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To A/22
4/13/86

MEMORANDUM FOR: William L. Axelson, Chief
Nuclear Materials Safety and Safeguards Branch, R111

FROM: John W. Hickey, Section Leader
Industrial, Medical, and Academic Section
Material Licensing Branch
Division of Fuel Cycle and Material Safety

SUBJECT: TEMPERATURE DATA ON WESF CAPSULES

As a follow-up to your memorandum to Bill Adam dated January 15, 1986, we have reviewed the enclosed letters from the Department of Energy (DOE) regarding temperature monitoring data on the cesium-137 WESF Capsules installed at Radiation Sterilizers, Inc. in Westerville, Ohio. We have also discussed the data with W. Resini (DOE) and G. Tingey (Pacific Northwest Laboratory).

DOE is satisfied that the temperature data is repetitive and predictable, so they recommend removal of the thermocouple attached to the dummy WESF capsule. They believe that the data obtained from the stationary thermocouple will be adequate for evaluation purposes. Therefore, we do not object to removal of the thermocouple on the dummy capsule, provided that the stationary thermocouple is maintained.

John W. Hickey, Section Leader
Industrial, Medical, and Academic
Section
Material Licensing Branch
Division of Fuel Cycle and
Material Safety

Enclosures:

1. Ltr fr W. Resini to
J. Hickey dtd 01/23/86
2. Undated ltr fr J. Resini to
R. Neusser (received 04/02/86)

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PDR FOIA
O'BRIENB9-112 PDR

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RECORD # LISTING OF DOCUMENTS CONCERNING RSI INCIDENT

REC#	DOCUMENT TITLE	DOC_DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
1	BACKGROUND INFORMATION ON WESF CAPSULE	/ / 06/09/88		-INCLUDES: Sample of DOE Lease . Submitted by Steve Baggett
2	CS-C1 COMPATIBILITY TEST. PROG PNL-4847	03/01/84 06/13/88	Battelle	-Cesium Chloride Compatibility Testing Program Annual Report-Fiscal Year 1983.
3	CS-C1 COMPATIBILITY TEST. PROG. PNL-5341	01/01/85 06/13/88	Battelle	-Cesium Chloride Compatibility Testing Program Annual Report Fiscal Year 1984
4	GOVERNOR'S STATEMENT	06/09/88 06/10/88	Region II	-Shut Down of RSI Responsible for coord. of activities is the Dept. Of Natural Resources.
5	LEAKING WESF CESIUM-137 SOURCE	06/10/88 06/10/88	V. L. Miller	-Answer-Question-if other NRC licensees had problems with leaking source.
6	MORNING REPORT-REGION II	06/09/88 06/10/88	Region II	-Supplements information provided in PNO-II-88-40 and PNO-II-88-40A
7	PRELIMINARY NOTIFICATION PNO-II-88-40	06/07/88 06/09/88	Region II	-Leaking WESF Cesium-137 Source
8	PRELIMINARY NOTIFICATION PNO-II-88-40A	06/08/88 06/09/88	Region II	-Leaking WESF Cesium-137 Source-Update.
9	PRELIMINARY NOTIFICATION PNO-II-88-40B	06/09/88 06/10/88	Region II	-Leaking WESF Cesium-137 Source-Second Update
10	REVIEW OF SAFETY ISSUES (WESF) PNL-5170	07/01/84 06/09/88	Battelle	-Review of Safety Issues that pertain to the use of WESF Cesium Chloride Capsules.
11	RSI Customers/Products Based on Invoices	06/10/88 06/10/88	Pat Vacca	-Customers/Products information based on telecon. with Joan Rotlee
12	SANDIA REPORT UC-23	04/01/88 06/13/88	Sandia Natl.lab	-Characterization of Two WESF Capsules After Five Years of Service.
13	SANDIA REPORT UC-71	10/01/84 06/13/88	Sandia Natl.Lab	-WESF Cesium-137 Gamma Ray Sources.
14	WESF CESIUM CAPSULE BEHAVIOR PNL-5517	06/01/85 06/13/88	Battelle	-WESF Cesium Capsule Behavior at High Temperature or During Thermal Cycling

RECORD # LISTING OF DOCUMENTS CONCERNING RSI INCIDENT

REC#	DOCUMENT TITLE	DOC_DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
15	WESF CESIUM CAPSULE DATA SHEET	06/09/88	06/10/88	I. E. Reep
16	TELECON WITH P. STOHR, REC, VLM, MAL, JH	06/14/88	06/14/88	Pat Vacca
17	MEETING WITH DOE PERSONNEL	06/13/88	06/14/88	Pzt Vacca
18	DOE/CONTRACTORS/NRC WESF	06/13/88	06/14/88	
19	HANDOUT FROM 6/13/88 DOE MEETING	06/13/88	06/14/88	DOE
20	HANDOUT FROM 6/13/88 DOE MEETING	06/13/88	06/14/88	DOE
21	HANDOUT FROM 6/13/88 DOE MEETING	06/13/88	06/14/88	DOE
22	MATERIAL LICENSE 04-19644-01	05/22/87	06/10/88	NRC
23	SAFETY SYSTEM AUDIT (RSI) 04-19644-01	11/01/87	06/10/88	Barry Fairland
24	CIVIL MONETARY PENALTY 030-19025	08/18/87	06/10/88	J. M. Taylor
25	CONFIRMATORY ACTION LETTER 30-19025	02/04/87	06/10/88	J. G. Keppler
26	RSI RADIATION SURVEY	09/25/85	06/10/88	B. P. Fairland
27	RSI RADIATION SURVEY	09/05/85	06/10/88	B. P. Fairland
28	RSI RADIATION SURVEY	08/21/85	06/10/88	B. P. Fairland

-Information on Cesium Chloride Capsules
 -Status of Capsules for Commercial /Non Users.
 -Update of current events and information.
 -Summary of 1:30 meeting on June 13, 1988 with DOE
 -List of contractors, their organization and phone number.
 -Potentially Leaking Cesium Capsules at RSI, Decatur, Georgia
 -Status Of Cesium Capsules for Commercial/Non-commercial users
 -Potential Leaking Cesium Capsule, RSI Facility
 -License and background information for RSI in Westerville, Ohio, eff. 6/1/87
 -Test results for quarterly corporate safety system audit for RSI Westerville Facility.
 -Order imposing a civil monetary penalty.
 -Refers to conversation between B. Meyer, Dr. B. Fairand, and J. L. Lynch
 -Radiation survey in compliance with USNRC Material License, condition number 16.
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REC#	DOCUMENT TITLE	DOC_DATE ENTERED	LETTER FROM	SUBJECT OF LETTER	
29	RSI RADIATION SURVEY	08/12/85	06/10/88	B. P. Fairand	-Radiation survey in compliance with USNRC Material License, condition number 16.
30	LETTER REFERING TO DOCKET NO. 030-19025	11/23/87	06/10/88	Allen Chin	-Renew request and seek mitigation of civil monetary penalty to < \$5,000
31	LETTER FROM JAMES LIEBERMAN	10/19/87	06/10/88	J. Lieberman	-Reference to Oct. 1, 1987 meeting concerning Notice of Violation.
32	NOTICE OF VIOLATION 030-19025	04/29/87	06/10/88	Allen Chin	-NRC Inspection Report No. 030-19025/87001 (DRSS)
33	NOTICE OF VIOLATION 030-19025	04/30/87	06/10/88	Allen Chin	-NRC Inspection Report No. 030-19025/87001 (DRSS).
34	NOTICE OF VIOLATION 030-19025	05/17/87	06/10/88	A. Bert Davis	-NRC Inspection Report No. 030-19025/87001 (DRSS).
35	ROUTINE SAFETY INSPECTION	02/12/87	06/10/88	Jack A. Hind	-Letter refers to routine safety inspection conducted on Jan. 14, 1987.
36	CONFIRMATORY ACTION LETTER	01/16/87	06/10/88	J. G. Keppler	-Reference to conversations between T.Mates, T.Morgan, J.A.Hind, W.L.Axelson on 1/16/87
37	ENFORCEMENT BOARD BRIEFING	01/27/87	06/10/88	W. H. Schultz	-1/23/87 Enforcement Board Briefing reviewed the findings of 1/14/87 inspection.
38	SITE VISIT OF RSI, SCHAUMBURG, ILLINOIS	09/19/86	06/10/88	W. L. Axelson	-Reference to Sept. 11, 1986 visit to evaluate if upgrade systems are needed.
39	LETTER IN REFERENCE TO W.L.AXELSON VISIT	09/19/86	06/10/88	Allen Chin	-Additional info. in reference to W. Axelson visit to RSI's Schaumburg facility.
40	SITE VISIT TO RSI (OH.PLANT) 04-19644-01	01/07/86	06/10/88	W. L. Axelson	-Site visit on 11/30/85 to review install. and operation of the Cs-137 capsule.
41	WESF CESIUM CAPSULE TEMP. INFO FOR NRC	04/02/86	06/10/88	J. D. White	-Information on cesium capsule temperature requested by W. C. Remini.

