



CHEM-NUCLEAR SYSTEMS, INC.

220 Stoneridge Drive • Columbia, South Carolina 29210

WM DOCKET CONTROL
CENTER

'85 OCT -9 P4:35

October 8, 1985

WM Record File

WM Project 19

Docket No. _____

PDR ☒

LPDR _____

Distribution:

PERSON

(Return to WM, 623-SS)

Mr. Leroy S. Person
Nuclear Regulatory Commission
7915 Eastern Avenue
Silver Springs, Maryland 20910

Dear Mr. Person:

Per your telephone conversation with Jim Staehr, I am enclosing completed Leach Test Results for Resin A and 66% PWR Waste Forms for both deionized water and sea water.

If you have further questions, please don't hesitate to let me know.

Sincerely,

E. H. Neilsen
Senior Development Engineer

EHN/ma

Enclosures

851024012C 851008
PDR WASTE PDR
WM-19

LEACH TEST RESULTS

LEACH TEST IDENTIFICATION NUMBER Resin A (Seawater)LABORATORY WHERE TESTS PERFORMED CNSI, Barnwell, SCANALYST P. Rowland, J. CarlsonDATE RESULTS REPORTED 9-13-85

Part A. Description of Leach Specimen

Specimen Id. Number Resin A (seawater)Portion of Waste Incorporated in Mixture 53

Weight %

72

Volume %

(Based on initial volumes)

Type of Waste, Chemical and Radioisotopic Composition, and Specific Activity of the Waste

Mixal base Resin Based (CMA-3) depleted with Sodium Sulfate. Spiked with 40.4 μ Ci Cs-137, 31.0 μ Ci Sr-85 and 31.5 μ Ci Co-60.Type and Composition of the Solidification Agent Epoxy 250 grams waste150g Portland Cement Type I75g CNSI Proprietary Agent M-5Preparation of Specimen Resin slurry was prepared using fresh MR-3resin. Sodium sulfate was added to deplete the resin & allowed to stand overnight. The radioactive mixture was added (250 ml) and mixed. Portland Cement & M-5 were mixed with the waste. Transferred toShape and Dimension of Specimen 250 ml plastic cup & seal. Cure in 40° oven for 3 days.

Sphere, diameter, d (cm) =

Cylinder, diameter, d (cm) =

length, l (cm) =

Parallelepiped, length, l (cm) =

width, w (cm) =

height, h (cm) =

Other Shape Truncated coneDimensions Top diameter = 7.5 cm, bottom diameter = 6.0 cm, height = 7.0 cm

Initial Weight of Specimen, W (g) =

Volume of Specimen *, V (cm³) = 251Surface area of Specimen, S* (cm²) = 220Storage Conditions Stored in a sealed plastic cup during cure and cooling period.After cooling, sample was removed and immediately placed in the leaching vessel.Appearance No free liquid was observed. No cracking or deterioration was observed.Description of Leachant (Synthesized Seawater per ANSI 6.1, Appendix D)

Leach Interval (n)	Electrical Conductivity (μ mho/cm)	Volume, V _L (ml)
1	greater than 10,000	2200
2	greater than 10,000	2200
3	greater than 10,000	2200
4	greater than 10,000	2200
5	greater than 10,000	2200
6	greater than 10,000	2200
7	greater than 10,000	2200
8, 9, 10	greater than 10,000	2200

* Calculated from dimensions of specimen.

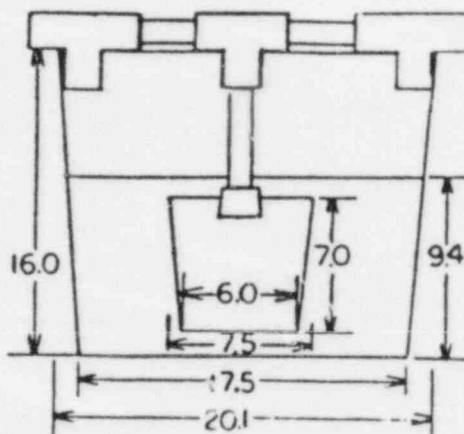
LEACH TEST RESULTS

LEACH TEST IDENTIFICATION NUMBER Resin A (Seawater)
 LABORATORY WHERE TESTS PERFORMED CINSE, Barnwell, SC
 ANALYST P. Roeland, P. Carbon
 DATE RESULTS REPORTED 9-13-85

Part B. Description of Leach Test Procedure

Specimen Preparation * (Same as Part A)

Diagram of Leach Apparatus:



Leachate Sampling Procedure Sample was removed from the leaching vessel and immediately placed in another leach vessel. The sample was not rinsed between periods. The leachate is stirred and a known volume withdrawn using an automatic pipette with disposable tips. The leachate sample is then pipetted into a numbered borosilicate vial. DI water is then added to bring the total volume to 15 ml.

