF (kev)	DECAY CORR UCI/ml	COMMENTS
			********	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	
CO-58	Ap	810.76	0.18	5.622E-07	QA Results OK
CO-60	AP	1332.49	0.14	5.693B-07	QA Results OK
C\$-137	FP	661.64	-0.13	1.040E-07	QA Results OK
•			*****		
AVG	ENER	GY DIFF :	= 0.06	1.236E-06 =	TOTAL GAMMA ACTIVITY
				1.040E-07 =	Total FP Activity
				1.132E-06 =	Total AP Activity

### UNIDENTIFIED/REJECTED PEAKS

ENERGY	NET	AREA	FWHM	GAMMA/SEC	Gamma/Sec /ml	¥	ERROR	Flag	Potential ID	ACTIVITY
********* 776 76	*~ *		******			-			************	
335.34		14.	7.33	6.740 <sup>1</sup> /40 <sup>1</sup> /	8.9275-04		152.0	R	TR-13TM	2.8355-07
410.24		15.	1.87	8.921E-01	1.182E-03		24.6	U	unk	
511.54		39.	2.54	2.785E+00	3.688E-03	1	43.6	Ū	<b>C-11</b>	4.036E-03
				1	•			IJ	F-18	3.710E-07
			A number	lat.on			,	υ	ZN~65	3,524E+06
	•							U	I-133	6.552E-06
								U	TL-208	4.616E-07

Total Unidentified/Rejected Peaks = 3 % Unidentified/Rejected Peaks = 42.86

Flags: U - Unknown Line

PERFORMED BY :

R - Rejected During Analysis

P - Positively Identified (line not in analysis library)

DATE : 07 30

\*\*\*\* End Of Report ( 1 Page ) \*\*\*

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**C** 

ffluent Release (Water) Report

TOTAL

Sample ID:S092111019Sample Time:30-JUL-200908:10:00Sample Title:U1 - RWST MOAT 08:10 07/30Nuclide Library:LIQUID

Nuclide Name	Weighted Mean Activity (uCi/ml )	ECL Type	ECL Limit (uCi/cm3)	Fraction Of ECL	
CO-58	5.6218E-07	D.	2.000E-05	2.8109E-02	
CO-60	5.6933E-07	D	3.000E-06	<b>1.8978E-01</b>	
CS-137	1.0402E-07	D	1.000E-06	1,0402E-01	

3.2191E-01

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30-JUL-2009 13:31:25.84

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SEQUOYAH NUCLEAR	PLANT	
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AMPLE TITLE : U1 - RWST MOAT 08:10 07/	'30
ILE IDENT : CAS\$DISK:[SQN.SAMPLE.CHE	Em.NEW] 5092111019.CNF;1
AMPLE ID : S092111019 AMPLE TIME : 30-JUL-2009 08:10 AMPLE TYPE : SI-421 LIQUID	* OPERATOR : CAS Account * SAMPLE GEOMETRY : LM1 * SHELF HEIGHT : 0 * EFFICIENCY FILE : LM10 * SAMPLE QUANTITY : 7.55000E+02 ml
CQ DATE & TIME : 30-JUL-2009 13:14	* DEADTIME (%) : 0.0%
RESET LIVE TIME : 0 00:16:40	* SENSITIVITY : 4.00000
LAPSED REAL TIME : 0 00:16:40	* GAUSSIAN SEN : 10.00000
LAPSED LIVE TIME : 0 00:16:40	* NBR ITERATIONS : 10
DETECTOR : ADC1	<pre>* LIBRARY : LIQUID</pre>
MFIC CAL DATE : 18-AUG-2004 10:36	* EFFIC CERT DATE : 18-AUG-2004 10:36
CAL DATE & TIME : 30-JUL-2009 03:09	* ENERGY TOLER : 1.25
(EV/CHAN : 4.99710E-01	* HALF LIFE RATIO : 8.00000
DFFSET : 1.48561E-01 keV	* ABUNDANCE LIMIT : 70.0%
2 COEFFICIENT : 8.55423E-08	* CORRECTION FACTOR : 1.00000E+00
PEAK START CHAN : 110	.* PEAK END CHAN. : 4091
NALYSES : PEAK V16.9 NID V3.4 MINACT	V2.8 WTMEAN/KEY V1.8