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REC#	DOCUMENT TITLE	DOC_DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
42	TEMP. DATA ON WESF CAPSULES 04-19644-01	04/14/86 06/10/88	J. W. N. Hickey	-Follow-up to W. L. Axelsson memorandum to B. Adam dated 1/15/86.
43	ANALYSIS OF TEMP. DATA FOR RSI (OHIO)	01/28/86 05/10/88	DOE/W. Remini	-Analysis of WESF Capsules placed in the Westerville, Ohio, irradiator in Aug. 85
44	REQUEST TO LOAD WESF CAP.INTO OTHER FAC.	01/28/86 06/10/88	W. J. Adam	-Response to letters dated 7/31/85, 8/19/85. Ref. to loading capsules into other facilities.
45	RSI THERMOCOUPLE DATA 04-19644-01	01/15/86 06/10/88	W. L. Axelsson	-Review of RSI's amendment request dated August 19, 1985
46	USE OF WESF CAPSULES AT RSI	10/21/85 06/10/88	V. L. Miller	-Ref. to 10/1/85 letter. Confirms no diff. with source travel as a result of thermocouples
47	REFERENCE TO RSI LICENSE NO. 04-19644-01	10/07/85 06/10/88	Allen Chin	-Letter is to confirm 9/30/85 conversation between B. Mallett, J. Lynch, and W. Adam.
48	CONFIRMATORY ACTION LETTER	10/01/85 06/10/88	W. L. Axelsson	-Comments concerning letter dated August 19, 1985.
49	USE OF WESF AT RSI	09/03/85 06/10/88	W. L. Adam	-Specific amendment refers to J. Hickey's letter dated 7/25/85.
50	AMENDMENT TO LICENSE NO. 04-19644-01	08/19/85 06/10/88	Allen Chin	-Reply to 07/22/85 letter regarding use of Cs-137 WESF capsules in irradiators.
51	COMMENTS TO JULY 22, 1985 LETTER	07/25/85 06/10/88	J. W. N. Hickey	-Additional information regarding the temperature monitoring of the WESF Capsules
52	TEMP. MONITORING OF WESF CAPSULES (OHIO)	07/31/85 06/10/88	Allen Chin	-Letter lists completed tasks by RSI regarding the shipments of cesium.
53	LETTER REGARDING SHIPMENT OF CAPSULES	07/22/85 06/10/88	Allen Chin	-RSI agrees to conditions stated in the letter for amendment of their license.
54	RSI AMENDMENT CONDITIONS 04-19644-01	04/04/85 06/10/88	Allen Chin	

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REC#	DOCUMENT TITLE	DOC_DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
55	REQUEST FOR AMENDMENT/LIC. # 04-19644-01	04/04/85 06/10/88	John Hickey	-Regards the authorization to use DOE WESF Cs-137 capsules Menlo Park, CA Facility.
56	AGREEMENTS BETWEEN DOE AND NRC /WESF CAP	04/03/85 06/10/88	R. Cunningham	-Re:The licensing of a commercial facility to act as a demon.of the use of WESF capsules.
57	AGRMNT.FOR LEASE OF BYPRODUCT RAD. MAT'L	03/01/85 06/10/88	DOE	-Agreement for lease of byproduct radioactive material between USA and Iotech,Inc
58	DOE ISOTOPE AND TECH. SERVICE ORDER FORM	01/21/85 06/10/88	DOE	
59	RADIOACTIVE MAT'L LICENSE COLO. 613-01	01/14/85 06/10/88	State of CO.	
60	STATUS OF WESF CAPSULES	02/01/85 06/10/88	R. Cunningham	-Document NMSS staff evaluation and concl. regarding WESF capsules for licensing.
61	EXAM. OF WESF Cs-137 CAP. USED IN SIDSS	01/23/85 06/10/88	Garth L. Tingey	-Optical metallographic examination of corrosion specimens taken from two capsules.
62	AMENDMENT TO LICENSE NO. 04-19644-01	12/14/84 06/10/88	Allen Chin	-Requests continued action relative to 11/08/84 letter related to amendment.
63	REQUESTED CHANGES FOR LICENSE APPL.	11/08/84 06/10/88	Allen Chin	-Responses to inquiries staed in Oct. 15, 1984 letter signed by Bernard Singer.
64	REPLY TO SEPTEMBER 6, 1985 LETTER	10/21/85 06/10/88	R. Cunningham	-A reply to J. Jicha letter , asking NRC to review its position on use of Cs-137.
65	AMENDMENT TO LICENSE 04-19644-01	10/15/84 06/10/88	Bernard Singer	-Resume processing of the April 3, 1984 application for amendment to license.
66	AMENDMENT TO LICENSE 04-19644-01 (GA)	12/10/84 06/10/88	Bernard Singer	-NRC will take no further action for amendment since plant is in Alanta Georgia.

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REC#	DOCUMENT TITLE	DOC_DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
67	PROGRESS REPORT FOR USE OF Cs-137 SOURCE	09/14/84 06/10/88	James E. Ayer	-Cesium sources in the form of WESF capsules in dry irradiation--wet storage facility.
68	LETTER FROM DOE TO NRC RE:LICENSING	07/25/84 06/10/88	J. J. Jicha, Jr	-Re:7/10/84 mtng,"A Review of Safety Issues That Pertains to the Use of WESF Capsules"
69	RESPONSE TO 6/26/84 LETTER	07/23/84 06/10/88	Allen Chin	-Discussion on PNL-4847 report. Specific data cited was erroneous.
70	CORROSION OF WESF Cs-137 CAPSULES	07/16/84 06/10/88	J. L. McElroy	-NRC will take no further action on licensing application until more information is provided
71	LETTER ON FATIGUE PROP. OF 316L STEEL	07/03/84 06/10/88	Climax Moly. Co	-Literature on fatigue life of 316L stainless steel.
72	LETTER IN RESPONSE TO APPL. FOR LICENSE	06/26/84 06/10/88	Nathan Bassin	-NRC is not prepared to license the use of WESF cap. in fac. with dry irradiation
73	AMENDMENT NUMBER 03 TO LIC# 04-19644-01	05/29/84 06/10/88	W. J. Adam	-Amendment Authorizes changes requested in 4/3/84 letter, and rad. survey in 4/2/84 letter.
74	REQUEST FOR AMENDMENT TO 04-19644-01	04/03/84 06/10/88	Allen Chin	-Conversations with John Potter on 6/10/88.Re: Recent Cs-137 contamination
75	CONFIRMATION OF ACTION LETTER	06/13/88 06/15/88	J. N. Grace	incident-RSI
76	PRELIMINARY NOTIFICATION PNO-II-88-40D	06/13/88 06/15/88	Region II	-Leaking WESF Cesium-137 Source - Fourth Update.
77	CESIUM RELEASE AT RSI'S GA FACILITY	06/13/88 06/15/88	R. E. Lynch	-DOE's Oak Ridge Operations has agreed to provide assistance to RSI.
78	FOR RELEASE-OFFICE OF THE GOVERNOR	06/13/88 06/15/88		-Updated information concerning incident at RSI's Decatur, Georgia facility.

