

INTERIM REPORT

ACCESSION NO. _____
ORNL/HASRD-81

Contract Program or
Project Title:

Evaluation of Docket Files of
Terminated Licenses

Subject of this Document:

Technical Progress

Type of Document:

Monthly Progress Report

Author(s):

C. F. Holoway and H. W. Dickson
Health and Safety Research
Division*

Date of Document:

May 1980

Responsible NRC Individual and
NRC Office or Division:

William T. Crow
Fuel Processing and Fabrication Branch
Office of Nuclear Material Safety
and Safeguards

This document was prepared primarily for preliminary or internal use. It has not received full review and approval. Since there may be substantive changes, this document should not be considered final.

Prepared for
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
Under Interagency Agreement(s) DOE #40-549-75
NRC FIN No. A9085-7

*Oak Ridge National Laboratory
Oak Ridge, Tennessee 37830
operated by
Union Carbide Corporation
for the
Department of Energy

INTERIM REPORT

8 007140 031

NRC Research and Technical
Assistance Report

MONTHLY PROGRESS REPORT FOR MAY 1980

EVALUATION OF DOCKET FILES OF TERMINATED LICENSES
(189 No. A9085-7)

PRINCIPAL SCIENTISTS: C. F. Holoway and H. W. Dickson

Objectives:

The technical objective of this project is to review terminated licenses in the Nuclear Regulatory Commission (NRC) Docket File System, extract pertinent data, create a computer file of these data and identify which previously licensed sites potentially could constitute residual radiological safety hazards.

Major Accomplishments:

During May, 58 dockets were group analyzed as shown in Table 1.

Table 1. Group analysis of docket files
for month of May

Category	Categorization before group analysis	Categorization after group analysis
No	17	39
Un	41	2
OK	0	17
Total	58	58

The 41 questionables remaining after group analysis are tabulated in Attachment 1. The totals for group analyzed files are shown in Table 2.

Table 2. Group analyzed Part 30 dockets
(February-May)

Month	Category			Total
	No	Un	OK	
February	4	1	6	11
March	17	8	18	43
April	32	3	11	46
May	40	1	17	58
Total	93	13	52	158

As part of quality control, four boxes previously screened by ERC analysts were randomly sampled (four dockets from each). This sampling, summarized in Attachment 2, indicates no disagreement between the original categorization and quality control review categorization.

The total number of Part 2 dockets given initial screening by individual analysts has reached 3211, of which 2325 were computer retrievable as of the May 21, 1980 computer update. Total computer-retrievable No's as of the May 21, 1980 update were 73; Un's 64; OK's 2185; for a total of 2322 records, leaving 3 uncategorized (duplications or input errors).

The number of different radionuclides found in licenses screened so far total 161, an increase of 12 from last month. Table 3 lists these nuclides, their respective radiological half-lives, the annual limits of intake, and the residual permissible annual limits of intake for the parent nuclides t years after site shutdown.

While 161 radionuclides have been identified in those dockets screened, five radionuclides or groups of radionuclides are responsible for a majority of the dockets categorized as Mo or Un. Attachment 3 lists radionuclides in order of frequency of occurrence in those dockets screened and group analyzed. The five major nuclides or groups are, in order of decreasing occurrence:

1. ^{90}Sr ,
2. By-Products and/or Activation Products,
3. ^3H ,
4. ^{60}Co , and
5. ^{137}Cs .

The Evaluation Research Corporation (ERC) created 133 computer records or more from inspection reports contained in general file folders, when licenses could be identified therein but not assigned to existing docket folders. Because of funding limitations, and because general file folders are outside the defined scope of docket file folders, this practice will be discontinued. However, where license information in a general file folder can be appended to existing docket file folder computer files, this will be done. In addition, a manual listing of those licenses referred to in general file folders will be kept, along with identifying box numbers, so that such information can be found manually at a future date, if needed. Attachment 4 contains a sample listing of a few licenses found in general file folders but not in docket file folders examined in accordance with the policy changes on handling general files. Attachment 5 indicates typical material obtainable from general file folders.