Nuclides ٢t Energy Area Bkgnd FWHM Channel Left Pw %Err Fit 1 335.34 670.69 14 15 1.35 667 7 52.6 3.41E+00 1 410.24 15 0 1.87 820.54 816 8 24.6 6.55E-01 1 12 43.6 1.71E+00 511.54 2.54 1023.20 39 50 1020 10 21.7 1.29E+00 CS-137 1 661.51 28 3 2.45 1323.19 1317 1 13 9.2 8.96E-01 CO-58 810.94 146 7 1.83 1622.08 1617 1 1173.10 107 2339 13 10.1 1.69E+00 CO-60 0 1.63 2346.32 1 1332.63 12 10.2 3.01E-01 CO-60 98 0 1.86 2665.28 2660

ost-NID. Peak Search Report

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uclide Line Activity Report ample ID : S092111019

Page : 2 Acquisition date : 30-JUL-2009 13:14:17

uclide Type: AP

	·		•	Uncorre	cted I	Decay	Corr	1-Sigma	•
uclide	Energy	%Abn	*Eff	uCi/m	1	uCi	/ml	&Error	Status
0-58	810.76	99.40*	9.402E-01	5.610E	-07*	5.62	, 2E-07	9.16	OK
	863.94	0.74	8.906E-01		Line	Not	Found		Absent
	1321.76	0.10	6.188E-01		Line	Not	Found		Absent
	1621.52	Misce	llaneous		Line	Not	Found		Absent
•	1674.68	0.54	5.040E-01	****	Line	Not	Found	******	Absent
	Final Mea	n for 1	Valid Peaks	= 5.6	228-0	7+/-	5.152E	-08 (	9.16%)
0-60	310.49	Doubl	e Escape		Line	Not	Found		Absent
	1173.22	100.00	6.856E-01	5.597E	-07	5.59	7E-07	10.09	OK
·	1332.49	100.00*	6.144E-01	5.693E	-07	5.69	3E-07	10.18	OK
	Final Mea	n for 2	Valid Peaks	= 5.6	93E-0'	7+/-	5.797E	-08 ( 1	0.18%)

uclide Type: FP	- A					•
uclide. Energy 5-137 661.64	<b>%*Ab</b> n: 85.12*	%Eff 1.120E+00	Uncorrected uCi/ml 1.040E-07	Decay Corr uCi/ml ` 1.040E-07	1-Sigma %Error 21.72	Status OK
•Final Me	an for 1	Valid Peak	3 = 1.040E-	07+/- 2.2601	E-08 ( 21	,72%)

lag: "\*" = Keyline

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ildentified Energy Lines ample ID : S092111019

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Acquisition date : 30-JUL-2009 13:14:17

Page :

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Area Bkgnð FWHM Channel Left Pw Cts/Sec %Err %Eff Flags t Energy 7 1.37E-02 52.6 335.34 14 15 1,35 670.69 667 2.03E+00 Τ. 1 15 0 1.87 820.54 816 8 1.52E-02 24.6 1.70E+00 1 410.24 1023.20 1020 12 3.91E-02 43.6 1 511.54 39 50 2.54 1.40E+00