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REC#	DOCUMENT TITLE	DOC_DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
79	PRELIMINARY NOTIFICATION PNO-II-88-40C	06/10/88	Region II	-Leaking WESF Cs-137 Source - Third Update
80	ITEMS OF INTEREST FOR THE COMMISSION	06/15/88	V. L. Miller	-Update on cesium release at RSI's Decatur, Georgia facility (ref.: PNO-II-40 ff)
81	CONFIRMATORY ACTION LTTR.RIII-CAL-88-014	06/14/88	A. Bert Davis	-Refers to conver. with J. Lynch, Dr. B.S. Mallet regarding a recent Cs-137 Contamination.
82	NEWS ARTICLE -Atlanta Constitution	06/10/88	06/22/88	-Special task force formed to study radiation leak at Decatur plant.
83	MORNING REPORT - REGION II	06/16/88	Region II	-Meeting at RSI to discuss and review the RECOVERY ORGANIZATION AND ASSOCIATED RESPONSIBILITY
84	MEMORANDUM FOR HUGH THOMPSON, Jr.	06/15/88	06/20/88	-Update on cesium release at RSI's Decatur, Georgia facility (ref. PNO-II-88-40 ff)
85	NOTE FOR COLORADO FILE	06/15/88	06/20/88	-Iotech Irradiator In Colorado
86	TELECON WITH JIM AYER	06/15/88	06/20/88	-Discussion on WESF Capsules. Jim makes an "educated guess" on the cause of failure.
87	STATEMENT OF RESPONSIBILITIES (DRAFT)	06/15/88	06/20/88	-Health Physics Support, Decon., Source Ident., Source Recovery and Source Transportation.
88	STATEMENT OF RESPONSIBILITIES (FINAL)	06/16/88	06/20/88	-Health Physics Support, Decon, Source Ident., Source Recovery and source transportation.
89	DOE MANGEMENT PLAN FOR RSI	06/21/88	06/22/88	-Event followup for 6/21/88.
90	MORNING REPORT - REGION II	06/21/88	06/22/88	-Notes (Bill Cline, Region II).
91	UPDATE IN WESF	06/15/88	06/20/88	-Region II update on RSI (GPA, RII, NMSS)
92	TELECON ON 6/17/88	06/17/88	06/22/88	

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93	LETTER TO J. E. BAUBLITZ ABOUT RSI	06/17/88	06/22/88	R.E. Cunningham -Letter refers to recent failure of Cs-137 sealed sources at RSI's facility.
94	COMMENTS ON "DOE MGT. PLAN"	06/23/88	06/28/88	P. Vacca
95	TELECON TO BILL CLINE	06/23/88	06/28/88	P. Vacca
96	NOTES FROM MEETING WITH R. CUNNINGHAM	06/28/88	06/28/88	P. Vacca
97	SURVEYS OF RSI'S PRODUCT CARTONS	06/21/88	06/28/88	J. Nelson Grace -Summary of the results of external dose rate and contamination surveys
98	TEMP. WORK INSTR. FOR DEMINERALIZATION	06/24/88	06/28/88	J. Stohr -Temporary work instructions for demineralization services at RSI. prepared by W. D. Dayton.
99	MORNING REPORT -REGION II	06/22/88	06/28/88	-Event followup. The region cont. to provide Agreement State oversight and other tech. assist
100	MORNING REPORT - REGION II	06/23/88	06/28/88	-Event Followup. Region II cont. to provide Agreement State oversight and other tech. assist.
101	MORNING REPORT - REGION II	06/24/88	06/28/88	-Event followup. Processing of the pool water expected to begin on 6/24/88.
102	MORNING REPORT - REGION II	06/28/88	06/28/88	-Event Followup. Pool monitor readings remain constant at about 46 uCi.
103	ADD'L INFO. ON 6/22/88 UPDATE ON RSI	06/24/88	06/28/88	R.E. Cunningham -Comments to DOE's "Source Identification and Isolation Plan".
104	MGT. PLAN FOR RSI'S RECOVERY ACTIVITIES	06/22/88	06/28/88	J. Stohr -First Draft. Chem-nuclear systems, Inc. management plan for RSI's recovery activities.
105	DRAFT PLAN FOR SOURCE IDENTIFICATION	06/22/88	06/28/88	J. Stohr -RSI recovery activity source identification task plan, June 21, 1988.

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REC#	DOCUMENT TITLE	DOC_DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
106	ACCEPTABLE SURFACE CONTAMINATION LEVELS	/ / 06/28/88		-From Policy & Guidance Directive FC83-3.
107	TELECON WITH BILL CLINE'S SECRETARY RII	06/23/88 06/28/88	P. Vacca	-Provided comments on "Cesium Canister Visual Examination" (draft) document. -Draft.
108	CESIUM CANISTER VISUAL EXAMINATION	06/23/88 06/28/88		-Deminerlization of pool water continues. RSI dicussing with FDA the restart of saline pack
109	MORNING REPORT - REGION II	06/29/88 07/07/88		-Act. level in pool was .015 mCi/ml. In rack camera survey operations have been completed.
110	MORNING REPORT - REGION II	07/01/88 07/21/88		-Current pool act level is .015 mCi/ml. Source handling tools and equip are put in pool.
111	MORNING REPORT - REGION II	07/05/88 07/21/88		-Examination of pool equipment began. RE-Survey of product pallets showed no contamination.
112	MORNING REPORT - REGION II	07/07/88 07/21/88		-Series of benign tests will be initiated to identify and locate the leaking sources -Regional reps. are meeting with senoir officials of the Georgia Dept.of Natural Resources.
113	MORNING REPORT - REGION II	07/08/88 07/21/88		- Nine of thirty-three sources exam. visually were considered to be suspect.
114	MORNING REPORT - REGION II	07/11/88 07/21/88		-13 of approx. 60 sources are suspect. 1 appears to have a pinhole (fusion weld area).
115	MORNING REPORT - REGION II	07/12/88 07/21/88		-25 capsules of 125 have been ident. as being suspect. Georgia planning an invest. team.
116	MORNING REPORT - REGION II	07/13/88 07/21/88		
117	MORNING REPORT - REGION II	07/14/88 07/21/88		

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REC#	DOCUMENT TITLE	DOC_DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
118	MORNING REPORT - REGION II	07/15/88 07/21/88		-24 of 119 sources are suspect. 2 appear to have pinholes leaks on outer tube.
119	MORNING REPORT - REGION II	07/18/88 07/21/88		-Licensee agreed to cont. funding Chem-Nuclear while discuss.cont. with DOE (liability)
120	MORNING REPORT - REGION II	07/19/88 07/21/88		-29 of 252 caps. were suspect. Color camera ident. the pinhole stains as rust from weld area
121	MORNING REPORT - REGION II	07/20/88 07/21/88		-Capsule examinations (Westinghouse-Hanford) was completed. Divider wall is complete.
122	MORNING REPORT - REGION II	07/21/88 07/25/88		-DOE plans on shipping 1 suspect source to ORNL on 7/24/88 and 3 by the end of the month.
123	MORNING REPORT - REGION II	07/22/88 07/25/88		-Initial shipment of sources to ORNL has slipped and is now alternatively set for 8/6/88.
124	TYPE B INVESTIGATION: Cs-137 SOURCE LEAK	06/21/88 07/21/88	D. Collins	-DOE investigation team appointment memo.
125	WORK PLAN FOR SOURCE ISOLATION/CLEANUP	06/28/88 07/21/88	D. Collins	-Final: RSI source isolation/examination procedures.
126	RSI RECOVERY ACT. DOCUMENT AND PROCEDURE	06/28/88 07/21/88	D. Collins	-Source ident. task plan draft pack. and trans. plan Cs canister gen. area exam procedures.
127	INDIVIDUAL Cs CANISTER SIPPER EXAM. PROC	06/30/88 07/21/88	Region II	-Individual Cs canister sipper exam. procedure, CCTV exam. procedure, and handling procedure
128	RSI RECOVERY ACTIVITY DAILY SITE REPORT	07/05/88 07/21/88	W. Cline	-Information items

