



Seventh Annual Report Of Radiation Exposures For AEC & AEC Contractor Employees

1974

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PREFACE

In 1968, the U.S. Atomic Energy Commission (AEC) established a program for reporting certain occupational radiation exposure information to a central radiation records repository maintained at the Union Carbide Computing Technology Center, Oak Ridge, Tennessee. Previous annual summaries (WASH-1350-R1 through WASH-1350-R6) were reported for the years 1968-1973 and included data on AEC contractor employees as well as on employees of companies in the private sector licensed by the AEC. These reports may be seen at ERDA Public Documents Room, 20 Massachusetts Ave., NW., Washington, D.C.

In January 1975, two new agencies, the Energy Research and Development Administration (ERDA) and the U.S. Nuclear Regulatory Commission (NRC) were formed and now share the responsibilities previously held by the AEC. Previous AEC licensees now report to NRC while the contractors report to ERDA. This report contains only the data from 1974 AEC contractors (now ERDA contractors) as required by Manual Chapter 0525.

WHOLE-BODY RADIATION EXPOSURES

Introduction

The 1974 whole-body radiation exposure reporting requirements were changed from previous years as a result of a revision of Manual Chapter 0525 on January 7, 1975. Two major changes were prescribed. Improved personnel dosimetry methods now permit more precise measurements of low radiation doses and greater sensitivity. Therefore, instead of asking for the number of employees having between 0-1 rem dose equivalents, this exposure range has been subdivided into six ranges as indicated in the tables. The second major change is the requirement that the contractors now report the whole-body exposures according to type of facility in which the major portion of the dose equivalent was received. These changes permit a better assessment of contractor performance and indicate which facilities are responsible for the largest collective dose equivalent.

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General Trends

Tables 1 and 2 show data for the last 11 years of the Atomic Energy Commission (AEC) and its contractor employees. Table I illustrates that as time progresses, the number of personnel receiving large dose equivalents has been reduced. It also shows that fewer employees are being monitored each year. Monitoring is required where the potential exists for the individual to receive a dose or dose commitment in any calendar quarter in excess of 10 percent of the quarterly standards as prescribed in AEC Manual Chapter 0524. However, many contractors badge everyone at a site rather than only those working in radiation areas. Other contractors in their efforts to minimize radiation exposures have, in recent years, highly restricted access to radiation areas and thus reduced the number of people monitored. Therefore, the total number monitored is not necessarily an indicator of the potential for personnel radiation exposure.

As indicated in Table 1, most of the personnel receive an undetectable dose equivalent. Prior to 1974, contractors were asked only to report the number of personnel in the 0-1 rem range making a total man-rem dose equivalent estimate difficult.

The trend in higher ranges of exposures is shown in Table 2. Individuals with dose equivalents of less than 1 rem were excluded and the midpoints of the ranges were used to calculate the man-rem dose equivalents. The percent of the employees with dose equivalents greater than 1 and 2 rem are presented. The corresponding number of employees is given in parenthesis. It is evident that the percentage and number of employees with high dose equivalents as well as the total man-rem dose equivalent is declining as time progresses. In 1974, 45 percent of the total man-rem dose equivalent was distributed to those receiving less than 1 rem. Therefore, Table 2 should be interpreted as the trend for higher ranges of exposures only.

Table 1
WHOLE-BODY RADIATION EXPOSURE HISTORY FOR AEC AND AEC CONTRACTOR EMPLOYEES

NUMBER OF ESTIMATED DOSE EQUIVALENTS IN EACH OF FOLLOWING RANGES (REMS)

						`				•	•			TOTAL
YEAR	0-1*	1-2	2-3	3-4	4 - 5	5-6	6-7	7 - 8	8-9	9-10	10-11	11-12	>12	MONITORED
1964	122711	3583	1823	575	176	43	20	10	7	6	10	1		128965
1965	128360	4158	1704	515	294	70	32	26	25	22	6	2		135214
1966	131522	3706	1630	597	313	88	47	24	6	2			1	137939
1967	102510	3472	1572	555	168	35	29	23	17	4	1			108386
1968	103206	2799	1408	425	144	3	1							107986
1969	98625	2554	1313	335	86	4					1			102918
1970	92185	2698	1329	279	158	5	4	2		1				96661
1971	90640	2380	888	275	118	8	3			<u> </u>	1		2	94315
1972	86077	2130	929	219	95	8	2							89460
1973	89071	1944	727	172	60	2	1							91977
1974	75485	1683	692	149	40	4								78005

^{*}Approximately 80 percent of these employees received an undetectable dose equivalent.