To date, 158 dockets have been group analyzed. Thirty of these group-analyzed folders were also checked by the group against the respective computer printouts which had been prepared from information found in the general file folders only. Of these 30 records and their corresponding general file folders, 5 were OK, 1 was Un and 24 were No. This demonstrates the importance of general file folder material for evaluating licenses not found in the docket file folders analyzed so far. It is recommended, therefore, that additional funding be made available at some future date for analysis of general file folders before making final decisions as to potential hazards represented by terminated Part 30 licenses.

Status of Project.

Preliminary screening has been done on 41 of the 101 boxes of Part 30 docket file folders, including preparation of data analysis/computer input forms, of which 28 boxes are now available on permanent computer file for searching. Assuming an approximate total of 7,000 docket file folders (exclusive of general file folders), about 46% have been screened and 33% are searchable on a permanent computer file. At an average of 78 dockets per box (3211/41), the remaining 60 boxes would represent 4,680 file folders or a total of approximately 7,900 folders, 7,000 of which are estimated to be docket file folders, the remaining 900 to be general file folders. A count from the manual inventory sheets would give a more accurate estimate.

The project is running on schedule.

Manpower and Cost Summary:

Efforts in Man Months			Cost K\$			Additional cost to completion (est.)
May 1980	FY 1980	Total to date	May 1980	FY 1980	Total cost to date K\$	
1.1	9.3	64.2	18.9	125.9	413.9	\$143,000

Table 3. New radionuclides found in licenses screened during May

ISOTOPE	CRITICAL ORGAN(S)	HALF-LIFE (yrs)	ALI(MBq)	PERMISSIBLE AMTS AFTER TIME t (yrs) (MBq)			
				t=0	t=5	t=10	t=20
Cl-38	GI(S)	7.1(-5)	119	1.2(4)	>3.7(7)		
Ca-41	d	1.3(5)	0.27	27	27	27	27
Sc-44	d	4.5(-4)	0.27	27	>3.7(7)		
V-48	Lung	0.044	5.4	560	>3.7(7)		
Mn-52	GI(LLI)	0.015	8.9	890	>3.7(7)		
Cu-67	d	0.007	0.27	27	>3.7(7)		
Ba-131	Lung	0.032	27	2.7(3)	>3.7(7)		
Cs-136	Lung	0.037	16	1.6(3)	>3.7(7)		
Ir-194	GI(LLI)	2.2(-3)	8.9	890	>3.7(7)		
Pb-210	Kidney	22.3	0.011	1.1	1.5	1.5	2.2
Th-228	Lung	1.91	5.6(-4)	5.6(-2)	3.4(-1)	2.1	78
Pu-239	Bone	2.4(4)	1.6(-4)	1.6(-2)	1.6(-2)	1.6(-2)	1.6(-2)

Attachment 1.

ERC/ORNL

Group
Docket AnalysisDate: May 16, 1980

No.	Record No.	License No.	Licensee	Orig. Cat.	Analyst					Group Cat.	Comments
					DGJ	LEB	JSE	HWD	CFH		
102	1752	46-0091-03	Boeing Airplane Co., Engineering Dept., Seattle, WA	2No	OK	No	No	No	No	2No	In view of the many by-product material licenses this company had - the possibility of contamination is high.
104	1757	46-0091-08	Boeing Airplane Co., Industrial Hygiene Unit, Seattle, WA	2UN	UN	No	No	No	No	2No	Continual stream of waste products collected, stored, packaged and transported. Tends to be messy operation.
105	1758	46-0091-09	Boeing Airplane Co., Seattle, WA	2UN	No	No	No	No	No	2No	Allows possession of large amounts of by-products 3-R3 (25 Ci), and transuranics. Radioactive materials were disposed by burning and packaging ashes in drums. Incidents of overexposures reported. Had plans for a 10,000 Ci Co-60 irradiating facility. Six 100 Ci Co-60 sources stored in stainless steel under water.
108	1827	42-0579-02	O'Neill, Thaggard Wiesner, Drs., Nix Professional Bldg., San Antonio, TX	2UN	No	No	UN	NO	No	2NO	Need to account for Sr-90 source.
109	1888	42-1068-06	Welex Jet Serv. Inc., 1400 East Berry St., Ft. Worth, TX	2No	No	No	No	No	No	2NO	Need to know correct disposition of Ac-227.