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REC#	DOCUMENT TITLE	DOC_DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
129	PACKAGING AND TRANSPORTATION PLAN	07/08/88	W. Cline	-Packaging and transportation plan for RSI recovery program.
130	RSI RECOVERY ACTIVITY DAILY SITE REPORT	07/07/88	J. Potter	-Information items.
131	DEKALB NEWS/SUN ARTICLE	07/06/88		-News article "Tech. still searching for radiation leak source at Dekalb Industrial plant"
132	UPDATE ON FAILURE OF Cs-137 WESF SOURCES	07/14/88		-Item for the EDO staff meeting.
133	TELECON WITH J. POTTER & D. WOODRUFF RII	07/19/88	P. Vacca	-Answer to questions and other information relayed from RII.
134	DOE LETTER TO RSI	07/15/88	R. E. Lynch	-Contracting officer states that there is no basis for issuing any modification to the lease
135	LETTER TO LESTER PRICE FROM RSI	07/13/88	Allen Chin	-RSI asking for contract modifications or else cancel its subcontract with Chem-Nuclear.
136	RSI UPDATE-TELECON WITH J. POTTER	07/19/88		-Update on source contamination, pool concentration, and other information.
137	TELECON WITH JOHN POTTER	07/19/88		-Relayed NRC comments on 7/18/88 pkg.
138	LETTER TO R. CUNNINGHAM	07/18/88	P. Vacca	Update and info. on contamination levels of products
139	TELECON WITH DICK ODEGARDEN	07/18/88	D. Odegarden	-Breifing to R. Cunningham on "Daily Site Report" dated 7/14/88
140	TELECON WITH REGION II, NMSS, OGC, & GPA	07/21/88		-Conversation in regard to his note of 7/18/88 (questions).
141	TELECCN WITH ALECIA ABBOTT, FDA, & CDRH	07/18/88		-Status on examination and shipment of Cs-137 sources..
				-Response to telephone inquiry to FDA.

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REC#	DOCUMENT TITLE	DOC DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
142	TELECON WITH DICK ODEGAARDEN	07/15/88	07/21/88	-Suggestions for shipping container to ship leaking sources.
143	TELECON WITH DOE/OR, GA, GPA/SLIP, RII	07/15/88	07/21/88	-Conversation deals with agreement between RSI, Chem-Nuclear and DOE.
144	TELECON WITH BILL CLINE, RII	07/15/88	07/21/88	-Update on events.
145	PROCED. FOR TRANSPORTING CS-137 FROM RSI	07/12/88	07/21/88	-Letter points out that public sensitivity may be of concern.
146	TELECON WITH JOHN KENDIG, GPA/SLITP	07/13/88	07/21/88	-Letter raises questions about the acceptable decontamination levels.
147	TELECON WITH DICK ODEGAARDEN	07/15/88	07/21/88	-Letter mentions options for shipment of capsules.
148	SURVEYS OF RSI'S PRODUCT CARTONS	06/28/88	07/21/88	-Surveys of Radiation Sterilizer, Inc., product cartons (6/10-16/88-corrected copy).
149	TELECON WITH DOE, HQ, DOE @ RSI	07/12/88	07/21/88	-Update on events. Letter mentions markings on capsule.
150	SPECIAL SAFETY INSPECTION WESTERVILLE OH	07/06/88	07/21/88	-Safety inspection conducted by Patricia J. Whiston on June 14, 1988.
151	TELECON WITH RII	07/13/88	07/21/88	-Update on events.
152	RSI RECOVERY ACTIVITY SOURCE IDENT. PLAN	06/28/88	07/21/88	-SOURCE IDENTIFICATION PLAN - TASK AND SCHEDULE
153	PACKAGING & TRANSPORTATION PROCEDURES	07/13/88	07/21/88	-RSI's cesium source recovery packaging and transportation procedure.
154	PACKAGING AND TRANSPORTATION PLAN	07/13/88	07/21/88	-Management plan for handling, drying, packaging and transportation of sources.
155	CERTIFICATE OF COMPLIANCE NO. 5980	10/28/87	07/21/88	-Certificate of compliance for the model # GE-600 shipping container and related information
156	TELECON WITH DICK WOODRUFF RII	06/30/88	07/21/88	-Joel Lubenau (GPA/SLITP) notes on telecon with Dick Woodruff on 6/30/88

RECORD # LISTING OF DOCUMENTS CONCERNING RSI INCIDENT

REC#	DOCUMENT TITLE	DOC_DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
157	LIST OF LARGE IRRADIATORS (USA)	06/30/88	07/21/88	L. Bolling
158	TELECON WITH RII, NMSS	07/20/88	07/21/88	P. Vacca
159	NOTES MADE BY PAT VACCA	07/20/88	07/21/88	P. Vacca
160	MORNING REPORT - REGION II	06/30/88	07/07/88	
161	MORNING REPORT - REGION II	07/26/88	07/27/88	
162	MORNING REPORT - REGION II	07/25/88	07/27/88	
163	MORNING REPORT - REGION II	07/22/88	07/27/88	
164	COLORADO'S CONFIRMATORY LETTER	06/22/88	07/21/88	D.A. Nussbaumer
165	NOTES BY PAT VACCA	07/18/88	07/21/88	
166	NOTES BY PAT VACCA	07/14/88	07/21/88	
167	NOTES - DICK ODEGAARDEN	07/18/88	07/21/88	
168	MORNING REPORT - REGION II	07/27/88	09/06/88	
169	MORNING REPORT - REGION II	07/28/88	09/06/88	
170	MORNING REPORT - REGION II	07/29/88	09/06/88	

-Followup on 7/18/88 telecon
-RSI related information.
-Update. Source ident.
activities and radiological surveys are continuing at RSI.
-Mr. Setser was appointed to head up state's investigation. Recovery operations are cont.
-Saline solution process line is cleared for operation. Shipment of sources tent. set for 8/6
-Regional agree. states rep. mtg. with SLITP and NMSS. Lead state rep. mtg. with DOE rep. -

-Joel Leibenau reported on telecon with R. Trojanowski, RII.
-Mike Lamastra informed Ray Hull of events related to RSI.
-Notes are in regard to a 3rd. submittal sent by Marianne Haiskell.
-Act. levels in pool are stable. Shipment of suspect sources is tent. scheduled for 8/06/88
-General info. no actual morning report. NMSS reps. are accompanying J. Stohr to visit RSI.
-Meeting with DOE and Region III to discuss the use of Cs-137 WESF capsules at RSI.

RECORD # LISTING OF DOCUMENTS CONCERNING RSI INCIDENT

REC#	DOCUMENT TITLE	DOC_DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
171	MORNING REPORT - REGION II	08/03/88 09/06/88		-First shipment is expected for August 8, 1988.
172	MORNING REPORT - REGION II	08/04/88 09/06/88		-Georgia issued a draft Management Plan for the conduct of the task Force lessons learned.
173	MORNING REPORT - REGION II	08/08/88 09/06/88		-Date of shipment has moved to August 17-22. Concern about Chem-Nuclear remaining on site.
174	MORNING REPORT - REGION II	08/11/88 09/06/88		-Total act. of the 3 vessels is est. between 4 and 8 curies. Concern about shipping in pool.
175	MORNING REPORT - REGION II	08/12/88 09/06/88		-USDOE/Westinghouse is bringing in equip. to begin sipping 26 of the 29 suspect capsules.
176	MORNING REPORT - REGION II	08/17/88 09/06/88		-DOE expects to ship 1 suspect capsule on 8/17/88 to DOE Oak Ridge National Labs.
177	MORNING REPORT - REGION II	08/19/88 09/06/88		-Sipping examinations are expected to begin today and completed by the weekend.
178	MORNING REPORT - REGION II	08/22/88 09/06/88		-DOE has issued an abnormal shipping occurrence report concerning the recent shipment.
179	MORNING REPORT - REGION II	08/23/88 09/06/88		-Schedule of second shipment has been put on hold. 6 of the original 28 remain to be checked
180	MORNING REPORT - REGION II	08/24/88 09/06/88		-Sipping examinations on the 28 suspect capsules are completed. Results indicated no leaks.
181	MORNING REPORT - REGION II	08/25/88 09/06/88		-Two sources will be tentatively shipped from RSI to ORNL on Aug. 31, 1988.