lags: "T" = Tentatively associated

# ejected Report ample ID : S092111019

			Half-Life			Activi	ity 1-9	ligma		
uclide	Halt	f-life	Ratio	Energy	*Abund	(uCi/r	nl) %E	rror	Rejecte	d by
E-131M	1 3	30.00H	0.17	81.14	4.07	Not	Found		Abun.	
	×			102.06	7.90	Not	Found		*	
				149.72	5.10	Not	Found			
	•			200.63	7.56	Not	Found			•
				240.93	7,59	Not	Found			. ,
				278.56	1.78	Not	Found			• •
				334.27	9.60	2.835E	-07 52	2.55		,
			·	364.98	1.20	Not	Found			
				452.32	1.50	Not	Found			
				462.92	1.82	Not	Found			
				586,30	1.98	Not	Found		•	
			e	665.05	4.34	Not	Found		-	
			·	713.10	1.43	Not	Found			
				744.20	1.59	Not	Found			•
				773.67	* 38.20	Not	Found			,
				782.49	7 79	Not	Found			
			· · · · · ·	793 75	13 90	Not	Found		•	1
				822 78	±3.90	NOL	Found			
	· .			852.70	20 70	Not	Found			
<b>en</b>		· .	1	910 00	20.70	NOL	Found		• .	
			· + ++++ 3.	920.00	3.29	NOL	Found		• •	
·•	· .			1050.60	1.20	Not	Found			
. •				1105 16	. 11 40	NOC	Found			· ·
•		,		1125.40	11.40	NOL	Found		••	
••	•	. •		1006 60	. T'20	NOL	Found			••
•	•		· •	1200.00	9.80	NOL	Found		•	
		-4		1040.01	1.24	NOC	round			
			<i>i</i> .	1887.70	1.36	NOT	Found		,	
		٩.	7	2000.94	2.01	NOT	Found			
		<del>.</del>	Abundances	rouna =	5.41	(Abn.	Limit	= 36	.00%)	
-132	•	2 201		0.00 70						
~ <b>.</b>		2.500	4.41	262.70	1.44	NOC	Found		Abun.	
				446,00	0.60	Not	Found			
				505.90	5.03	Not	Found			
1	•		,	522.65	16.10	Not	Found	· · ·		
				535.50	0,52	Not	Found			
		•••		547.10	1.25	Not	Found			
,				621.20	1.58	Not	Found			,
	· ·			630,22	13.70	Not	Found			
				650.60	2.66	Not	Found			_
				667.69	* 98.70	Not	Found			
				669.80	4.90	Not	Found			
	· ·.			671.60	5.20	Not	Found			
				727.00	5.40	Not	Found			•
				728.50	1.10	Not	Found			• •
				772.61	76.20	Not	Found			
,				780.20	1,23	Not	Found			
	· .*			784.50	0.42	Not	Found			
				809.80	2,90	9.242E	- 05	9.16		1. N.
				812.20	5.60	Not	Found			
				876.80	1.08	Not	Found	** ** **	·	
				954.55	18.10	Not	Found			

ejected Report (continued) ample ID : S092111019

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		Half-Life	•		Activi	ltv 1-si	ama		
uclide	Half-life	Ratio	Energy	*Abund	(uCi/n	nl) %Er	ror	Rejected	bv
-132	2.30H	2.27	1136.03	2.96	Not	Found -		Abun.	
			1143.40	1.35	Not	Found -			
			1173.20	1.09	2.468E-	-04 10.	09		
	•.		1290.70	1.14	Not	Found -			
		· .	1295.30	1.97	Not	Found -			
			1372.07	2.47	Not	Found -			
			1398.57	7.10	Not	Found -			
•	•		1440.30	0.00	Not Fr	nd Miscl	L – –		
		· •	1442.56	1.42	Not	Found	-	•	
			1757.50	0.30	Not	Found -			
		•	1921.08	1.18	Not	Found -	· • •	·	
			2002.20	1.09	Not	Found -	· ·	•	
	Ê	Abundances	Found =	1.39	(Abn. 1	Limit =	61.	.00%)	
P-239	2.36D	0.09	99.55	14.70	Not	ຮ່ວນກວ່		Abun	
			103.76*	23.70	Not	Found		Abull .	
			106.13	22.70	Not	Found .			
			117.00	11.10	Not	Found			
			209.75	3.24	Not	Found -			
			228.18	10.70	Not	Found .			
			277.60	14.10	Not	Found			
		· ·	315.88	1.59	Not	Found		•	
	~~ ~		. 334.19	2.03	1.2678	-06 57	55		
	* 8	Abundances	Found =	1.95	(Abn)	limit –	 A 77	0081	
					- /			, UUTO/ 14-0 11-0	,

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# nterférence Report ample ID : S092111019

Page : 6 Acquisition date : 30-JUL-2009 13:14:17

# o interference correction performed

immary of Nuclide Activity ample ID : S092111019	Acquisition date : 30-JUL-2009 13:14:17
Total number of lines in spectrum Number of unidentified lines Number of lines tentatively identified	7 2 by NID 5 71.43%
uclide Type : AP Wtd Mean Uncorrected	Wtd Mean Decay Corr 1-Sigma
uclideHlifeDecayuCi/mlD-5870.80D1.005.610E-07D-605.27Y1.005.693E-07	uCi/ml 1-Sigma Error %Error Flags 5.622E-07 0.515E-07 9.16 5.693E-07 0.580E-07 10.18
Total Activity : 1.130E-06	1.132E-06
uclide Type : FP Wtd Mean Uncorrected uclide Hlife Decay uCi/ml S-137 30.17Y 1.00 1.040E-07	Wtd Mean Decay Corr Decay Corr 1-Sigma uCi/ml 1-Sigma Error %Error Flags 1.040E-07 0.226E-07 21.72
Total Activity : 1.040E-07	1.040E-07
Grand Total Activity : 1.234E-06 lags: "K" = Keyline not found "E" = Manually edited	"M" = Manually accepted "A" = Nuclide specific abn. limit
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aximum Permissible Concentration Report Page : 8 ample ID : S092111019 Acquisition date : 30-JUL-2009 13:14:17