^{**}Data for 1966 and 1967 differ from previous reports due to the discovery of an error in the radiation exposure records of one major contractor.

Table 2

WHOLE-BODY EXPOSURE HISTORY OF AEC AND AEC CONTRACTOR EMPLOYEES

	(Percent of emp1	loy ees wi th dose		
	equivalent g	greater than)	Tot al	Tot al
Year	1 rem (number)	2 rem (number)	Man rem*	Monitored
1964	4.85 (6254)	2.07 (2671)	13411	128965
1965	5.07 (6854)	1.99 (2696)	14818	135214
1966 *	5.35 (7387)	1.98 (2738)	15454	137939
1967 **	6.11 (6622)	2.23 (2415)	13715	108386
1968	4.43 (4780)	1.83 (1981)	9877	107986
1969	4.17 (4293)	1.69 (1739)	8707	102918
1970	4.63 (4476)	1.84 (1778)	9137	96661
1971	3.90 (3675)	1.37 (1295)	5395	94315
1972	3.78 (3383)	1.40 (1253)	6170	89460
1973	3.16 (2906)	1.05 (962)	5623	91977
1974	3.26 (2543	1.13 (882)	4935	78005

^{*}Individuals with dose equivalent of less than 1 rem have been excluded. In 1974, this represented approximately 45 percent of the total man rem. Therefore, these data reflect only the trend in high ranges of dose equivalents rather than the total collective dose equivalent.

^{**}Data for 1966 and 1967 differ from previous reports due to the discovery of an error in the radiation exposure records of one major contractor.

Distribution of Annual Whole-Body Exposures by Facility Type-1974

Table 3 provides a breakdown of the 1974 whole-body dose equivalents according to facility type. This was the first year that the contractors were asked to submit data of this kind and many were unable to adjust their reporting systems in time to fully comply. They instead reported as a group under the General Research facility type. It was intended that the General Research facility type would include only those that received their radiation exposures from a variety of sources. It is expected that subsequent reports will more truly represent the source of the radiation exposure than does this 1974 report.

Table 4 gives the average annual whole-body dose equivalent for each facility type. As expected, the highest average exposures occur in reactor, fuel processing, and accelerator facilities. However, due to the large number of workers, General Research and Weapons Fabrication and Testing (F&T) produce the highest collective dose equivalent.

Appendix A contains whole body dose equivalent distributions by facility type as reported to each of the 10 operations offices or Naval Reactor offices.

Appendix B contains whole-body dose equivalent distributions for each contractor. These are placed alphabetically under their respective field office or Naval Reactors office. Exposure distributions for each AEC field office or area office are also presented.

TABLE 3

DISTRIBUTION OF ANNUAL WHOLE BODY EXPOSURES FOR ALL EMPLOYEES 1974

FACILITY TYPE	TOTAL MONITR	KEAS.	<0.10	0.10 0.25	0.25 0.50	0.50 0.75	0.75 1.00	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	TOTAL 9-10 10-11 11-12 >12 MAN-REM
REACTOR	3757	1664	619	335	333	245	139	212	169	36	5					1378
FUEL FAB	1076	50	479	249	161	63	23	25	25	1						291
FUEL PROC	2118	365	588	256	236	180	128	242	105	17	1					1077
URAN ENRO	H 2249	1652	356	144	66	19	7	5								93
WEAPON F&	T 19026	10295	4183	2066	1555	365	193	263	74	30	2					2244
IRRAD FAC	L															
GEN RESEC	н 31612	20702	6561	2046	1040	491	272	378	101	11	8	2				2526
ACCELERAT	R 6674	4317	1139	438	234	1 09	90	192	90	44	20	1				1131
OTHER	9720	2324	4895	929	602	302	188	341	124	10	4	1				1866
VISITORS	45802	43438	1686	436	158	44	12	23	5							305
AEC OFFCS	1773	1395	268	63	38	5	1	3								47
TOTAL	123807	86202	20774	6962	4423	1823	1053	1684	693	149	40	4				10958