Analytical Techniques:

Counting Instrument Identification and Calibration A Harshaw 3 x 3 NaI(Tl) detector type number 12SW12-W4 serial number 328 calibrated using a NBS traceable standard of Cs-137, Co-60, and Sn-113.

Constituent a_1 , Analytical Procedure, Standard Deviation of Method EG&G Ortec Model 7100 multi-channel analyzer

Constituent a_2 , Analytical Procedure, Standard Deviation of Method Same as a_1 .

Constituent a_3 , Analytical Procedure, Standard Deviation of Method Same as a_1 .

LEACH TEST RESULTS

LEACH TEST IDENTIFICATION NUMBER Resin A (Seawater)
 LABORATORY WHERE TESTS PERFORMED CNSI
 ANALYST P. Rowland, J. Carlson
 DATE RESULTS REPORTED _____

Part C. Experimental Data

Constituent Analyzed, Sr-85

Free Standing Water in Leach Specimen Containers: Yes ☒ No
 If Yes, Volume (ml) = _____; Radioactivity (μCi) = _____; and % of A_0 = _____

Specimen Rinse Before Initiation of Leaching: Do not include with results in the table below.
 Volume (ml) = NA; Radioactivity (μCi) = _____; and % of A_0 = _____

Initial Amount in Specimen, A_0 (μCi) [after 30-s rinse] = 31.0

LIX	Leach interval (n)	Temp. (°C)	Time and Date ^b In Out	V_L^a (mL)	$(\Delta t)_n$ (s)	$t = \Sigma(\Delta t)_n$ (s)	A_n Analyzed (**)	Blank (**)	Corrected Conc. (**) $\times 10^{-5}$	a_n^{***} (n)	a_n/A_0	$[a_n/A_0][1/(\Delta t)_n]$ (fraction/s)	$F = \frac{\Sigma a_n}{A_0}$
8.4	1	22.2	09:55 11:55 6-17 6-17	2200	7200	7200	3.23×10^{-5}	0	3.23×10^{-5}	0.16	.0052	7.22×10^{-7}	.0052
8.1	2	24.2	11:55 16:40 6-17 6-17	2200	1.71×10^4	2.43×10^4	3.95×10^{-5}	0	3.95×10^{-5}	0.20	.0065	3.80×10^{-7}	.0117
8.8	3	22.8	16:40 08:13 6-17 6-18	2200	5.73×10^4	8.16×10^4	3.30×10^{-5}	0	3.30×10^{-5}	0.17	.0055	9.60×10^{-8}	.0173
9.1	4	22.2	08:13 09:35 6-18 6-18	2200	8.91×10^4	1.71×10^5	7.20×10^{-5}	0	7.20×10^{-5}	0.11	.0035	3.93×10^{-8}	.0207
9.3	5	22.2	09:35 09:50 6-18 6-18	2200	8.97×10^4	2.60×10^5	1.34×10^{-5}	0	1.34×10^{-5}	0.07	.0023	2.56×10^{-8}	.0230
9.6	6	21.7	09:50 09:50 6-18 6-18	2200	8.52×10^4	2.91×10^5	8.58×10^{-6}	0	8.58×10^{-6}	0.04	.0013	1.53×10^{-8}	.0243
9.8	7	22.0	09:50 08:14 6-18 6-24	2200	2.57×10^5	5.48×10^5	1.40×10^{-5}	0	1.40×10^{-5}	0.08	.0025	9.73×10^{-8}	.0268
9.4	8	22.2	08:14 10:30 6-24 7-5	2200	9.57×10^5	1.51×10^6	5.12×10^{-5}	0	5.12×10^{-5}	0.31	.0100	1.04×10^{-7}	.0368
8.4	9	21.7	10:30 9:15 7-5 8-2	2200	2.42×10^6	3.93×10^6	1.82×10^{-4}	0	1.82×10^{-4}	1.51	.0487	2.01×10^{-8}	.0855
9.0	10	21.8	9:15 9:15 8-2 8-13	2200	3.63×10^6	7.56×10^6	5.52×10^{-5}	0	5.52×10^{-5}	0.72	.0232	6.79×10^{-9}	.1087

^aDetermined at end of rinse operation.

^bDate, hour, and minute.

^{*}At the end of the leaching interval.

^{**}Concentration, show units.

^{***} a_n = corrected concentration $\times V_L \times$ factor to convert to same units as A_0 .

The value of a_n must include any radioactivity rinsed from the specimen and the leach apparatus at the end of the leaching interval.