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Nuclide	Activity (uCi/ml)	1-Sigma % Error	MPC (uCi/ml)	% MPC	
CO-58	5.622E-07	9.2	9E-05	0.625	
CO-60	5.693E-07	10.2	3E-05	1.90	
CS-137	1.040E-07	21.7	2E-05	0.520	
Totale	1 2368-06			3 04	

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				•		
		••				
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					•	
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		•				
		•				•
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# ffluent Release (Water) Report

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#### 30-JUL-2 13:54:54

# Page

#### \*\*\*\*\*\*\*\*\*\* \* \* \*\*\*\*\*\* \*\*\*\*\*\* \*\*\* \* \* \* BFFLUENT RELEASE \*\*\*\*\*\*\*\* EFFLUENT (WATER) REPORT \* \* \* \* \* \*\*\*\*\* يو يو يو ب ي \*\*\* هر مان الد . . . .

Sample ID:	S092111022
Sample Time:	30-JUL-2009 08:10:00
Sample Title:	U1 - RWST MOAT 08:10 07/30
Nuclide Library:	LIQUID

Nuclide Name	Weighted Mean Activity (uCi/ml )	ECL Type	ECL Limit (uCi/cm3)	Fraction Of ECL
	· • • • • • • • • • • • • • • • • •			
CO-58	5.7163E-07	D .	2.000E-05	2.8581E-02
CO-60	5.3219E-07	. D	3.000E-06	1.7740E-01
CS-137	6.7537E-08	D	1.000E-06	6.7537E-02

TOTAL 

2.7352E-01

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30-JUL-2009 13:51:42.07

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AMPLE TITLE : U1 - RWST MOAT 08:10 07/ PILE IDENT : CAS\$DISK: (SQN.SAMPLE.CHE	/30 EM.NEW] S092111022.CNF;1
SAMPLE ID : S092111022 SAMPLE TIME : 30-JUL-2009 08:10	* OPERATOR : CAS Account * SAMPLE GEOMETRY : LM1 * SHELF HEIGHT : 0 * DEFICIENCY FILE IM10
AMPLE TYPE : LIQUID	* SAMPLE QUANTITY : 7.55000E+02 ml
ACQ DATE & TIME : 30-JUL-2009 13:34 PRESET LIVE TIME : 0 00:16:40 SLAPSED REAL TIME : 0 00:16:40 SLAPSED LIVE TIME : 0 00:16:40 ************************************	* DEADTIME (%) : 0.0% * SENSITIVITY : 4.00000 * GAUSSIAN SEN : 10.00000 * NBR ITERATIONS : 10 ****
DETECTOR       : ADC1         3FFIC CAL DATE       : 18-AUG-2004 10:36         )CAL DATE & TIME       : 30-JUL-2009 03:09         )CAL DATE & TIME       : 30-JUL-2009 03:09         (EV/OHAN       : 4.99710E-01         )FFSET       : 1.48561E-01 keV         )COEFFICIENT       : 8.55423E-08         ?EAK START CHAN       : 1.10         `************************************	* LIBRARY : LIQUID * EFFIC CERT DATE : 18-AUG-2004 10:36 * ENERGY TOLER : 1.25 * HALF LIFE RATIO : 8.00000 * ABUNDANCE LIMIT : 70.0%. * CORRECTION FACTOR : 1.00000E+00 * PEAK END CHAN : 4091
ANALYSES : PEAK V16.9 NID V3.4 MINACT	V2.8 WTMEAN/KEY V1.8