MAN-REMS PER FACILITY TYPE 1974

FACILITY TYPE	TOTAL NO. INDIVIDUALS MONITORED	NO. INDIVIDUALS WITH MEASURABLE EXPOSURE	TOTAL NO.	AVERAGE EXPOSURE (REM) PER INDIVIDUAL (BASED ON ALL EXPOSURES)	AVERAGE EXPOSURE (REM) PER INDIVIDUAL (BASED ON MEASURABLE EXPOSURES)
	+				
REACTOR	3757	2093	1 378	•37	.66
FUEL FAB	1076	1026	291	•27	•28
FUEL PROC	2118	1753	1077	•51	.61
URAN ENRCH	2249	597	93	. 04	•16
WEAPON FET	19026	8731	2244	•12	•26
IRRAD FACL	0				
GEN RESRCH	31612	10910	2526	• 08	•23
ACCELERATR	6674	2357	1131	•17	-48
OTHER	9720	7396	1866	•19	-25
VISITORS	45802	2364	305	•01	•13
AEC OFFCS	1773	378	47	• 03	•13

Ratios of Average Exposures

In some instances, it might be desirable to compare exposures associated with the same facility type but at different locations. However, exposure data alone is inadequate in assessing whether radiation exposures are reduced to as low as practicable. Variables such as facility age and design, along with all the other factors which enter into accomplishing the program objectives may by far outweigh the efforts of management, radiation workers, and safety personnel in reducing personnel exposures to the levels that exist at similar facilities elsewhere.

Average exposure ratios have been calculated for each facility type under the operations offices and presented in Table 5. The average exposure ratio is defined as the ratio of the average personnel exposure of the subgroup and the average personnel exposure of the group. The numbers within the parentheses of Table 5 are derived by discarding all "less than measurable exposures" while those outside the parentheses are calculated by discarding all exposures less than 0.5 rem. No interpretation of these numbers is possible other than that those numbers less than 1 indicate low average exposures relative to the average for that facility type while those ratios larger than 1 indicate a higher average exposure relative to the average for that facility type.

Pable 5

Average Exposure Ratio

1974

Field Office	Reactor	Fuel <u>Fabric</u>	Fuel Process	Uran Enrich	Weapons Fab&Test	Irrad Facil	General Research	Acceler	<u>Other</u>	Visitr	AEC Offices
					1.03(1.44))	1.08(1.35)		.72(.83)	.62(.70)	1.17(1.34)
Albuquerque Operations					•		1.12(1.12)	1.04(1.70)	1.26(1.31)	1.01(1.23)	(.40)
Chicago Operations	.66(.45)						1.12(1.12)		. ,		.66(1.23)
Idaho Operations	.87(.73)		1.12(1.29)								.06(1.23)
Nevada Operations					.75(.62)					(.77)	(.41)
·	(.17)	.72(.68)		1.00(1.00)	.71(.41)		.86(.58)		.67(.24)	.62(.77)	(.47)
Oak Ridge Operations	•	./2(100)			•		.89(1.23)		.66(1.17)	(.41)	(.89)
Pittsburgh Naval Reactors	.63(.45)						.09(1.23)				
Richland Operations	1.42(2.64)	1.46(2.94)					1.00(1.27)		1.02(2.73)	(1.62)	(1.60)
San Francisco Operations	.43(.60)				.53(.78)		1.00(.62)	.66(.29)	.87(.64)	(.48)	(.69)
							.72(.67)		1.12(2.73)	1.13(2.86)	(.72)
Schenectady Naval Reactors							•				((2)
Savannah River Operations	.64(.65)	.89(1.05)	.94(.88)		.83(.84)		1.06(1.38)		.90(.83)		(.42)

The average exposure ratio has been defined as the average personnel exposure of the facility subgroup divided by the average personnel exposure of the total facility group. The numbers inside and outside the parenthesis represent the ratios where all measurable exposures and all exposures greater than 500 mrem were considered, respectively.

INTERNAL EXPOSURES

AEC Manual Chapter 0525 requires AEC contractors to submit a report on personnel with radioactive material deposited in their bodies. A report was required when:

- a. any uptake of radioactive material occurring during the reporting year that independently, or when added to a current burden, is estimated to result in dose commitment to the critical organ in excess of 50 percent of the pertinent annual dose equivalent standards set forth in appendix 0524.
- b. any previously unreported uptake of radioactive material that is determined to have been reportable according to the above criteria by reason of more recent dose estimates.