RECORD # LISTING OF DOCUMENTS CONCERNING RSI INCIDENT

REC#	DOCUMENT TITLE	DOC DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
182	MORNING REPORT - REGION II	08/29/88 09/06/88		-DOE to begin visual exam at RSI/OH. If no leakers found, will test all by "bell jar" system
183	MORNING REPORT - REGION II	08/30/88 09/06/88		-DOE mtg w/ ORNL: capsule overpack design modifications & aux equip to do He lk. & vacuum test
184	RSI HANDOUTS FROM 7/15/88	07/14/88 07/21/88	John Potter	-CsCl caps1 can & GE600cask/Work Instrctn/Decontmntn&Release/Source ID plan/Condensate Trap
185	TELECON WITH PAT VACCA	07/01/88 07/21/88	Bill Cline	-HQ comments on 3 draft procedures / Status of RSI
186	CURRENT STATUS OF RSI IRRADIATOR Cs PROB	09/01/88 09/06/88	Glen Sjoblom	-DOE sipping/2 leakers at GA to be sent to ORNL/Westinghouse starts OH testing 9/8/88
187	FACSIMILE TRANSMITTAL TO R. CUNNINGHAM	08/08/88 09/06/88	Bill Cline	-Letter to Allan Chin from Thomas Hill: Discussion of termination of CNSI contract.
188	FACSIMILE TRANSMITTAL TO R. CUNNINGHAM	08/08/88 09/06/88	Bill Cline	-DOE (Bobby Davis) ltr. to Bryan Walker: Results of pool water analysis performed by ORNL.
189	FACSIMILE TRANSMITTAL TO RALPH WILDE	08/11/88 09/06/88	Bill Cline	-ORNL procedure for identifying leaking RSI capsules (Draft #3)
190	FACSIMILE TRANSMITTAL TO M. LAMASTRA	08/29/88 09/06/88	John Potter	-RSI Recovery Activity Daily Site Report (Bryan Walker)
191	RSI FACILITY BACKUP INFORMATION (FAX)	08/02/88 09/06/88	Patty Whiston	-Pool specifications and rack orientation (drawings) for RSI Ohio.
192	MORNING REPORT - REGION II	08/05/88 09/06/88	Bruce Mallett	-Transmittal request to M. Lamastra from P. Whiston: R III def. ltr.
193	LETTER TO RAY JAGLOWSKI (AMWAY CORP)	07/12/88 09/06/88	D.G. Wiedeman	-Results of safety inspection by R III for possible contamination from recent RSI shipment.

RECORD # LISTING OF DOCUMENTS CONCERNING RSI INCIDENT

REC#	DOCUMENT TITLE	DOC_DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
194	LETTER TO RSI (OH) FROM R III	07/29/88	09/06/88	A. Bert Davis
195	LETTER TO GA. GOVERNOR FROM R II	08/03/88	09/06/88	J. Nelson Grace
196	LETTER FROM DOE TO IOTEC	07/27/88	09/06/88	Robert E Lynch
197	LETTER TO RSI FROM DOE	07/27/88	09/06/88	Robert E. Lynch
198	LETTER TO APPLIED RADIANT ENERGY CORP.	07/27/88	09/06/88	Robert E. Lynch
199	NEWS RELEASE FROM DOE	01/20/88	09/06/88	
200	LETTER TO IOTEC FROM DOE	08/09/88	09/06/88	Pete Dayton
201	LETTER TO R. CUNNINGHAM FROM DOE	07/21/88	09/06/88	John Baublitz
202	LETTER TO RSI FROM DOE	07/15/88	09/06/88	Robert E Lynch
203	RSI RECOVERY ACTIVITY DAILY SITE REPORT	07/18/88	09/06/88	Bobby Davis
204	RSI RECOVERY ACTIVITY DAILY SITE REPORT	07/17/88	09/06/88	Bobby Davis
205	RSI RECOVERY ACTIVITY DAILY SITE REPORT	07/16/88	09/06/88	Bobby Davis

-Agreements per telecon regarding storage and use of WESF capsules.
 -Reply to inquiry regarding activities at RSI & establishment of Incident Eval. Task Force.
 -Advisory notice that Cs capsules in wet storage must remain there until RSI invstgtn ends.
 -Notice that Cs capsules in wet storage in OH & GA must remain there until RSI invstgtn ends
 -Advisory notice that all Cs capsules in wet storage remain there until RSI invstgtn ends.
 -DOE advises three companies to take precautions in handling radioactive capsules.
 -WESF Capsule Advisory (Revision One)
 -Response to information request on Cs capsules.
 -Statement of position regarding leases between RSI & DOE.
 -Pkg engr's work put on hold/Discontinuance of gnrl re-screening/Suspect list reduced to 29
 -Re-examination of 10 suspect capsules/Difficulties with periscope device.
 -Capsule screening complete 34 suspect/Rec'd capsule overpack
 comments/pkging&transp on hold.

RECORD # LISTING OF DOCUMENTS CONCERNING PSI INCIDENT

REC#	DOCUMENT TITLE	DOC DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
206	RSI RECOVERY ACTIVITY DAILY SITE REPORT	07/15/88 09/06/88	Bobby Davis	-61 capsules examined to date/ORNL capsule overpack & condensate trap redesign addressed.
207	WESTINGHOUSE HANFORD DOCUMENT	07/16/88 09/06/88	C J Maller	-Post capsule screening examination procedure.
208	DOCUMENT DRAFT	07/18/88 09/06/88		-Decontamination/Release Criteria for Equipment, Systems, Structure & Product in Zone 3, RSI
209	LETTER TO RSI FROM DOE	07/29/88 09/06/88	Joe La Grone	-RSI representative on DOE investigation board.
210	LETTER TO RSI FROM DOE	08/03/88 09/06/88	Peter Dayton	-Clarification of WESF capsule advisory
211	LETTER TO H. THOMPSON FROM DOE	08/30/88 09/06/88	Robert E Lynch	-Information update on cesium capsule examination
212	FACSIMILE FROM DOE	08/25/88 09/06/88	E. A. Wright	-RSI/WESF Cesium Examination Plan, Phase I, Part II
213	LETTER TO RSI FROM DOE	08/29/88 09/06/88	Peter Dayton	-DOE's response to RSI letter of 8/15/88
214	LETTER TO IOTEC FROM DOE	08/23/88 09/06/88	Robert E Lynch	-DOE's response to Iotech letter of 8/4/88
215	RSI RECOVERY ACTIVITY DAILY SITE REPORT	08/19/88 09/06/88		-Daily site reports for August 19, 20 and 21.
216	RSI RECOVERY ACTIVITY DAILY SITE REPORT	08/22/88 09/06/88		-Daily site report
217	LETTER TO R. CUNNINGHAM FROM R III	08/04/88 09/06/88	J Philip Stohr	-RSI Incident Evaluation Task Force Management Plan
218	COMMENTS BY K.I. PARCZEWSKI, NRR	08/11/88 09/06/88		-Comments concerning Visual Inspection, Unloading of Capsules, & Storage of Capsules.
219	LETTER FROM NRC TO STATE OF GA	08/10/88 09/06/88	D. Nussbaumer	-Cover letter for DOE's reply to NRC request for info & DOE draft report on exam. results.
220	ITEM FOR EDO STAFF MEETING	08/11/88 09/06/88		-Update on leaking Cs-137 encapsulation and storage facility sources