Post-NID Peak Search Report

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Γt	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	*Err	Fit	Nuclides
1	135.27	20	29	2.34	270.39	265	10	55.1	2.41E+00	
1	428.05	19	· 3	1.82	856.17	853	7	27.0	9.46E-01	
1	511.04	65	35	2.95	1022,20	1015	16	24.0	1.63E+00	
1	661.89	18	0	1.41	1323.96	1319	8	22.9	4.42E-01	CS-137
1	810.98	149	5	1.51	1622,15	1616	11	8.9	9.72E-01	CO-58
1	1173.09	114	3	1.61	2346.30	2341	12	10.0	4.30E-01	CO-60
1	1332.39	91	0	2.21	2664.82	2659	12	10.6	5.89E-01	CO-60

Auclide Line Activity' Report ample ID : S092111022

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luclide	Type:	AP
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•			τ	Incorrected	Decay Corr	1-Sigma	
luclide	Energy	&Abn	%Eff	uCi/ml	uCi/ml	%Error	Status
10-58	810.76	99.40*	9.401E-01	5.703E-07	5.716E-07	8.89	OK
	863.94	0.74	8.906E-01	Line	Not Found		Absent
	1321.76	0.10	6.188E-01	Line	Not Found		Absent
	1621.52	Misce	llaneous	Line	Not Found		Absent
•	1674.68	0.54	5.040E-01	Line	Not Found		Absent
	Final Mean	n for 1	Valid Peaks	= 5.716E-(	07+/- 5.081E	-08 ( 8	.89%)
<b>:</b> O~60	310.49	Doubl	e Escape	Line	e Not Found		Absent
· ·	1173.22	100.00	6.856Ê~01	5.952E-07	5.953E-07	9.96	OK
	1332.49	100.00*	6. <b>1</b> 45E-01	5.321E-07	5.322E-07	10.56	OK
	Final Mea	n for 2	Valid Peaks	= 5.322E-0	07+/- <sup>5.618</sup>	2-08 ( 10	.56%)

uctide	Type:	F P									
Juclide S-137	• Ener 661.	gy 64	%Ab 85∵1	n 2*	%Eff 1.120E+00	Uncorrected uCi/ml 6.754E-08	Decay Corr uCi/ml . 6.754E-08	1-Sigma %Error 22.93	Status OK	•	
	***		•		· · ·		• • • •			<b>N</b> _	
•	Final	Mean	for	1	Valid Peak	s = 6.754E-1	08+/- 1.548	E-08 ( 22	.93%)		
			•								

"lag: "\*" = Keyline

Rejected Report ample ID : S092111022

Page : 3 Acquisition date : 30-JUL-2009 13:34:38

						•	
		Half-Life			Activi	ty 1-Sigma	
	- nail-1110	Ratio	Energy 4	RADUNG	(uC1/n	(1) KELLOL	. Kejected by
JU57	270.900	0.00	122,00*	10 CD	NOL		ADUN.
	<b>9</b>	Abundanceg	E00040	11 03	2.000E	-07 55.10	•
	ų	munuances		11.05			
3B-125	2.77Y	0.00	176.33	6.89	Not	Found	Abun.
			380.44	1.50	Not	Found	
			427.90*	29.33	1.382E	-07 26.99	· · ·
			463.38	10.35	Not	Found	
•			600.56	17.80	Not	Found	
			606.64	5.02	Not	Found	
•			635.90	11.32	Not	Found	
		-	671.41	1.81	Not	Found	
	8	Abundances	Found =	34.91	(Abn. 1	Limit = 56	5.00%)
I-132	2.30H	. 2.41	262.70	1.44	Not	Found	Abun.
			446.00	0.60	Not	Found	
		•	505.90	5.03	Not	Found	
•			522.65	16.10	Not	Found	•
	•		535.50	0.52	Not	Found	
•		•.	547.10	1.25	Not	Found	
•	. 4	•	.621.20	1.58	Not	Found	
		<b>•</b> .	630, 22	13.70	Not	Found '	
•	•.	· ,	650,60	2,66	Not	Found	•
	• <sup>-</sup>	*	667.69*	98.70	Not	Found	
			669.80	.4.90	Not	Found	
• •			671.60	5.20	Not	Found	
		, •	727.00	5.40	Not	Found	
		۱. ۱.	728.50	1.10	Not	Found	
			772.61	76.20	NOT	Found	· · ·
			780.20	1.23	NOT	Found	· .
			/04.50	0.42	NOU	Found ~	
			812 20	5 60	L.V415		
	•	. *	876 80	3.00	5.390E	-05 0.89 Found	·
			954 55	18 10	$\rightarrow$ == Not	Found	
		<b>پ</b>	983 70	0 56	and Not	Found	
			1136.03	2.96	Not	Found	
	•		1143.40	1.35	Not	Found	
			1173.20	1.09	2.9071	-04. 9.96	
			1290.70	1.14	Not	Found	÷
	•	۰	1295.30	1.97	' Not	Found	
	њ. <sup>1</sup> .		1372.07	2.47	Not	Found	•
		, , , , , , , , , , , , , , , , , , ,	1398.57	7.10	) Not	Found	
			1440.30	0.00	Not F	nd Miscl	1 a .
			1442.56	1.42	Not	Found	
	:		1757.50	0.30	) Not	Found	4
	•		1921.08	1.18	3 Not	Found	
	· •		2002.20	1.09	) Not	Found	
*	*	Abundances	Found =	3.35	5 (Abn.	Limit = 6	1.00%)
[-134	52.60M	6,33	135.40	3.76	5 4.6611	5-05 55.10	Abun.
	- ,	· · · · · · · · · · · · · · · · · · ·	235.47	1 98	3 Not	Found	