In 1974, 56 workers were determined to have radioactive material deposited in their bodies which produced 50 percent of the annual dose equivalent standard for a critical organ. Many of these had had a previous organ burden but were not reportable according to the Manual Chapter criteria. Additional exposure in 1974 added to their previous organ burden and thus they were reported in 1974. Fourteen of the uranium workers were reported in one or both of the two preceding years but determined to have received an additional uptake during 1974 and were included in the 1974 report.

Table 6 gives a breakdown of these 56 cases where the annual dose commitment exceeded 50 percent of an organ dose standard. The radionuclides are specified as well as the critical organ. The maximum annual dose equivalent limit for the lungs is 15 rem and that for bone is 30 rem as prescribed in AEC Manual Chapter 0524.

TABLE 6	SUMMARY OF EXPOSURES RESULTING IN INTERNAL	L BODY
	DEPOSITIONS OF RADIOACTIVE MATERIALS FOR C	CY 1974

				D		_					
<u>Nuclide</u>	Organ					<u>]</u>	Dose (Rem	1)			
		0-5	5-10	10-15	15-20	20-25	25-30	30-50	50-100	100-200	200-300
222 242											
239-240 Plutonium	Bone				1						
238-239-240 Plutonium	Bone				2						
239-240-241 Plutonium	Lung		3								
239-240 - 241 Plutonium Am	Lung		12	4	2		1	1			
235 Uranium	Lung		1								
234 - 235 Uranium	Lung		2								
234-235 -23 8 Uranium	Lung		19	6							
Natural Uranium	Lung		2								

WORKER TERMINATIONS

There were 5356 monitored workers in 1974 who terminated their employment with the AEC or AEC contractors. Table 7 gives the length of employment time distribution. Of particular concern for personnel radiation protection purposes is the large number of workers terminating within 90 days of their employment.

It is possible for certain craft workers to be employed by several AEC contractors or licensees during a short period of time and receive a cumulative dose equivalent which exceeds the radiation exposure standards. A check of the AEC contractor records revealed that no AEC contractor employees could be classified as transient radiation workers. Transient workers are defined as workers who began and terminated their employment with two or more employers within a calendar quarter. Short term employment of AEC contractor employees by AEC licensees is a possibility but it is unlikely that the number of workers is large.

TABLE 7

LENGTH OF EMPLOYMENT FOR INDIVIDUALS TERMINATING IN 1974

1-89 DAYS	90-180 DAYS	180-365 DAYS	1-2 YEARS	2-4 YEARS	4-6 YEARS	>6 YEARS	TOTAL NO. OF INDIVIDUALS TERMINATING	NO. OF TERMINATION REPORTS
1169	525	541	449	482	.293	1897	5356	5413

		•	

APPENDIX A

Operations Office Report

Distribution of Annual Whole-Body Exposures by Facility Type

TABLE 1

DISTRIBUTION OF ANNUAL WHOLE BODY EXPOSURES ALBUQUERQUE OPERATIONS OFFICE 1974

FACILITY TYPE	TOTAL MONITR	< MEAS.	<0.10	0.10 0.25	0.25 0.50	0.50 0.75	0.75 1.00	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	TOTAL 9-10 10-11 11-12 >12 MAN-REM
REACTOR																
FUEL FAB																
FUEL PROC																
URAN ENRCH	1															
WEAPON FET	r 5296	441	1357	1 378	1286	312	172	244	74	30	2					1802
IRRAD FACL	_															
GEN RESRCH	1 5143	3616	713	387	177	81	54	83	29		3					478
ACCELERATE	₹															
OTHER	441	317	76	20	13	9	3	2	1							26
VISITORS	2766	2005	571	157	31	2										69
AEC OFFCS	514	335	104	41	28	2	1	3								30
TOTAL	14160	6714	2821	1983	1535	406	230	332	104	30	5					2405