RECORD # LISTING OF DOCUMENTS CONCERNING RSI INCIDENT

REC#	DOCUMENT TITLE	DOC_DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
221	TELECON BETW. REC, RIII, P VACCA, R HALL	08/08/88	Rad. Energ Corp	-Chin's resolutions w/ AECL, ChemNuclear DOE Hanford ready to receive WESF sources, 3 wks.
222	TELECON W/ PETE SHANDRUCK, FDA	07/27/88	Pat Vacca	-Inquiry into impact on supply of medical products if 3 WESF facilities shut down.
223	DOCUMENT BY J. STOHR	08/04/88	J Philip Stohr	-RSI incident evaluation task force charter and management plan (final)
224	MTG OF REC, RHALL, PVACCA, MLAM., RWILDE	07/28/88	Pat Vacca	-Notes from meeting on July 29, 1988: principally about REC's visit to RSI on July 28.
225	ITEM FOR EDO STAFF MEETING	07/28/88		-Update on contamination incident at RSI in Georgia
226	NEWS RELEASE FROM DOE	07/27/88		-DOE advises three companies to take precautions in handling radioactive capsules (Draft 4).
227	MEETING IN REC'S OFFICE	07/26/88	Pat Vacca	-Mtg: Joel L, John H, Susan Chidihal, R Hall, P Vacca, J Austin, M Lamastra, B Cline.
228	LETTER TO NRC FROM RSI	08/01/88	Barry Fairand	-Photographs of holders used to store the Cs capsules on the bottom of RSI's pool.
229	SEVERAL LETTERS FROM STATE OF GA & CRCPD	07/22/88		-Formation of RSI Incident Evaluation Task Force.
230	LETTER TO DOE FROM NRC	10/21/85	R Cunningham	-DOE's request for NRC to review position on use of Cs WESF capsules in wet storage irrads.
231	MEMORANDUM TO FILES	06/09/88	D Nussbaumer	-Letter documenting telecon with Tom Hill, Director of GA radiation control program.
232	MEMORANDUM FOR CHAIRMAN PALLADINO	06/12/84	Wm. J. Dircks	-Licensing of DOE Cs-137 sealed sources mfr'd at WESF in Hanford, WA.

RECORD # LISTING OF DOCUMENTS CONCERNING RSI INCIDENT

REC#	DOCUMENT TITLE	DOC_DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
233	LETTER TO DOE FROM NRC	04/03/84 07/21/88	R Cunningham	-Statement that in-depth analysis of the use of WESF capsules in irradiators is needed.
234	TELECONS W/ D.ODEGOARDEN(NMSS) & JPOTTER	07/11/88 07/21/88	Pat Vacca	-Two telecons re: packaging & transportation plan.
235	MEMO FOR KENNETH F. BARR, RII	11/06/85 07/21/88	Vandy Miller	-Comments & background info for review of A.R.E.'s amendment request for use of WESF capsules
236	"CESIUM CHLORIDE FOR IRRADIATORS" MTG.	02/23/84 07/21/88		-NRC briefing on WESF cesium capsule
237	LETTER TO APPLIED RADIANT ENERGY CORP	08/12/88 09/06/88	Pat Vacca	-Form letter delivered to Bill Cline for use by Regions.
238	MORNING REPORT - REGION II	09/14/88 09/22/88		-One day delay in shipment schedule/suspect capsule to be loaded 9/15 & 9/16, shipped 9/17.
239	MORNING REPORT - REGION II	09/19/88 09/22/88		-Two suspect capsules shipped to ORNL on 9/16. Shipping suspended temporarily.
240	MORNING REPORT - REGION II	09/16/88 09/22/88		-Capsule packaging operations expected to be completed today.
241	TELECON W/ BILL CLINE & JOHN POTTER	09/16/88 09/22/88	Pat Vacca	-Suspect shipment/Remvl of water frm shipping casks shows no Cs in water/No H2O in annulus'.
242	FACSIMILE TRANSMITTAL TO G. SJOBLUM	09/15/88 09/22/88	W. E. Cline	-RSI recovery activity daily site report.
243	ITEM FOR THE EDO STAFF MEETING	09/15/88 09/22/88		-DOE Cesium-137 Investigation Group activities.
244	DOE/NRC WESF MEETING	09/15/88 09/22/88		-Attendees at DOE/NRC meeting on WESF
245	RSI/WESF Cs CAPSULE EXAMINATION PLAN	09/09/88 09/22/88		-Phase II of Examination of Suspected Leaking Capsules.
246	OPERATING PROCEDURE FOR RSI CAPSULE TEST	09/02/88 09/22/88	Fis Prod Dev Lb	-Procedure for He leak test, Liquid Penetrant Exam, Bubble leak test, Carrier loading.

RECORD # LISTING OF DOCUMENTS CONCERNING RSI INCIDENT

REC#	DOCUMENT TITLE	DOC_DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
247	MORNING REPORT - REGION II	09/15/88 09/22/88		-B. Mallett will be at OH facility of RSI to discuss transfer of capsules to DOE, & Co-60.
248	MORNING REPORT - REGION II	09/13/88 09/22/88		-Overpack valves rec'd/Loading procedures appr'v'd/Training for loading/WHC set up CCTV camera
249	MEMO FOR FILES	09/13/88 09/22/88	C. MacDonald	-Shipment of RSI suspected leaking source capsules in Model GE600 cask.
250	MEMO TO FILES	09/07/88 09/22/88	C. MacDonald	-Shipment of RSI suspected leaking source capsules in Model GE600 cask.
251	MEMO TO FILES	09/13/88 09/22/88	Glen Sjoblom	-Georgia Task Force Study for RSI
252	LETTER TO RSI FROM NRC	09/06/88 09/22/88	C. E. Norelius	-Response to RSI request to use Co-60 sources in OH irradiator while storing Cs WESF capsules
253	FACSIMILE TRANSMITTAL TO H. THOMPSON	09/09/88 09/22/88	B. Davis	-Corrected schedule for examining RSI/WESF capsule C1507 and C1542.
254	MORNING REPORT - REGION II	09/09/88 09/22/88		-DOE to begin screening/evaluating WESF capsules at OH facility.
255	FACSIMILE TRANSMITTAL TO H. THOMPSON	09/09/88 09/22/88	B. Davis	-Schedule for examining RSI/WESF capsules C1507 and C1542.
256	MORNING REPORT - REGION II	09/08/88 09/22/88		-Sipping continues all results negative so far./DOE announces it will recall WESF capsules.
257	MORNING REPORT - REGION II	08/31/88 09/22/88		-Potential for redistribution of activity from pool wall surfaces & capsule racks evaluated.
258	MORNING REPORT - REGION II	09/07/88 09/22/88		-ORNL Investigation team arrived to resume operations.

RECORD # LISTING OF DOCUMENTS CONCERNING RSI INCIDENT

REC#	DOCUMENT TITLE	DOC_DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
259	LETTER TO NRC FROM DOE	08/31/88 09/22/88	Ronald Hultgren	-Meeting requested to discuss Cesium-137 licensing and WESF capsules incident.
260	LETTER TO APPLIED RADIANT ENERGY CORP.	09/01/88 09/22/88	J Nelson Grace	-Update advisory letter on WESF capsule storage, 7/27/88
261	MORNING REPORT - REGION II	08/30/88 09/22/88		-Capsule overpack design modifications & auxiliary equip required to meet NRC requestd tests
262	MORNING REPORT - REGION II	09/01/88 09/22/88		-Sipping of remaining 223 capsules not among primary suspects.
263	MORNING REPORT - REGION II	09/02/88 09/22/88		-Capsules 1542 & 1507 were tested in inverted position, negative results.
264	MORNING REPORT - REGION II	08/15/88 08/16/88		-First capsule to be shipped 8/17
265	SCHEMATIC DIAGRAM	07/08/88 08/10/88		two other suspects to be shipped by 8/31.
266	DRAFT OF DOCUMENT	07/12/88 07/21/88		-Diagram of Capsule Overpack/Condensate Trap Piping Arrangemnt schedule for 1st 2 shipments
267	RSI MEETING ON JULY 28, 1988	07/28/88 09/06/88		-Examination of RSI Cs-137 capsule to determine cause & mechanism of release of material.
268	"CAPSULE LEAKING RADIATION FOUND"	12/01/88 12/01/88	W. CLINE	-NRC attendees at meeting/Meeting agenda
269	MORNING REPORT - REGION II	11/30/89 12/01/88		-NEWSPAPER ARTICLE FROM THE ATLANTA CONSTITUTION.
270	TELECON WITH BILL CLINE, RII	11/30/88 11/30/88		-WESF CAPSULE #1502 FOUND TO HAVE A LARGER DIAMETER THAN THE SAMPLE WELL.