Average LIX = 9.0

LEACH TEST RESULTS

LEACH TEST IDENTIFICATION NUMBER Resin A (Seawater)
 LABORATORY WHERE TESTS PERFORMED CNSI
 ANALYST P. Rowland, J. Carlson
 DATE RESULTS REPORTED 9-13-85

Part C. Experimental Data

Constituent Analyzed, Cs-137

Free Standing Water in Leach Specimen Container: Yes ☐ No ☒
 If Yes, Volume (ml) = _____; Radioactivity (μCi) = _____; and % of A_0 = _____

Specimen Rinse Before Initiation of Leaching: Do not include with results in the table below.
 Volume (ml) = NA; Radioactivity (μCi) = _____; and % of A_0 = _____

Initial Amount in Specimen, A_0 (μCi) [after 30-s rinse] = 40.4

LIX	Leach interval (n)	Temp. (°C)	Time and Date ^b		V_L^* (mL)	$(\Delta t)_n$ (s)	$t - I(\Delta t)_n$ (s)	A_n Analyzed (**)	Blank (**)	Corrected Conc. (**)	a_n^{***} (n)	a_n/A_0	$[a_n/A_0][1/(\Delta t)_n]$ (fraction/s)	$r = \frac{r_n}{A_0}$
6.8	1	22.2	09:55 6-17	11:55 6-17	2200	7200	7200	5.91×10^{-4}	0	5.91×10^{-4}	1.30	.0322	4.47×10^{-6}	.0322
6.5	2	24.2	11:55 6-17	1:40 6-17	2200	1.71×10^4	2.43×10^4	7.17×10^{-4}	0	7.17×10^{-4}	1.58	.0391	2.29×10^{-6}	.0713
6.9	3	22.8	1:40 6-17	09:10 6-18	2200	5.73×10^4	8.16×10^4	8.16×10^{-4}	0	8.16×10^{-4}	1.79	.0443	7.73×10^{-7}	.1156
7.0	4	22.2	09:10 6-18	09:35 6-18	2200	8.91×10^4	1.71×10^5	7.38×10^{-3}	0	7.38×10^{-3}	1.62	.0401	4.50×10^{-7}	.1537
7.2	5	22.2	09:35 6-18	09:10 6-20	2200	8.97×10^4	2.60×10^5	4.33×10^{-4}	0	4.33×10^{-4}	0.95	.0235	2.62×10^{-7}	.1793
7.3	6	21.7	09:10 6-20	09:10 6-21	2200	8.52×10^4	2.91×10^5	3.55×10^{-4}	0	3.55×10^{-4}	0.78	.0193	2.07×10^{-7}	.1983
6.9	7	22.0	09:10 6-21	08:10 6-24	2200	2.57×10^5	5.48×10^5	7.58×10^{-4}	0	7.58×10^{-4}	1.67	.0413	1.61×10^{-7}	.2398
6.9	8	22.2	08:10 6-24	10:30 7-5	2200	9.57×10^5	1.51×10^6	2.40×10^{-3}	0	2.40×10^{-3}	5.27	.1304	1.36×10^{-7}	.3702
6.7	9	21.7	10:30 7-5	9:50 8-2	2200	2.42×10^6	3.93×10^6	5.26×10^{-3}	0	5.26×10^{-3}	11.58	.2866	1.18×10^{-7}	.6568
6.7	10	21.7	9:50 8-2	9:15 9-13	2200	3.63×10^6	7.56×10^6	2.78×10^{-3}	0	2.78×10^{-3}	6.12	.1515	4.17×10^{-8}	.8083

^aDetermined at end of rinse operation.

^bDate, hour, and minute.

^{*}At the end of the leaching interval.

^{**}Concentration, show units.

^{***} a_n = corrected concentration $\times V_L \times$ factor to convert to same units as A_0 .

The value of a_n must include any radioactivity rinsed from the specimen and the leach apparatus at the end of the leaching interval.

Average LIX = 6.9

LEACH TEST RESULTS

LEACH TEST IDENTIFICATION NUMBER Resin A (DL H₂O)
 LABORATORY WHERE TESTS PERFORMED CNSI Barnwell, SC.
 ANALYST P. Rowland, J. Carlson
 DATE RESULTS REPORTED 9-13-85

Part A. Description of Leach Specimen

Specimen Id. Number Resin A (DL H₂O)
 Portion of Waste Incorporated in Mixture 53 Weight %
72 Volume %

(Based on initial volumes)

Type of Waste, Chemical and Radioisotopic Composition, and Specific Activity of the Waste
Mixal bad Resin Bad (MA-3) depleted with Sodium
sulfate. Spiked with 40.4 μ Ci Cs-137, 31.0 μ Ci Sr-85
and 31.5 μ Ci Co-60.