DISTRIBUTION OF ANNUAL WHOLE BODY EXPOSURES CHICAGO OPERATIONS OFFICE 1974

FACILITY TYPE	TOTAL MONITR	MEAS.	<0.10		0 • 25 0 • 50	0 • 50 0 • 75	0.75 1.00	1-2	2-3	3-4	4-5	5-6 	6-7	7-8	8-9	9-10 1	0-11	11-12 >12	TOTAL MAN-REM
REACTOR	143	7	57	30	25	13	6	4		1									40
FUEL FAB																			
FUEL PROC																			
URAN ENRCH	1																		
WEAPON FET	r																		
IRRAD FACE																			
GEN RESECT	1 5866	3527	1367	449	234	99	62	87	28	6	5	2							606
ACCELERATE	1807	623	283	257	151	83	79	182	86	42	20	1							967
OTHER	749	338	216	110	28	20	11	12	4	5	4	1							132
VISITORS	5095	3842	836	233	114	36	11	18	5										197
AEC OFFCS	282	262	18	2															1
TOTAL	13942	8599	2777	1081	552	251	169	303	123	54	29	4							1943

TABLE 3

DISTRIBUTION OF ANNUAL WHOLE BODY EXPOSURES IDAHO OPERATIONS OFFICE 1974

FACILITY TYPE	TOTAL MONITR	< MEAS.	<0.10		0.25 0.50	0.50 0.75	0.75	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10 10-11 11-12 >12 MA	OT AL N-REM
REACTOR	1924	1364	1 83	123	91	48	39	53	19	4							270
FUEL FAB																	
FUEL PROC	836	317	87	105	95	61	31	80	43	16	1						412
URAN ENRC	н																
WEAPON FE	т																
IRRAD FACE	L																
GEN RESRCI	н																
ACCELERATE	R																
OTHER																	
VISITORS																	
AEC OFFCS	230	204	15	6	2	3											4
TOTAL	2990	1885	285	234	188	112	70	133	62	20	1						686

DISTRIBUTION OF ANNUAL WHOLE BODY EXPOSURES NEVADA OPERATIONS OFFICE 1974

TOTAL

1930 2 18936 236 62 49 12 2 5

EXPOSURE RANGES (REMS)

FACILITY TYPE	TOTAL MONITR	KEAS.	<0.10		0.25 0.50	0.50 0.75	0.75 1.00	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	>12	TOTAL MAN-REM
REACTOR																				
FUEL FAB																				
FUEL PROC																				
URAN ENRC	н																			
WEAPON FE	T 10122	9769	225	60	49	12	2	5												57
IRRAD FACI	L																			
GEN RESRC	н																			
ACCELERATI	R																			
OTHER																				
VISITORS	8877	8867	8	2																i
AEC OFFCS	30.3	300	3																	

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TABLE 5

DISTRIBUTION OF ANNUAL WHOLE BODY EXPOSURES OAK RIDGE OPERATIONS OFFICE 1974

FACILITY TYPE	TOTAL MONITR	MEAS.	<0.10	0.10 0.25	0.25 0.50	0.50 0.75	0.75 1.00	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10 10-11 1	TOTAL 1-12 >12 MAN-REM
REACTOR	18	9	6	3													1
FUEL FAB	670	8	332	183	99	29	10	8	1								127
FUEL PROC																	
URAN ENRC	1 2249	1 652	356	144	66	19	7	5									93
WEAPON FET	Г 3411		2539	601	210	35	16	10									362
IRRAD FACE	-																
GEN RESRCI	6263	3653	2026	308	126	74	35	33	7	1							350
ACCELERATE	₹																
OTHER	3810	91	3498	183	28	6	2	2									226
VISITORS	4886	4716	132	25	10	3											17
AEC OFFCS	40	6	33	1													2
TOTAL	21347	10135	8922	1448	539	166	70	58	8	1							1178

TABLE 6

DISTRIBUTION OF ANNUAL WHOLE BODY EXPOSURES PITTSBURGH NAVAL REACTORS OFFICE 1974

FACILITY TYPE	TOTAL MONITR	MEAS.	<0.10	0.10 0.25		0.50 0.75	0.75 1.00	1-2	2-3	3-4	4-5	5-6 	6-7	7-8	8-9	9-10	10-11	11-12 >	12 MA	OT AL
REACTOR	428	122	134	62	50	28	17	15												91
FUEL FAB																				•
FUEL PROC																				
URAN ENRCI	н																			
WEAPON FET	T																			
IRRAD FACL	_																			
GEN RESRCI	H 2166	687	763	250	214	117	56	61	18											421
ACCELERATE	₹																			721
OTHER	731	495	86	53	53	25	12	7												70
VISITORS	608	560	47	1																3
AEC OFFCS	42	24	14	3	1															2
TOTAL	3975	1888	1044	369	318	170	85	83	18											
																				587