Attachments (continued)

ERC/ORNL

Group
Docket Analysis

Date: May 16, 1980

No.	Record No.	License No.	Licensee	Orig. Cat.	Analyst					Group Cat.	Comments
					DGJ	LEB	JSE	HWD	CFH		
110	1889	42-1068-04	Welex Jet Serv. Inc., 1400 East Berry St., Ft. Worth, TX	2No	No	No	No	No	No	2No	Same as above.
112	2007	42-0596-02	Dr. H.A. Mueller 813 N. Zangs Blvd. Dallas, TX	2No	Un	OK	OK	No	No	2No	604 Ci of Co-60 creates a substantial radiation field even after 20 years. Need to know final disposition of source.
113	2025	34-0999-03	National Carbon Co. 12900 Snow Rd. Parma, OH	2UN	NO	No	No	No	No	2No	Dismantled nuclear batteries to obtain Sr-90. Could be a messy operation.
114	2029	34-0999-06	National Carbon Co. 12900 Snow Rd. Parma, OH	2Un	No	No	No	No	No	2NO	Possessed 50 mCi sealed Sr-90 source and had other operations with Sr on the site.
116	2055	31-0984-02	New York City Dept. of Hospitals Bronx Municipal Hosp. Ctr., Bronx, NY	2UN	NO	NO	OK	NO	No	2No	A substantial radiation field would still exist from a 700 Ci Co-60 source.
117	2057	31-0510-01	Francis Delafield Hospital, 99 Ft. Washington Ave., New York, NY	2UN	No	No	OK	NO	NO	2NO	The potential for residual by-product contamination is high.

Attachment 1. (continued)

ERC/ORNL

Group
Docket AnalysisDate: May 16, 1980

No.	Record No.	License No.	Licensee	Orig. Cat.	Analyst					Group Cat.	Comments
					DGJ	LEB	JSE	HWD	CFH		
118	2062	31-0488-01	New York City Dept. of Hospitals Queens Gen. Hosp. 82-68 164th St. Jamaica, NY	2UN	No	No	No	No	No	2NO	Need to know disposition of Sr-90 source.
119	2068	31-2034-01	New York Eye and Ear Infirmary, 218 2nd Ave., New York, NY	2UN	No	No	No	No	No	2No	Need to know disposition of Sr-90 source.
120	2072	31-0477-04	New York Med. Col., Flower & 5th Ave. Hosp., New York, NY	2UN	No	No	UN	OK	No	2No	Had a Sr-90 source not licensed and other irregularities at the site.
121	2090	31-0511-01	New York State Psychiatric Inst. 722 W. 168th St., New York, NY	2UN	No	UN	UN	No	No	2No	Possibility of large amounts of by-product materials.
122	2097	19-0296-05	National Inst. of Health, Nat. Inst. of Neurological Diseases and Blindness, Bethesda, MD	2UN	No	No	No	No	No	2No	Need to know final disposition of Sr-90 Source.

Attachment 1. (continued)

ERC/ORNL

Group
Docket Analysis

Date: May 16, 1980

No.	Record No.	License No.	Licensee	Orig. Cat.	Analyst					Group Cat.	Comments
					DGJ	LEB	JSE	HWD	CFH		
123	2100	19-0296-08	National Inst. of Health, Nat. Heart Inst., Bethesda, MD	2UN	UN	No	UN	UN	No	2UN	Tritium was converted to organic compounds which have higher radiotoxicity.
124	2133	26-0162-08	University of Nebraska, 424 Dewey Ave. Omaha, NE	2UN	No	No	UN	No	No	2No	Rat carcasses containing Sr-90 encased in concrete and buried locally.