-TELECON BETWEEN BILL CLINE AND PAT VACCA ABOUT POSSIBLE IDENTIFICATION OF 1 LEAKING SOURCE

RECORD # LISTING OF DOCUMENTS CONCERNING RSI INCIDENT

REC#	DOCUMENT TITLE	DOC DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
271	LETTER TO J. BAUBLITZ FROM ALLEN CHIN	12/07/88	ALLEN CHIN	-CONCERNS ABOUT THE SWOLLEN CAPSULES.
272	MORNING REPORT - REGION II	09/28/88	/	-CNSI COMPLETED REMOVAL AND PACKAGING OF CONTAMINATED TROLLEY CHAIN.
273	MORNING REPORT - REGION II	09/27/88	/	-RUST SPOTS OBSERVED ON THE POOL FLOOR. DISASSEMBLY, DECON, SURVEY AND STORAGE IS CONTINUING
274	MORNING REPORT - REGION II	09/23/89	/	-PRELIMINARY RESULTS OF THE TWO CAPSULES INDICATE THAT THEY ARE NOT LEAKERS.
275	MORNING REPORT - REGION II	09/22/88	/	-THE OVERPACKS FOR CAPSULES 1507 AND 1542 SHOWED NO SIGNIFICANT CONTAMINATION.
276	MORNING REPORT - REGION II	09/21/88	/	-STILL AN INCREASE IN ACTIVITY AFTER SHIPMENT OF THE SECOND AND THIRD POTENTIAL LEAKING CAPS
277	DAILY SITE REPORT	10/18/88	W. CLINE	-DAILY SITE REPORT FOR 10/17/88.
278	DAILY SITE REPORT	10/19/88	W. CLINE	-DAILY SITE REPORT FOR 10/18/88
279	DAILY SITE REPORT	10/20/88	W. CLINE	-DAILY SITE REPORT FOR 10/19/88. SOURCE LEAKAGE INCREASED FROM 47UCI/HR TO 131UCI/HR.
280	DAILY SITE REPORT	10/24/88	W. CLINE	-DAILY SITE REPORT FOR 10/21/88. AVERAGE SOURCE LEAKAGE RATE IS 135UCI/HR
281	DAILY SITE REPORT	10/27/88	W. CLINE	-DAILY SITE REPORT FOR 10/24/88. AVERAGE SOURCE LEAKING RATE IS 145UCI/HR.
282	DAILY SITE REPORT	10/26/88	W. CLINE	-DAILY SITE REPORT FOR 10/25/88. AVERAGE SOURCE LEAKING RATE IS 158 UCI/HR.
283	DAILY SITE REPORT	10/28/88	W. CLINE	-DAILY SITE REPORT FOR 10/26/88. AVERAGE SOURCE LEAKING RATE IS 159 UCI/HR.

RECORD # LISTING OF DOCUMENTS CONCERNING RSI INCIDENT

REC#	DOCUMENT TITLE	DOC_DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
284	DAILY SITE REPORT	10/28/88 11/01/88	W. CLINE	-DAILY SITE REPORT FOR 10/27/88. SOURCE LEAKING ESSENTIAL CONSTANT BETWEEN 150-160 UCI/HR.
285	DIALY SITE REPORT	10/31/88 11/01/88	W. CLINE	-DAILY SITE REPORT FOR 10/28/88. SOURCE LEAKAGE RATE DECLINED TO 135 UCI/HR.
286	DAILY SITE REPORT	10/12/88 11/01/88		-DAILY SITE REPORT FOR 10/11/88. LEAKAGE RATE IS IN THE ORDER OF 200 UCI/HR.
287	DAILY SITE REPORT	10/10/88 11/01/88		-DAILY SITE REPORT FOR 10/07/88.
288	DAILY SITE REPORT	10/17/88 11/01/88	JOHN POTTER	-DAILY SITE REPORT FOR 10/14/88.
289	DAILY SITE REPORT	10/16/88 11/01/88		-DAILY SITE REPORT FOR 10/15/88.
290	DAILY SITE REPORT	10/03/88 11/01/88		-DAILY SITE REPORT FOR 9/30/88.
291	MORNING REPORT - REGION II	10/21/88 11/01/88		-A SIGNIFICANT SPIKE OF ACTIVITY WAS OBSERVED IN LEAK TEST OF DRAWER C-4
292	MORNING REPORT - REGION II	10/06/88 11/01/88		RACK 4 ON 10/20/88 -REVIEW OF THE LICENSEE'S STORAGE PROVISIONS AND OBSERVATION OF LOADING OPERATIONS.
293	MORNING REPORT - REGION II	10/11/88 11/01/88		-LEAKAGE RATE INCREASED TO ABOUT 244 UCI/HR.
294	MORNING REPORT - REGION II	10/12/88 11/01/88		-LEAKAGE RATE ESTIMATED AT ABOUT 600 UCI/HR.
295	MORNING REPORT - REGION II	09/30/88 11/01/88		-DOE REPS INDICATE COMPLETION OF THE DESIGN WORK ON A REVISED METHOD OF CAPSULE SIPPING.
296	MORNING REPORT - REGION II	10/26/88 11/01/88		-STRONG INDICATIONS AS TO THE POSSIBLE LOCATIONS OF THE LEAKING SOURCE(S).

RECORD # LISTING OF DOCUMENTS CONCERNING RSI INCIDENT

REC#	DOCUMENT TITLE	DOC_DATE ENTERED	LETTER FROM	SUBJECT OF LETTER
297	M-D-D-I REPORT (OCT. 31, 1988)	10/31/88 11/01/88		-FINANCINGS IN BRIEF"
298	TELEFAX FROM DOE	10/28/88 11/01/88	SYLVIA	-LETTER DATED OCT. 27, 1988. "WESF CESIUM CAPSULES ACTIVITIES UPDATE".
299	TELEFAX FROM DOE	10/28/88 11/01/88		-DOE LTR TO B. MALLETT (10/27/88). "TECH ISSUES RELATED TO THE SHIPMENT OF CS-137 CAPSULES".
300	FAX TO G. SJOBLUM	10/11/88 11/01/88		-CHARTS AND POOL DEMNERIALIZATION LOG.
301	P. VACCA NOTES - UPDATE ON RSI	10/04/88 11/01/88	P. VACCA	-DISCUSSION ON INFORMATION COLLECTION.
302	NOTE TO P. VACCA	10/04/88 11/01/88	G. SJOBLUM	-WESF CESIUM CAPSULES ACTIVITIES UPDATE"
303	FAX FROM ORNL	10/14/88 11/01/88	ORNL	-LETTER ON RESIN BACKLEAKAGE. -SET UP MEETING WITH DOE TO DISCUSS CURRENT ISSUES RELATED TO SHIPMENT OF CAPSULES.
304	FAX TO V. MILLER	10/17/88 11/01/88		-WESF CESIUM CAPSULES ACTIVITIES UPDATE".
305	NOTE TO FILE	10/25/88 11/01/88	G. SJOBLUM	-CERTIFICATE OF COMPLIANCE FOR MODEL 1500 SHIPPING PACKAGE AND ATTACHED USERS LIST.
306	FAX FROM DOE	10/06/88 11/01/88	DOE	
307	CERTIFICATE OF COMPLIANCE NO. 5939	12/30/87 11/01/88		

5

The Immobilization of Radioactive Cesium in
Highly Durable Silica-based Glasses.

Several techniques which have been developed at The Catholic University of America's Vitreous State Laboratory have been proved suitable for the immobilization of high levels of cesium in highly durable silica-based glasses. These techniques include molecular doping with a high-silica cladding, molecular doping without a cladding, and ion-exchange. The common feature of all these methods is that they lead to the incorporation of cesium at high concentrations (up to 15%) in a silica-based glass matrix to form a product which has much lower leach rates than those obtained with the borosilicate glass compositions commonly used in nuclear waste vitrification. At the same time, these techniques require processing temperatures which are similar to those used in borosilicate glass preparation or even lower (850-1150°C), obviating the need for the very high temperatures required for the preparation of high-silica glasses by conventional methods and avoiding the loss of cesium through volatilization which results from the use of such high temperatures.