TABLE 7

DISTRIBUTION OF ANNUAL WHOLE BODY EXPOSURES RICHLAND OPERATIONS OFFICE 1974

FACILITY TYPE	TOTAL	<pre>ME AS •</pre>	<0.10	0.10 0.25		0.50 0.75	0.75 1.00	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	TOTAL 9-10 10-11 11-12 >12 MAN-REM
REACTOR	390		21	25	20	31	27	82	149	30	5					679
FUEL FAB	103		14	14	35	11	3	6	19	1						86
FUEL PROC																
URAN ENRC	н															
WEAPON FE	τ															
IRRAD FAC	L															
GEN RESRCI	H 1064	21	439	326	117	61	34	52	11	3						307
ACCELERATI	R															
OTHER	1470	19	148	343	333	183	119	227	93	5						1001
VISITORS	11	3	1	5	2											2
AEC OFFCS	20		8	5	7											4
TOTAL	3058	43	631	718	514	286	183	367	272	39	5					2079

TABLE 8

DISTRIBUTION OF ANNUAL WHOLE BODY EXPOSURES SAN FRANCISCO OPERATIONS OFFICE 1974

	OTAL IONITR	KEAS.	<0.10	0.10 0.25	0.25 0.50	0.50 0.75	0.75 1.00	1-2	2-3	3-4	4-5	5-6 	6-7	7-8 	8-9	9-10 	10-11	11-12	>12	 TAL -REM
REACTOR	28		1	5	16	6														11
FUEL FA8																				
FUEL PROC																				
URAN ENRCH																				
WEAPON FET	76	61	5	6	3	1														3
IRRAD FACL																				
GEN RESRCH	6701	5848	651	103	55	20	5	15	3	1										122
ACCELERATR	4867	3694	856	181	83	26	11	10	4	2										163
OTHER	297	211	60	14	6	2	1	3												14
VISITORS	23023	22942	71	10																5
AEC OFFCS	69	46	20	3																2
TOTAL	35061	32802	1664	322	163	55	17	28	7	3										320

TABLE 9

DISTRIBUTION OF ANNUAL WHOLE BODY EXPOSURES SCHENECTADY NAVAL REACTORS OFFICE

FACILITY TYPE	TOTAL MONITR	KEAS.	<0.10	0.10	0.25 0.50	0.50 0.75	0.75 1.00	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	>12	TOTAL MAN-REM	
REACTOR																					
FUEL FAB																					
FUEL PROC																					
URAN ENRCH	1																				
WEAPON FET	r																				
IRRAD FACL	-																				
GEN RESRCH	3807	3222	355	137	61	19	8	5												91	
ACCELERATE	₹																				
OTHER	654	425	56	42	37	17	16	43	18											158	
VISITORS	536	503	20	3	1	3	1	5												12	
AEC OFFCS	89	86	2	1																	
TOTAL	5086	4236	433	183	99	39	25	53	18											261	

TABLE 10

DISTRIBUTION OF ANNUAL WHOLE BODY EXPOSURES SAVANNAH RIVER OPERATIONS OFFICE 1974

FACILITY TYPE	TOTAL MONITR	MEAS.	<0.10		0.25 0.50	0.50 0.75	0.75 1.00	1-2	2-3	3-4	4-5	5-6 	6-7	7-8 	8-9	9-10 10-11 11-12 >12	TOTAL 2 MAN-REM
REACTOR	826	162	217	87	131	119	50	58	1	t							286
FUEL FAB	303	42	1 33	52	27	23	10	11	5								78
FUEL PROC	1282	48	501	151	141	119	97	162	62	1							665
URAN ENRC	н																
WEAPON FG	T 121	24	57	21	7	5	3	4									21
IRRAD FAC	L																
GEN RESRC	H 602	128	247	86	56	20	18	42	5								1 52
ACCELERATI	R																
OTHER	1538	402	753	164	102	40	24	45	8								238
VISITORS																	
AEC OFFCS	184	132	51	1													3
TOTAL	4856	938	1959	562	464	326	202	322	81	2							1443