∞

Attachment 1. (continued)

ERC/ORNL

Group
Docket AnalysisDate: May 22, 1980

No.	Record No.	License No.	Licensee	Orig. Cat.	Analyst					Group Cat.	Comments
					DGJ	LEB	JSE	HWD	CFH		
125	1403	32-3053-01	North Carolina Pulp Co., Plymouth, NC	2No	No	No	No	No	No	2No	Need to know final disposition of Sr-90.
126	1404	32-0928-02	North Carolina Baptist Hospital Winston-Salem, NC	2Un	No	No	No	No	No	2No	Large source with potential external radiation hazard. Need to know final disposition.
127	1411	45-0131-03	Norfolk General Hospital, Norfolk, VA	2Un	No	OK	Un	No	No	2No	Potential external radiation hazard. Need to know final disposition of source.
128	1417	31-1953-01	New York University Washington Sq. College, New York, NY	2Un	No	No	No	No	No	2No	Need to know final disposition of 80 mCi Sr-90.
129	1477	20-0320-09	New England Nuclear Corp., 575 Albany St. Boston, MA	2Un	OK	No	No	No	No	2No	A lot of contamination. Did not follow regulations. Had sloppy handling procedures. Presently hold 20-0320-09, -13, -14E, -15G, -16MD, -17MA, -18MD, -19, 20-11868-01.
130	1507	34-2160-03	Babcock & Wilcox Co., Barberton, OH	2Un	No	No	No	No	No	2No	Potential external radiation hazard from 1107 Ci of Co-60. Presently hold 34-02160-03, -04.
131	1512	20-2729-01	AVCO Mfg. Corp. 201 Lowell St. Wilmington, MA	2Un	No	No	No	No	No	2No	Need to know final disposition of batteries and thickness gauge. Presently hold 20-02729-05.

Attachment 1. (continued)

ERC/ORNL

Group
Docket Analysis

Date: May 23, 1980

No.	Record No.	License No.	Licensee	Orig. Cat.	Analyst					Group Cat.	Comments
					DGJ	LEB	ISE	HWD	CFH		
132	1518	29-3048-02	Automatomics, 184 N. Madison Dr. S. Plainfield, NJ	2Un	No	No	No	No	No	2No	Need to know disposition of Sr-90 sources.
133	1519	29-3048-01	Automatomics 184 N. Madison Dr. S. Plainfield, NJ	2Un	No	No	No	No	No	2No	Need to know disposition of Sr-90.
136	1622	23-1651-01	McWilliams Clinic 1300 27th Ave. Gulfport, MS	2Un	OK	No	No	No	Un	2No	Need to know disposition of Sr-90.
138	1701	21-1297-02	Federal Civil Defense Admin. Battle Creek, MI	2No	No	No	No	No	No	2No	Need to know disposition of 6000 Ci of Cs-137.
140	1720	31-1139-02	Jewish Hospital of Brooklyn 555 Prospect Place Brooklyn, NY	2Un	No	No	No	No	No	2No	Disposition of Sr-90 unknown.
143	1745	31-4061-01	Bonoccolto, Giracimo, M.D. 123 E. 61st St. New York, NY	2Un	No	No	No	No	No	2No	Need to know disposition of Sr-90 source.
144	1747	35-0130-01	Drs. Boggs, Sukman, and Shultz 1200 N. Walker Suite 129 Oklahoma City, OK	2Un	No	No	No	No	No	2No	Possible external radiation hazard from 750 Ci Co-60 source.