# tejected Report (continued) Sample ID : S092111022

Page : 4 Acquisition date : 30-JUL-2009 13:34:38 ¥.;

		Half-Life	Activity 1-Sigma	
Muclide	Half-life	Ratio	Energy %Abund (uCi/ml) %Error Rej	ected by
[-134	52.60M	6.33	405.45 7.30 Not Found Abu	n.
			433.35 4.19 Not Found	
			458.92 1.30 Not Found	• •
			488.88 1.41 Not Found	
		•	514.40 2.34 Not Found	
		•	540.83 7.80 Not Found	
			595.36 11.40 Not Found	
-	1		621.79 10.60 Not Found	
		• •	627.96 2.37 Not Found	
			677.34 8,50 Not Found	•
			730.74 1.91 Not Found	
	•		739.18 0.76 Not Found	
		•	766.68 4.10 Not Found	
			847.03 95.41 Not Found	•
<b>\$</b> *1%	1	•	857.29 6.96 Nat Found	
		. •	884.09* 65.30 Not Found	
			947.86 4.04 Not Found	
	:		974.67 4.70 Not Found	
			1040.25 1.91 Not Found	
	• •		1072.55 15.30 Not Found	•
· , ·			1136.16 9.70 Not Found	
	·		1159.10 0.35 Not Found	
	•		1190.03 0.35 Not Found	
		• •	1455.24 2.29 Not Found	• • •
	•	•	1613.80 4.36 Not Found	
	•		1741.49 2:67 Not Found	۰,۰
	. · · · ·	N	1806.84 5.70 Not Found	
	<b>*</b>	Abundances	Found = 1.30 (Abn. Limit = 55.00%	)
<i>N</i> -187	23,834	0 22		
	23.0311	0.23	479 52 22 40 Not Not Not	n.
			551 55 5 44 Not Found	
			$\begin{array}{cccccccccccccccccccccccccccccccccccc$	,
·			625 $52$ $1$ $16$ $$ Not Found	
			685 81* 29 20 Not Found	
		۰.	772.87 4 40 Not Found	
	*	Abundancea	Found = 11.90 (abn Limit $ < < < < < < < < < < < < < < < < < < <$	1
	-		-21.50 (mult Dimit = 05.008	,