Type and Composition of the Solidification Agent epox 250 grams waste
150g Portland Cement Type I
75g CNSI Proprietary Agent M-5

Preparation of Specimen Resin Slurry was prepared using fresh MR-3
resin. Sodium sulfate was added to deplete the resin & allowed to
stand overnight. The radioisotope mixture was added (250 μ Ci) and
mixed. Portland Cement & M-5 were mixed with the waste. Transfere to
 Shape and Dimension of Specimen 250 ml plastic cup & seal. Cure in 40° over for 3 days.

Sphere, diameter, d (cm) = _____
 Cylinder, diameter, d (cm) = _____
 length, l (cm) = _____
 Parallelepiped, length, l (cm) = _____
 width, w (cm) = _____
 height, h (cm) = _____
 Other Shape Truncated cone

Dimensions Top diameter = 7.5 cm, bottom diameter = 6.0 cm, height = 7.0 cm

Initial Weight of Specimen, W (g) = _____

Volume of Specimen *, V (cm³) = 251

Surface area of Specimen, S* (cm²) = 220

Storage Conditions Stored in a sealed plastic cup during cure and cooling period.

After cooling, sample was removed and immediately placed in the leaching vessel.

Appearance No free liquid was observed. No cracking or
deterioration was observed.

Description of Leachant

Leach Interval (n)	Electrical Conductivity (μ mho/cm)	Volume, V _L (ml)
1	Less than 2.0	2200
2	Less than 2.0	2200
3	Less than 2.0	2200
4	Less than 2.0	2200
5	Less than 2.0	2200
6	Less than 2.0	2200
7	Less than 2.0	2200
8, 9, 10	Less than 2.0	2200

* Calculated from dimensions of specimen.

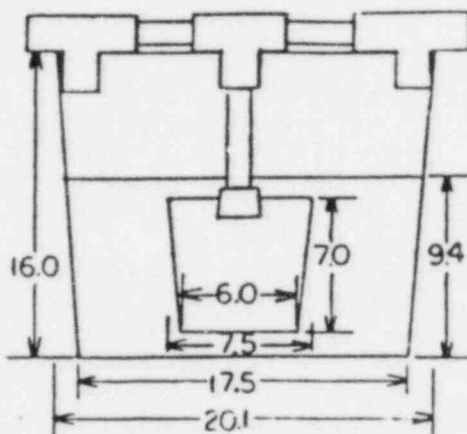
LEACH TEST RESULTS

LEACH TEST IDENTIFICATION NUMBER Resin A (DI A₂₀)
 LABORATORY WHERE TESTS PERFORMED CNSI, Barnwell, SC.
 ANALYST P. Rowland, D. Carlson
 DATE RESULTS REPORTED 9-13-85

Part B. Description of Leach Test Procedure

Specimen Preparation * (Same as Part A)

Diagram of Leach Apparatus:



Leachate Sampling Procedure Sample was removed from the leaching vessel and immediately placed in another leach vessel. The sample was not rinsed between periods. The leachate is stirred and a known volume withdrawn using an automatic pipette with disposable tips. The leachate sample is then pipetted into a numbered borosilicate vial. DI water is then added to bring the total volume to 15 ml.

Analytical Techniques:

Counting Instrument Identification and Calibration A Harshaw 3 x 3 NaI(Tl) detector type number 125W12-W4 serial number WD 328 calibrated using a NBS traceable standard of Cs-137, Co-60, and Sn-113.

Constituent a₁, Analytical Procedure, Standard Deviation of Method EG&G Ortec Model 7100 multi-channel analyzer

Constituent a₂, Analytical Procedure, Standard Deviation of Method Same as a₁.

Constituent a₃, Analytical Procedure, Standard Deviation of Method Same as a₁.

LEACH TEST RESULTS

LEACH TEST IDENTIFICATION NUMBER Resin A (Deionized Water)

LABORATORY WHERE TESTS PERFORMED CNSI

ANALYST P. Rowland, J. Carlson

DATE RESULTS REPORTED 9-13-85

Part C. Experimental Data

Constituent Analyzed, CS-137

Free Standing Water in Leach Specimen Container: Yes ☒ No ☐

If Yes, Volume (ml) = ; Radioactivity (μCi) = ; and % of A_0 =

Specimen Rinse Before Initiation of Leaching: Do not include with results in the table below.
Volume (ml) = NA; Radioactivity (μCi) = ; and % of A_0 =