Attachment 1. (continued)

ERC/ORNL

Group
Docket AnalysisDate: May 22, 1980

No.	Record No.	License No.	Licensee	Orig. Cat.	Analyst					Group Cat.	Comments
					DGJ	LEB	JSE	HWD	CFH		
146	1776	34-0501-01	Bendix Aviation Corp., 203 West 3rd St. Cincinnati, OH	2Un	OK	No	No	No	No	2No	Need to know disposition of Sr-90.
147	1781	48-2412-01	Beloit Iron Works Beloit, WI	2Un	No	No	No	No	No	2No	Need to know disposition of Sr-90 gauges. Presently hold 48-2412-02.
148	2153	21-0021-13	Michigan State U. East Lansing, MI	2Un	Un	Un	Un	No	No	2No	Possible contamination from Sr-90. Presently hold 21-0021-29, -30, -32.
151	2182	22-0057-01	Minnesota Mining and Mfg. Co., 2301 Hudson Rd. St. Paul, MN	2No	No	No	No	No	No	2No	Need to know disposition of 200 mCi of Sr-90 in any form used in fabricating sealed sources. Presently hold 22-0057-03, -06, -07, -32G, -34G, -56 MA, -58MD, -59MD, -60G, -61.
152	2183	22-0057-04	Minnesota Mining and Mfg. Co. 44 McKnight Rd. St. Paul, MN	2No	No	No	No	No	No	2No	1000 mCi of Sr-90 used in fabrication.
153	2184	22-0057-02	Minnesota Mining and Mfg. Co. 2301 Hudson Rd. St. Paul, MN	2No	No	No	No	No	No	2No	1 Ci amounts could be possessed of diverse by-product materials.
154	2185	22-0057-03	Minnesota Mining and Mfg. Co. St. Paul, MN	2Un	No	No	No	No	No	2No	Need to know disposition of 80 mCi of Sr-90.

Attachment 1. (continued)

ERC/ORNL

Group
Docket Analysis

Date: May 23, 1960

No.	Record No.	License No.	Licensee	Orig. Cat.	Analyst					Group Cat.	Comments
					DGJ	LEB	JSE	HWD	CFH		
155	2204	22-0218-02	University of Minnesota Hospitals Minneapolis, MN	2Un	No	No	No	No	No	2No	Need to know disposition of 2000 Ci Co-60 source. Presently hold 22-0218-29, -30, -31.
156	2237	33-1281-01	Minot Eye, Ear, Nose & Throat Clinic 119A Main St. Minot, ND	2Un	No	No	No	No	No	2No	Need to know disposition of 50 mCi Sr-90 source.

Attachment 2.

<u>Box No.</u>	<u>Analyst</u>	<u>ID</u>	<u>Comment</u>
31	LEB	34-5770-1	OK
		34-501-4	OK
		15-3608-1	OK
		29-3405-1	OK
<hr/>			
23	JSE	21-21-11	OK
		21-215-3	OK
		22-176-9	OK
		22-218-25	OK
<hr/>			
37	BCR	5-5654-1	OK
		46-4254-1	OK
		11-5209-1	OK
		209-3717-29	OK
<hr/>			
25	LEB	3-2531-1	OK
		31-191-4	OK
		5-3582-1	OK
		37-2895-1	OK

Attachment 3.

RADIONUCLIDES WHERE RESIDUALS WERE ABOVE SCREENING LEVELS*

Radionuclide	T _{1/2} (yrs.)	ALI (uCi)	Frequency	
			After Initial Screening	After Group Analysis
Sr-90	29	0.73	55	49
B.P. ^a	5.27 ^b	7.3	53	27
H-3	12.3	14,600	45	18
Co-60	5.27	22	42	24
Cs-137	30	36.5	22	10
Cl-36	3.01(5) ^c	60	8	--
F.P. ^d	29 ^e	0.73	4	3
Fe-55	2.7	2190	3	1
Eu-154	16	7.3	2	--
I-129	1.6(7)	3.2	2	--
C-14	5730	6420	2	2
Ni-63	92	150	2	--
Kr-85	10.7	21,900	2	--
Ac-227	21.8	5.8(-3)	2	2
Pm-147	2.62	150	2	1
Tl-204	3.8	66	1	1
Cs-134	2.06	29	1	--
Am-241	432	0.015	1	1

^aB.P. = Byproducts + Activation Material

^bHalf-life for Co-60 was used for the effective half-life of byproduct material.