Flag: "\*" = Keyline

<pre>tummary of Nuclide Activity hample ID : S092111022 Acquisition date : 30-JUL-2009 13:34:38 Acquisition date : 30-JUL-2009 13:34:38 Total number of lines in spectrum 7 Number of unidentified lines 1 Number of unidentified ines 1 Number of unidentified by NID 6 B5.71% Nuclide Type : AP Wtd Mean Uncorrected Decay Corr 1-Sigma Nuclide Hlife Decay UCL/ML UCL/ML 1-Sigma Error Flags 70-58 70.800 1.00 5.703E-07 5.716E-07 0.560E-07 8.89 70-50 5.277 1.00 5.321E-07 5.322E-07 0.562E-07 10.56 Total Activity : 1.102E-06 1.104E-06 Nuclide Type : FP Wtd Mean Uncorrected Decay Corr 1-Sigma S-137 30.177 1.00 6.754E-08 6.754E-08 1.548E-08 22.93 Total Activity : 1.170E-06 1.171E-06 Tags "K" = Keyline not found "M" = Manually accepted "A" = Nuclide specific abg. 1imit "A" = Nuclide specific abg. 1imit</pre>		
Total number of lines in spectrum Number of unidentified lines Number of lines tentatively identified by NID 6 35.71% Nuclide Type : AP Wtd Mean Uncorrected Decay Corr 1-Sigma Error %Error Flags 0.508E-07 8.89 0.508E-07 8.89 0.508E-07 8.89 0.508E-07 8.89 0.508E-07 8.89 0.508E-07 10.56 Total Activity : 1.102E-06 1.104E-06 Nuclide Hife Decay UCI/ml UCI/ml 1-Sigma Error %Error Flags 15-137 30.17Y 1.00 6.754E-08 6.754E-08 1.548E-08 22.93 Total Activity : 1.170E-06 1.171E-06 Grand Total Activity : 1.170E-06 1.171E-06 *** ** = Manually edited *** = Manually accepted *** ** = Manually edited *** = Nuclide speciffc atmat.finit.	Summary of Nuclide Activity Sample ID : S092111022	Page : 5 Acquisition date : 30-JUL-2009 13:34:38
<pre>Nuclide Type : AP Nuclide Type : AP Nuclide Hife Decay 0-58 No-60 S.227Y 1.00 S.321E-07 Total Activity : 1.102E-06 Nuclide Type : FP Nuclide Hife Decay 1.00 S.754E-08 Nuclide Hife Decay Nuclide Hife Decay Nucl</pre>	Total number of lines in spectrum Number of unidentified lines Number of lines tentatively identif	7 1 ied by NID 6 85.71%
Wild Mean Uncorrected 0-58Wild Mean Uncorrected uci/ml uci/ml uci/ml uci/ml uci/ml uci/ml uci/ml uci/ml 1Sigma Error %Error Flags 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 0.508E-07 10.56 1.104E-06Nuclide Hife Decay Corr 1.00 E-137 30.17Y 1.00 5.754E-08Wtd Mean Decay Corr 0.5754E-08 6.754E-08 6.754E-08 6.754E-08 6.754E-08Grand Total Activity ty 1.170E-061.171E-06 "Ma Manually edited "M" = Manually accepted "A" = Nuclide specific abg." limit A" = Nuclide	Juclide Type : AP	
Total Activity : 1.102E-06 1.104E-06 Juclide Type : FP Wtd Mean Uncorrected UC/ml 1-Sigma Error %Error Flags S-137 30.17Y 1.00 6.754E-08 6.754E-08 1.548E-08 22.93 Total Activity : 6.754E-08 6.754E-08 Grand Total Activity : 1.170E-06 1.171E-06 *1Ags: "K" = Keyline not found "M" = Manually accepted "A" = Nuclide specific aba". 1imit	Wtd Mean         Uncorrected           Nuclide         Hlife         Decay         uCi/ml           CO-58         70.80D         1.00         5.703E-07           CO-60         5.27Y         1.00         5.321E-07	Wtd Mean d Decay Corr Decay Corr 1-Sigma uCi/ml 1-Sigma Error %Error Flags 5.716E-07 0.508E-07 8.89 5.322E-07 0.562E-07 10.56
<pre>Nuclide Type : FP Wtd Mean Uncorrected Decay Corr 1-Sigma Vuclide Hlife Decay uci/ml 1-Sigma Error %Error Flags 5-137 30.17Y 1.00 6.754E-08 6.754E-08 1.548E-08 22.93 Total Activity : 6.754E-08 6.754E-08 Grand Total Activity : 1.170E-06 1.171E-06 **A* = Manually accepted **A* = Manually edited **A* = Nuclide specific abs: 1imit</pre>	Total Activity : 1.102E-06	1.104E-06
Wtd Mean Decay Corr Decay Corr 1-Sigma Uci/ml 1-Sigma Error %Error Flags 1.548E-08 6.754E-08 22.93 Total Activity : 6.754E-08 6.754E-08 Grand Total Activity : 1.170E-06 1.171E-06 *Lags: "K" = Keyline not found "M" = Manually accepted "A" = Nuclide specific abd. 1imit	Juclide Type : FP	· · ·
Total Activity : 6.754E-08 Grand Total Activity : 1.170E-06 *Iags: "K" = Keyline not found *M" = Manually accepted *A" = Nuclide specific abn. limit	Wtd Mean Uncorrected Juclide Hlife Decay uCi/ml LS-137 30.17Y 1.00 6.754E-08	Wtd Mean d Decay Corr Decay Corr 1-Sigma uCi/ml 1-Sigma Error %Error Flags 6.754E-08 1.548E-08 22.93
Grand Total Activity : 1.170E-06 1.171E-06 "lags: "K" = Keyline not found "M" = Manually accepted "A" = Nuclide specific abs. limit	Total Activity : 6.754E-08	6.754E-08
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<pre>"Lags: "K" = Keyline not found "B" = Manually accepted "A" = Nuclide specific abs "A" = Nuclide specific abs "A" = Nuclide specific abs "A" = Nuclide specific abs "A"</pre>	Grand Iotal Activity : 1.170E-06	1.171E-06
	<pre>"lags: "K" = Keyline not found ",, "E" = Manually edited</pre>	"M" = Manually accepted "A" = Nuclide specific aba limit
	<pre>"lags: "K" = Keyline not found "E" = Manually edited</pre>	"M" = Manually accepted "A" = Nuclide specific abn limit
	<pre>"Lags: "K" = Keyline not found ""E" = Manually edited</pre>	"M" = Manually accepted "A" = Nuclide specific abn limit
	<pre>"lags: "K" = Keyline not found ""E" = Manually edited</pre>	"M" = Manually accepted "A" = Nuclide specific abn limit
	<pre>"lags: "K" = Keyline not found ""E" = Manually edited</pre>	"M" = Manually accepted "A" = Nuclide specific aba limit
	<pre>"lags: "K" = Keyline not found ""E" = Manually edited """"""""""""""""""""""""""""""""""""</pre>	"M" = Manually accepted "A" = Nuclide specific abn limit
	<pre>*lags: "K" = Keyline not found *</pre>	"M" = Manually accepted "A" = Nuclide specific abn limit
	<pre>*lags: "K" = Keyline not found     ""E" = Manually edited     """</pre>	"M" = Manually accepted "A" = Nuclide specific abn limit
	<pre>*lags: "K" = Keyline not found "E" = Manually edited </pre>	"M" = Manually accepted "A" = Nuclide specific aba limit
	<pre>"lags: "K" = Keyline not found ""E" = Manually edited """"""""""""""""""""""""""""""""""""</pre>	"M" = Manually accepted "A" = Nuclide specific aba limit
	<pre>"lags: "K" = Keyline not found ""E" = Manually edited """"""""""""""""""""""""""""""""""""</pre>	"M" = Manually accepted "A" = Nuclide specific aba limit