Initial Amount in Specimen, A_0 (μCi) [after 30-s rinse] = 40.4

Leach Interval (n)	Temp. ($^{\circ}\text{C}$)	Time and Date In Out	V_L^a (mL)	$(\Delta t)^n$ (s)	$t - \frac{1}{2}(\Delta t)^n$ (s)	A_n Analyzed (μCi)	Blank (μCi)	Corrected Conc. (μCi)	A_n^{***} (n)	A_n/A_0	$[A_n/A_0][1/(\Delta t)^n]$ (fraction/s)	$\frac{A_n}{A_0}$
1	22.2	09:35 11:55 6-17 6-17	22.00	7200	7200	4.01×10^{-4}	0	4.01×10^{-4}	0.88	.0218	3.03×10^{-6}	.0218
2	24.2	11:55 1:00 6-17 6-17	22.00	1710 ⁴	2430 ⁴	6.06×10^{-4}	0	6.06×10^{-4}	1.33	.0329	1.92×10^{-6}	.0547
3	22.8	1:00 2:00 6-17 6-17	22.00	5730 ⁴	8460 ⁴	1.29×10^{-3}	0	1.29×10^{-3}	2.83	.0700	1.22×10^{-6}	.1247
4	22.2	09:35 11:55 6-17 6-17	22.00	8910 ⁴	1710 ⁵	1.22×10^{-3}	0	1.22×10^{-3}	2.69	.0666	7.42×10^{-7}	.1913
5	22.2	09:35 11:55 6-17 6-17	22.00	8970 ⁴	2400 ⁵	8.74×10^{-4}	0	8.74×10^{-4}	1.92	.0475	5.30×10^{-7}	.2388
6	21.7	09:35 11:55 6-17 6-17	22.00	8520 ⁴	2910 ⁵	6.82×10^{-4}	0	6.82×10^{-4}	1.50	.0371	4.35×10^{-7}	.2759
7	22.0	09:35 11:55 6-17 6-17	22.00	2570 ⁵	5480 ⁵	1.43×10^{-3}	0	1.43×10^{-3}	3.15	.0780	3.04×10^{-7}	.3539
8	22.2	09:35 11:55 6-17 6-17	22.00	9570 ⁵	1510 ⁶	2.52×10^{-3}	0	2.52×10^{-3}	5.55	.01374	1.44×10^{-7}	.4913
9	21.7	09:35 11:55 6-17 6-17	22.00	2420 ⁶	3930 ⁶	3.02×10^{-3}	0	3.02×10^{-3}	6.65	.1646	6.80×10^{-8}	.6559
10	21.1	09:35 11:55 6-17 6-17	22.00	3630 ⁶	7560 ⁶	2.41×10^{-3}	0	2.41×10^{-3}	8.51	.1314	3.62×10^{-8}	.7873

^aDetermined at end of rinse operation.

^bDate, hour, and minute.

^cAt the end of the leaching interval.

^dConcentration, show units.

^e A_n = corrected concentration $\times V_L$ x factor to convert to same units as A_0 .

The value of A_n must include any radioactivity rinsed from the specimen and the leach apparatus at the end of the leaching interval.

Average $LIX = 6.7$

LEACH TEST RESULTS

LEACH TEST IDENTIFICATION NUMBER Resin A (Deionized Water)
 LABORATORY WHERE TESTS PERFORMED CNSI
 ANALYST P. Rowland J. Carlson
 DATE RESULTS REPORTED 9-13-85

Part C. Experimental Data

Constituent Analyzed, Sr-85

Free Standing Water in Leach Specimen Container: Yes ☒ No
 If Yes, Volume (ml) = ; Radioactivity (μCi) = ; and I of A_0 =

Specimen Rinse Before Initiation of Leaching: Do not include with results in the table below.
 Volume (ml) = NA; Radioactivity (μCi) = ; and I of A_0 =