^cThe notation a(x) indicates a x 10^x.

^dF.P. = fission products.

^eHalf-life for Sr-90 was used for the effective half-life of fission products.

*This tabulation represents the initial screening of about 2300 docket, with 158 docket initially categorized as NO or UN. After group analysis 87 remained classed as NO or UN. If a docket was classified as UN or NO and was in either class for some reason other than a TSF>100, the radionuclide(s) on the license was (were) not included in this listing.

Attachment 4.

Listing of Licenses in General Files,
But Not in Separate Dockets

<u>License</u>	<u>Company</u>	<u>Box No.</u>
31-5429-1 31-5429-2	Anton Electronic Labs, Inc., Brooklyn, NY 1958 General File	41/114
17-532-1	Louisiana State University, Baton Rouge, LA Appl. for Renewal of 17-532-1 (2 files) (Also see 1958 General File)	41/114
19-994-1	Johns Hopkins Medical Institute Baltimore, MD 1958-1959 General Files	39/114
19-585-10	Johns Hopkins University Baltimore, MD 1960 General File	39/114
19-585-5 19-585-7 19-585-8 19-585-10 19-585-14 19-585-15 19-585-16 19-585-17 19-585-18 19-585-19 19-585-20 19-585-21 19-585-23 19-585-24 19-585-25	Johns Hopkins University Baltimore, MD 1959 General File	39/114
26-1256-1	Johns-Manville Research Center Central Chemical and Physical Research Dept. Manville, NJ 1958 General File	39/114

Attachment 5.

Sample Material Available
from General File Folders

150

<COMMENT >INFORMATION ON THIS LICENSE TAKEN FROM GENERAL FILES & INSPECTION REPORTS. WASTE WAS BURIED IN OWN PRIVATE BURIAL GROUNDS. INSPECTION REPORT INDICATED IT WAS A VIOLATION IN CERTAIN WAYS. METHOD WAS ALTERED. H-3 POSSESSION LIMIT: 5 CI; INDIVIDUAL ISOTOPE SHIPMENTS MUST BE LESS THAN OR EQUAL TO 100 CI (LIMIT/ISOTOPE).

151

<COMMENT >THIS INFORMATION COMES FROM THE 1957 GENERAL FILES ON CARNEGIE. CARNEGIE HOLDS A BROAD SPECIFIC LICENSE FOR ATOMIC #'S 3-83 INCLUSIVE. THIS WAS A LICENSE TO INCREASE THEIR SEALED SOURCE POSSESSION LIMIT FOR CO-60. DISPOSAL FACILITIES AVAILABLE AT NUCLEAR RESEARCH CENTER, SAXONBURG, PA. BY BURIAL. GENERAL FILE STATES ON INCIDENT OF INCINERATING WASTE BY MISTAKE.

152

<COMMENT >SOURCES MAY BE USED AT FIELD LOC. AS WELL. POSSESSED 8-CO-60 SOURCES WITHOUT PROPER AUTHORIZATION AT TIME OF INSPECTION. THIS WAS A CONSIDERABLE PROBLEM. INFORMATION ON THIS LICENSE COMES FROM THE 1957 GENERAL FILE ON THIS FILM.

153

<COMMENT >INFORMATION ON THIS LICENSE COMES FROM THE GENERAL FILE ON THIS HOSPITAL.