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PAGE 2 OF

REPORT NAME : QA CHECK (V9.3) REPORT DATE : 30-JUL-2009 13:51 REQUESTOR : CAS

# TENNESSEE VALLEY AUTHORITY SEQUOYAH NUCLEAR PLANT

# POST NID QA ANALYSIS

\*\*\*\* End Of Report ( 2 Pages ) \*\*\*\*

Q.

REPORT NAME : H3CAL (V 3) REPORT DATE : 7/30/2009 1:11:27 PM

# TENNESSEE VALLEY AUTHORITY SEQUOYAH NUCLEAR FLANT

### Liquid Scintillation Counter Calibration Report

STD REFERENCE DATE : 6-jan-2005 12:00 STD REFERENCE ACTIVITY 1 9.030E3 STD ACQUISITION DATE : 7/30/2009 2:49:43 AM STD AVERAGE CPM 1 8.679B3 STD VOLUME (ML) : 3.00 STD EFFICIBNCY : 0.414 LIMITS : 0.320 - 0.500 : 7.00 BKG AVERAGE CPM BKG COUNT LENGTH NUMBER OF COUNTS : 20.0 : 1

PART II - SAMPLE COUNTING DATA

SAMPLE TO	•	TIT RWST MOAT NEW STILL 07/30 0	
VOLUME (ML)		3.00	
VOLUME CORRECTION FACTOR		1.00	
LENGTH OF COUNT (min)		6.00	
NUMBER OF COUNTS		3	
AVERAGE COUNTRATE (CPM)	3	1836.3	
ACTIVITY (uCi/ml)	,	5.64B-4	
1-SIGMA ERROR		3.6728-6	
MDA (uCi/ml)	;	1.0558-6	

09

Date : 07/30/08

92:21 6002-00-0NU

Performed By :

90/10'd