Initial Amount in Specimen, A_0 (μCi) [after 30-s rinse] = 31.0

	Leach interval (n)	Temp. (°C)	Time and Date ^b		V _L ^a (mL)	(Δt) _n (s)	t-I(Δt) _n (s)	A _n Analyzed (**)	Blank (**)	Corrected Conc. (**)	a ^{***} (n ^{***})	a _n /A ₀	[a _n /A ₀][1/(Δt) _n] (fraction/s)	r = $\frac{I a_n}{A_0}$
4.1x			In	Out										
8.5	1	22.2	09:55 6-17	11:55 6-17	2200	7200	7200	1.77x10 ⁻⁵	0	1.77x10 ⁻⁵	.09	.0029	4.03x10 ⁻⁷	.0029
8.8	2	24.2	11:55 6-17	16:40 6-17	2200	1.71x10 ⁴	2.43x10 ⁴	1.71x10 ⁻⁵	0	1.71x10 ⁻⁵	.09	.0029	1.70x10 ⁻⁷	.0058
8.1	3	22.8	12:40 6-17	09:15 6-18	2200	5.73x10 ⁴	8.16x10 ⁴	6.88x10 ⁻⁵	0	6.88x10 ⁻⁵	.35	.0113	1.97x10 ⁻⁷	.0171
8.1	4	22.2	09:35 6-18	09:35 6-18	2200	8.91x10 ⁴	1.71x10 ⁵	6.57x10 ⁻⁵	0	6.57x10 ⁻⁵	.34	.0110	1.23x10 ⁻⁷	.0281
8.0	5	22.2	09:20 6-18	09:15 6-18	2200	8.97x10 ⁴	2.60x10 ⁵	5.96x10 ⁻⁵	0	5.96x10 ⁻⁵	.31	.0100	1.11x10 ⁻⁷	.0381
8.1	6	21.7	09:15 6-20	09:10 6-21	2200	8.52x10 ⁴	2.91x10 ⁵	4.60x10 ⁻⁵	0	4.60x10 ⁻⁵	.24	.0077	9.04x10 ⁻⁸	.0458
9.2	7	22.0	09:10 6-21	08:40 6-24	2200	2.57x10 ⁵	5.48x10 ⁵	2.77x10 ⁻⁵	0	2.77x10 ⁻⁵	.16	.0052	2.02x10 ⁻⁸	.0510
9.5	8	22.2	09:40 6-24	10:30 7-5	2200	9.57x10 ⁵	1.51x10 ⁶	4.18x10 ⁻⁵	0	4.18x10 ⁻⁵	.26	.0084	8.78x10 ⁻⁹	.0544
9.2	9	21.7	10:30 7-5	9:50 8-2	2200	2.42x10 ⁶	3.93x10 ⁶	2.19x10 ⁻⁵	0	2.19x10 ⁻⁵	.60	.0194	8.02x10 ⁻⁹	.0784
-	10	21.1	9:50 8-2	9:15 9-13	2200	3.63x10 ⁶	7.56x10 ⁶	ND	0	ND	-	-		

Average LIX = 8.7

^aDetermined at end of rinse operation.

^bDate, hour, and minute.

^cAt the end of the leaching interval.

^{**}Concentration, show units.

^{***} a_n = corrected concentration $\times V_L \times$ factor to convert to same units as A_0 .

The value of a_n must include any radioactivity rinsed from the specimen and the leach apparatus at the end of the leaching interval.

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Part C. Experimental Data

Constituent Analyzed, Dr 85

Free Standing Water in Leach Specimen Container: Yes No
If Yes, Volume (ml) = ; Radioactivity (μCi) = ; and % of A_{C} =

Specimen Rinse Before Initiation of Leaching: Do not include with results in the table below.
Volume (ml) = 14; Radioactivity (μCi) = ; and % of Ag =

Initial Amount in Specimen, A_0 (μCi) [after 30-sec rinse] = 31.0

AVERAGE LIX

^aDetermined at end of rinse operation.

date, hour, and minute.

*At the end of the leaching interval.

**Concentration, show units.

*** a_n = corrected concentration $\times V_L \times$ factor to convert to same units as A_0 .

The value of a_n must include any radioactivity rinsed from the specimen and the leach apparatus at the end of the leaching interval.

LEACH TEST RESULTS

LEACH TEST IDENTIFICATION NUMBER 66% PWR (P-20) Seawater
 LABORATORY WHERE TESTS PERFORMED CNSI
 ANALYST P Rowland, J. Carlson
 DATE RESULTS REPORTED 8-16-85

Part C. Experimental Data

Constituent Analyzed, Cs 137

Free Standing Water in Leach Specimen Container: Yes
 If Yes, Volume (ml) = ; Radioactivity (μCi) = ; and % of A_0 = ☒ No

Specimen Rinse Before Initiation of Leaching: Do not include with results in the table below.
 Volume (ml) = N/A; Radioactivity (μCi) = ; and % of A_0 =