154

<COMMENT >USED IN DENSITY GAUGES. DURING INSPECTION, 200 MCI OF UNLICENSED CO-60 WAS IN THEIR POSSESSION. THIS WAS REPORTED TO BE DISPOSED OF LATER AT OAK RIDGE. INFORMATION ON THIS LICENSE COMES FROM AN INSPECTION REPORT IN THE GENERAL FILES.

324

<COMMENT >LICENSE USED FOR SERVICE IRRADIATION PRODUCTS OF ELECTRONIC COMPONENTS CONTAINING MATERIALS BETWEEN ATOMIC #3-83. IRRADIATION SOURCE COVERED UNDER 12-0764-03. INFORM. ON THIS LICENSE TAKEN FROM GENERAL FILE, INSPECTION REPORT.

325

<COMMENT >FOR USE IN HIGH IRRADIATION CELL. 3900 CI ON HAND AS OF 11/01/56. INFORMATION TAKEN FROM 1956 GENERAL FILE INSPECTION REPORT. 2 UNLICENSED CO-60 (5CI) SOURCES IN THEIR POSSESSION.

326

<COMMENT >INFORMATION OBTAINED FROM GENERAL FILE, 1957. IT IS ASSUMED THAT THE SOURCE IS SEALED.

328

<COMMENT >USED FOR MEASUREMENT OF ADHESIVE FILM WEIGHT. DISPOSAL TO BE PERFORMED BY TINCULAB. THE INFORMATION ON THIS LICENSE WAS TAKEN FROM THE 1957 FIRM'S GENERAL FILE.

329

<COMMENT >EXPENDED SOURCES RETURNED TO GAMMA IND. FOR DISPOSAL. CO-60 USED FOR 'OPEN-AIR' RADIOGRAPHY. THIS WAS A COMPLIANCE VIOLATION. INFORMATION ON THIS LICENSE TAKEN FROM A GENERAL FILE.

330

<COMMENT >INFORMATION ON LICENSE IS TAKEN FROM GENERAL FILE INSPECTION REPORT. PLAN TO RETURN SOURCES TO SUPPLIER - TRACELAB. LICENSEE POSSESSED 10UCI SR-90 SOURCE IN VIOLATION. WORK WITH CO-60 WAS FORMERLY DONE IN HOOPER BLDG., 1200 PETERS ST., NEW ORLEANS, LA.

DISTRIBUTION

INTERNAL DISTRIBUTION

1. H. W. Dickson
2. C. F. Toloway
3. S. V. Kaye
4. F. R. Mynatt
5. P. S. Rohwer
6. ORNL Laboratory Records Department, R.C.

EXTERNAL DISTRIBUTION

- 7-8. DOE Technical Information (DOE-TIC)
9. T. F. Carter, Jr., Deputy Director, Fuel Cycle and Material Safety, U.S. Nuclear Regulatory Commission, 7915 Eastern Avenue, Silver Spring, Maryland 20910
- 10-11. W. T. Crow, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, 7915 Eastern Avenue, Silver Spring, Maryland 20910
12. R. E. Cunningham, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, 7915 Eastern Avenue, Silver Spring, Maryland 20910
13. Mr. W. J. Dircks, Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, 7915 Eastern Avenue, Silver Spring, Maryland 20910
- 14-15. D. A. Nussbaumer, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, 7902 Norfolk Avenue, Bethesda, Maryland 20014
16. R. G. Page, Chief, Uranium Fuel Licensing Branch, U.S. Nuclear Regulatory Commission, 7915 Eastern Avenue, Silver Spring, Maryland 20910
- 17-18. Division of Technical Information and Document Control, U.S. Nuclear Regulatory Commission, 7902 Norfolk Avenue, Bethesda, Maryland 20014
19. Joann Epler, Evaluation Research Corporation, 25 Tennessee Avenue, Oak Ridge, Tennessee 37830
20. Assistant Manager, Office of Energy Research and Development, Department of Energy, Oak Ridge Operations, Oak Ridge, Tennessee 37830