The enclosed re-prints and pre-prints describe these techniques in detail and report the results of characterization studies on the resulting products.

Reference no. 1 describes the preparation of high silica glasses with 15% cesium doping with and without a cesium-depleted cladding. It is shown that short-term leach tests on such glasses indicate that they have much lower dissolution rates than borosilicate glasses.

A/24

Reference no. 2 describes the long-term results of these leach tests (5 years at 22°C). It shows that after approximately 10 days the dissolution rates of both cladde and non-cladde 15% cesium-doped high-silica glasses stabilize at a level of $(4.4 \pm 1.0) \times 10^{-6} \text{ g} \cdot \text{m}^{-2} \cdot \text{d}^{-1}$. This rate is lower by a factor of 3.6 than the dissolution rates of tektites, natural glasses found in Southeast Asia and Australia which have survived for a period of 7.2×10^5 years with a very small extent of corrosion (field observations on the extent of corrosion agree very well with laboratory measurements).

Reference no. 3 shows that the activation energy of the leaching process of the high-silica glass is $(17.5 \pm 1.5) \text{ kcal}$. Based on this result, the dissolution rates of cesium-containing high-silica glass can be summarized in Table I. The absolute values of the leach rates of all the various glasses reported in Ref. 3 are inaccurate (by a factor of 2.6) due to the use of an incorrect specific areas in the powder tests. However, the results clearly demonstrate that at 70°C, for instance, the leach rates of the cesium-loaded high-silica glass are lower by a factor of 115 compared with those of the borosilicate glass PNL 76-78.

Another result reported in Ref. 3 is that high-silica glasses prepared by ion-exchange appear to be considerably less durable than those prepared by molecular doping. The durability of high-silica glasses prepared using ion-exchange techniques has been subsequently improved to make them comparable in durability by glasses prepared by molecular doping. Reference no. 4

describes the preparation of glasses doped with multi-element nuclear waste streams using a technique which includes absorption, ion-exchange and sintering. The results of leach tests show that high-silica glasses loaded with 30% of defense wastes have cesium leach rates which are lower by at least one order of magnitude than those of borosilicate glasses and Synroc-type ceramics, and that at long contact times between glass and water the difference corresponds to a factor of at least two orders of magnitude. The dissolution rates of high-silica glasses doped with cesium alone (see Table) are even lower than those of the composite waste glasses described in Reference no. 4.

TABLE I

Temperature C°	Rate of Glass Dissolution g·m ⁻² ·d ⁻¹	Rate of Glass Dissolution μm·yr ⁻¹	Rate of Cesium Release (Uncladded Glass) g·m ⁻² ·d ⁻¹	Rate of Cesium Release (Cladded Glass) g·m ⁻² ·d ⁻¹
4	6.3x10 ⁻⁷	1.1x10 ⁻⁴	9.5x10 ⁻⁸	3.2x10 ⁻⁹
22	4.4x10 ⁻⁶	7.3x10 ⁻⁴	6.6x10 ⁻⁷	2.2x10 ⁻⁸
40	2.4x10 ⁻⁵	4.1x10 ⁻²	3.7x10 ⁻⁶	1.2x10 ⁻⁷
70	2.9x10 ⁻⁴	4.7x10 ⁻²	4.3x10 ⁻⁵	1.4x10 ⁻⁶
90	1.2x10 ⁻³	1.9x10 ⁻¹	1.8x10 ⁻⁴	5.9x10 ⁻⁶

References

1. J. H. Simmons, P. B. Macedo, A. Barkatt and T. A. Litovitz, "Fixation of Radioactive Waste in High Silica Glasses", *Nature (London)*, 278, 729-731 (1979).
2. Aa. Barkatt, M. S. Boulos, Al. Barkatt, W. Sousanpour, M. A. Boroomand, P. B. Macedo and J. A. O'Keefe, "The Chemical Durability of Tektites - A Laboratory Study and Correlation with Long-term Corrosion Behavior", *Geochimica et Cosmochimica Acta* (1984), in the press.
3. Aa. Barkatt, J. H. Simmons and P. B. Macedo, "Evaluation of Chemical Stability of Vitrification Media for Radioactive Waste Products", *Physics and Chemistry of Glasses*, 22, 73-85 (1981).
4. P. B. Macedo, Aa. Barkatt and J. H. Simmons, "A Flow Model for the Kinetics of Dissolution of Nuclear Waste Forms; A Comparison of Borosilicate Glass, Synroc and High-Silica Glass" in *Scientific Basis for Nuclear Waste Management*, Vol. V, ed. W. Lutze, North-Holland, New York, NY, 1982, pp. 57-69.

Figure 3a.

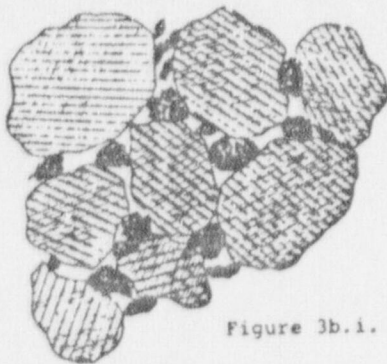
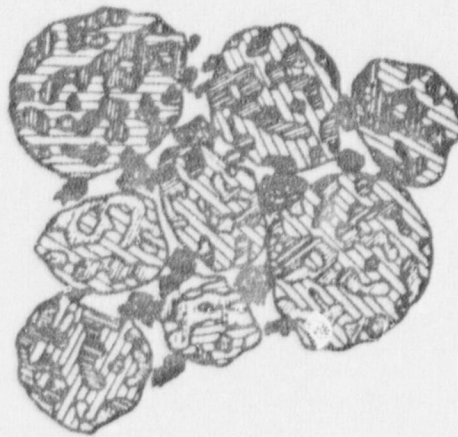


Figure 3b.i.

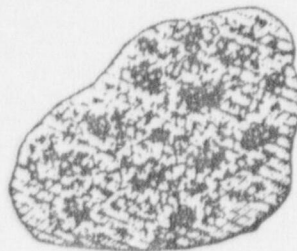
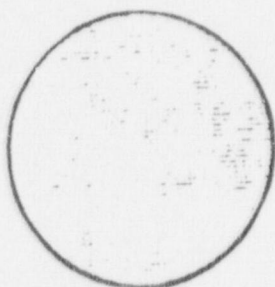


Figure 3b.ii.

- 3a. Radioactive isotopes (e.g. Cs-137) are loaded onto a porous glass powder by a process of absorption and ion-exchange.
- 3b.i. The radioactive isotopes are incorporated into a solid glass structure as the pores collapse.
- 3b.ii. If solid grains of a radioactive material are also present, the radioactive material becomes immobilized in the glass as the grains sinter together.

1. A borosilicate glass.
2. The glass is heat-treated and phase-separated into high-silica and low-silica regions.
3. The low-silica phase is dissolved and removed by leaching in acid solution, leaving a porous glass with an interconnected structure.
4. A solution of radioactive isotopes (e.g. Cs-137) is loaded into the pores.
5. If desired, the radioactive isotopes are washed away from the outer layer of the glass to form a clean cladding.
6. The glass is collapsed by sintering at 800°C into a solid, having a protected core of radioactive material surrounded by long-lasting high-silica envelope



1 BATCH GLASS ROD



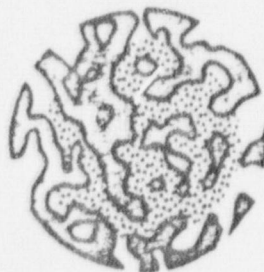
2 PHASE SEPARATION



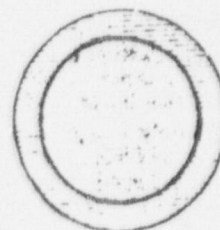
3 LEACHING AND WASHING



4 RADIOISOTOPE STUFFING



5 PROFILING



6 COLLAPSING