Initial Amount in Specimen, A_0 (μCi) [after 30-s rinse] = 40.4

L/X	Leach Interval (n)	Temp. ($^{\circ}\text{C}$)	Time and Date ^b		V_L^* (ml)	$(\Delta t)_n$ (s)	$t - \tau(\Delta t)_n$ (s)	A_n Analyzed (**)	Blank (**)	Corrected Conc. (**)	a_n^{***} (n)	a_n/A_0	$[a_n/A_0][1/(\Delta t)_n]$ (fraction/s)	$F = \frac{\tau a_n}{A_0}$
			In	Out										
6.4	1	22.9	10:10 7/11	12:10 7/11	22.00	7200	7200	1.02×10^3	0	1.02×10^3	2.24	.0554	7.69×10^{-6}	.0554
6.4	2	22.9	12:10 7/11	14:20 7/11	22.00	1.50×10^4	2.22×10^4	7.92×10^{-4}	0	7.92×10^{-4}	1.74	.0431	2.87×10^{-6}	.0985
6.6	3	21.7	16:20 7/11	09:30 7/12	22.00	6.15×10^4	8.40×10^4	1.28×10^{-3}	0	1.28×10^{-3}	2.91	.0696	1.13×10^{-6}	.1681
6.4	4	21.7	09:30 7/12	09:35 7/12	22.00	8.58×10^4	1.70×10^5	1.13×10^{-3}	0	1.13×10^{-3}	2.48	.0614	7.16×10^{-7}	.2295
6.5	5	22.2	09:25 7/12	10:30 7/12	22.00	1.73×10^5	3.43×10^5	1.27×10^{-3}	0	1.27×10^{-3}	2.78	.0684	3.98×10^{-6}	.12983
6.5	6	22.9	10:30 7/12	11:40 7/12	22.00	2.63×10^5	6.06×10^5	1.34×10^{-3}	0	1.34×10^{-3}	2.95	.0730	2.78×10^{-7}	.3713
6.6	7	21.7	11:40 7/12	09:25 7/12	22.00	3.81×10^5	9.44×10^5	1.18×10^{-3}	0	1.18×10^{-3}	2.61	.0646	1.91×10^{-7}	.4357
6.6	8	21.7	09:25 7/12	09:35 7/12	22.00	6.05×10^5	1.55×10^6	1.26×10^{-3}	0	1.26×10^{-3}	2.74	.0689	1.14×10^{-7}	.5047
6.6	9	21.7	09:35 7/12	10:05 7/12	22.00	2.42×10^6	3.97×10^6	4.23×10^{-3}	0	4.23×10^{-3}	9.28	.2297	9.49×10^{-8}	.734
	10		10:05 7/12		22.00				0					

*Determined at end of rinse operation.

^bDate, hour, and minute.

*At the end of the leaching interval.

^{***}Concentration, show units.

a_n^{***} = corrected concentration $\times V_L \times$ factor to convert to same units as A_0 .

The value of a_n must include any radioactivity rinsed from the specimen and the leach apparatus at the end of the leaching interval.

AVERAGE LIX

LEACH TEST RESULTS

LEACH TEST IDENTIFICATION NUMBER 66% PWR (P-20) DI water
 LABORATORY WHERE TESTS PERFORMED CNSI
 ANALYST P Rowland, J. Carlson
 DATE RESULTS REPORTED 8-16-85

Part C. Experimental Data

Constituent Analyzed, Sr 85

Free Standing Water in Leach Specimen Container: Yes ☒ No
 If Yes, Volume (ml) = ; Radioactivity (μCi) = ; and % of A_0 =
 Specimen Rinse Before Initiation of Leaching: Do not include with results in the table below.
 Volume (ml) = N/A; Radioactivity (μCi) = ; and % of A_0 =
 Initial Amount in Specimen, A_0 (μCi) [after 30-s rinse] = 31.0

LIX	Leach Interval (n)	Temp. (°C)	Time and Date ^b		V_L^* (mL)	$(\Delta t)_n$ (s)	$t = \tau(\Delta t)_n$ (s)	A_n Analyzed (**)	Blank (**)	Corrected Conc. (**)	a_n^{***} (n)	a_n/A_0	$[a_n/A_0][1/(\Delta t)_n]$ (fraction/s)	$F = \frac{\tau a_n}{A_0}$
9.4	1	22.8	10:10 7/11/85	12:10 7/11/85	2200	7200	7200	9.94×10^{-6}	0	8.94×10^{-6}	.05	.0016	2.22×10^{-7}	.0016
8.5	2	22.8	12:10 7/11/85	16:20 7/11/85	2200	1.50×10^4	2.22×10^4	1.82×10^{-5}	0	1.82×10^{-5}	.11	.0035	2.33×10^{-7}	.0051
8.6	3	21.7	16:20 7/11/85	09:30 7/12/85	2200	6.18×10^4	2.40×10^4	3.58×10^{-5}	0	3.58×10^{-5}	.21	.0068	1.10×10^{-7}	.0119
8.7	4	21.7	09:30 7/12/85	09:25 7/12/85	2200	8.58×10^4	1.70×10^5	2.61×10^{-5}	0	2.61×10^{-5}	.16	.0053	6.06×10^{-8}	.0171
9.2	5	22.2	09:25 7/12/85	10:30 7/12/85	2200	4.18×10^4	3.22×10^4	2.22×10^{-5}	0	2.22×10^{-5}	.14	.0045	2.60×10^{-7}	.0216
9.7	6	22.8	10:30 7/12	11:40 7/12	2200	2.63×10^5	6.06×10^3	1.47×10^{-5}	0	1.47×10^{-5}	.09	.0029	1.10×10^{-8}	.0245
10.6	7	21.7	11:40 7/12	05:25 7/12	2200	3.38×10^5	9.44×10^5	5.05×10^{-6}	0	5.05×10^{-6}	.03	.0010	2.96×10^{-9}	.0255
—	8	21.7	05:25 7/12	04:35 7/12	2200	6.05×10^5	1.55×10^6	—	0	—	—	—	—	.0255
9.8	9	21.7	04:35 7/12	10:05 8/16	2200	2.42×10^6	3.97×10^6	3.03×10^{-5}	0	3.03×10^{-5}	.29	.0094	3.88×10^{-9}	.0349
	10		10:05 8/16		2200				0					

^aDetermined at end of rinse operation.

^bDate, hour, and minute.

^{*}At the end of the leaching interval.

^{**}Concentration, show units.

^{***} a_n = corrected concentration $\times V_L \times$ factor to convert to same units as A_0 .

The value of a_n must include any radioactivity rinsed from the specimen and the leach apparatus at the end of the leaching interval.

AVERAGE LIX

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DATE RESULTS REPORTED 8-16-85

Part C. Experimental Data

Constituent Analyzed, Ca 137

Free Standing Water in Leach Specimen Container: Yes No
If Yes, Volume (ml) = ; Radioactivity (μCi) = ; and % of A_0 =

Specimen Rinse Before Initiation of Leaching: Do not include with results in the table below.
Volume (ml) = NA; Radioactivity (μCi) = ; and % of A_0 =

Initial Amount in Specimen, A_0 (μCi) [after 30-s rinse] = 40.4

	Leach Interval (n)	Temp. (°C)	Time and Date ^b		V _L ^a (mL)	(Δt) _n (s)	t = T(Δt) _n (s)	A _n Analyzed (**)	Blank (**)	Corrected Conc. (**)	a _n ^{***} (n ^{***})	a _n /A ₀	[a _n /A ₀][1/(Δt) _n] (fraction/s)	F = $\frac{T_0 n}{A_0}$
			In	Out										
LIX														
6.3	1	22.8	10:10 7/1	12:10 7/1	2200	7200	7200	1.13 × 10 ⁻³	0	1.13 × 10 ⁻³	2.48	.0614	8.53 × 10 ⁻⁶	.0614
6.3	2	22.8	12:10 7/1	14:20 7/1	2200	1.50 × 10 ⁴	2.22 × 10 ⁴	8.7 × 10 ⁻⁴	0	8.7 × 10 ⁻⁴	1.91	.0473	3.15 × 10 ⁻⁶	.1087
6.2	3	21.7	14:20 7/1	04:30 7/2	2200	6.18 × 10 ⁴	8.40 × 10 ⁴	2.02 × 10 ⁻³	0	2.02 × 10 ⁻³	4.45	.1101	1.78 × 10 ⁻⁶	.2188
6.1	4	21.7	04:30 7/2	04:25 7/2	2200	8.58 × 10 ⁴	1.70 × 10 ⁵	2.81 × 10 ⁻³	0	1.86 × 10 ⁻³	4.04	.1010	1.18 × 10 ⁻⁶	.3198
6.1	5	22.2	04:25 7/2	10:30 7/2	2200	8.73 × 10 ⁴	3.43 × 10 ⁵	1.98 × 10 ⁻³	0	1.98 × 10 ⁻³	4.36	.1079	6.24 × 10 ⁻⁶	.4277
6.2	6	22.8	14:30 7/2	11:40 7/2	2200	2.63 × 10 ⁵	4.06 × 10 ⁵	1.86 × 10 ⁻³	0	1.86 × 10 ⁻³	4.09	.1012	3.85 × 10 ⁻⁷	.5289
6.2	7	21.7	11:40 7/2	09:25 7/2	2200	3.32 × 10 ⁵	9.44 × 10 ⁵	1.68 × 10 ⁻³	0	1.68 × 10 ⁻³	3.69	.0913	2.70 × 10 ⁻⁷	.16202
6.2	8	21.7	09:25 7/2	04:35 7/2	2200	6.05 × 10 ⁵	1.55 × 10 ⁶	1.85 × 10 ⁻³	0	1.85 × 10 ⁻³	4.07	.1007	1.66 × 10 ⁻⁷	.7209
6.3	9	21.7	04:35 7/2	10:05 8/1	2200	2.42 × 10 ⁶	3.97 × 10 ⁶	2.56 × 10 ⁻³	0	2.56 × 10 ⁻³	5.63	.1394	5.76 × 10 ⁻⁸	.8603
	10		10:05 8/1		2800				0					

^aDetermined at end of rinse operation.

^bDate, hour, and minute.

*At the end of the leaching interval.

**Concentration, show units.

*** a_n = corrected concentration $\times V_L \times$ factor to convert to same units as A_0 .

The value of a_n must include any radioactivity rinsed from the specimen and the leach apparatus at the end of the leaching interval.

AVERAGE LIX	
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