AEC FIELD OFFICE/AREA DFFICE EMPLOYEE AVERAGE WHOLE BODY EXPOSURES

PAGE 1

1974

OFF ICE	<0.10	0.10 0.25	0.25 0.50		0.75 1.00	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	TOTAL >12 MAN-REM
U. S. AEC HQ GOO- 01-0000-00	2		2														1
SUBTOTAL	2		2														1
ALBUQUERQUE OPERATIO G01-00-0000-00	296	27	4	1													22
ANARILLO AREA OFFICE G01-01-0000-00	19	5	1														2
BURLINGTON AREA OFFI G01-02-0000-00	3																
DAYTON AREA OFFICE G01-03-0000-00	16	4															2
KANSAS CITY AREA OFF G01-04-0000-00																	
LOS ALAMOS AREA OFFI GO1-05-0000-00	15	5	2	1	1	1											5
PINELLAS AREA OFFICE G01-06-0000-00	2																
ROCKY FLATS AREA OFF G01-07-0000-00	1	20	25	1		2											17
SUBTOTAL	352	61	32	3	1	3											48
BATAVIA AREA OFFICE G03-01-0000-00	1																
CHICAGO OPERATIONS O GO3-00-0000-00	15	1															1
NEW BRUNSWICK LAB G03-03-0000-00	17	3															1
SUBTOTAL	33	4															2
IDAHO OPERATIONS OFF G05-00-0000-00	15	6	2	3													4
SUBTOTAL	15	6	2	3													4

AEC FIELD OFFICE/AREA OFFICE EMPLOYEE AVERAGE WHOLE BODY EXPOSURES

WERAGE WHOLE BODY EXPO: 1974

OFFICE	<0.10		0.25	0.75	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	>12	TOTAL MAN-REI	
NEVADA OPERATIONS OF G06-90-0000-00	•																	
SUBTOT AL	4																	
CINCINNATI AREA OFFI G08-01-0000-00																		
DAK RIDGE OPERATIONS G08-90-0000-00	33	1															;	2
PADUCAH AREA OFFICE G08-02-0000-00																		
PORTSMOUTH AREA OFFI G08-03-0000-00																		
SUBTOTAL	33	1																2
IDA BRANCH OFFICE G09-01-0000-00																		
PITTSBURGH NAVAL REA G09-00-0000-00	13	3	1															2
SHIPPINGPORT BRANCH G09-02-0000-00	1																	
SUBTOTAL	14	3	1															2
RICHLAND OPERATIONS G10-00-0000-00	8	5	7															4
SUBTOTAL	8	5	7															•
SAN FRANCISCO OPERAT G11-00-0000-00	20	3																2
SUBTOTAL	20	3																2
SCHENECTADY NAVAL RE G13-00-0000-00	2	1																
SCHENECTADY NAVAL RE G13-01-0000-00																		

PAGE 2

AEC FIELD OFFICE/AREA DFFICE EMPLOYEE AVERAGE WHOLE BODY EXPOSURES 1974

PAGE 3

OFF I CE	<0.10	0.10 0.25	0.25	0.50 0.75	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9		11-12	>12	TOTAL MAN-RE	M
SUBTOTAL	2	1															
SAVANNAH RIVER OPERA 614-00-0000-00	51	1											•				3

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APPENDIX B

Operations Office Report

Distribution of Annual Whole-Body Exposures by Contractor

AEC CONTRACTORS

AVERAGE WHOLE BODY EXPOSURES

PAGE 1

1974

ALBUQUERQUE OPERATIONS OFFICE

OFF I CE	<0.10	0.10 0.25	0.25 0.50	0.50 0.75	0.75	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10 10-11 11-12	TOTAL >12 MAN-REM
ALBUQUERQUE MISCELLA C01-00-0209-00	323	137	27	1											51
DOW CHEMICAL. USA C01-07-0007-01	127	1081	1187	282	150	221	72	29	2						1570
GENERAL ELECTRIC COM C01-06-0006-01	13	2													1
GENERAL ELECTRIC COM CO1-08-0006-02	24	12	9	6	3	2	1								19
INHALATION TOXICOLOG CO1-08-0009-01	61	2	4	4	•	1	1		1						19
JET PROPULSION LABOR C01-00-0210-01															
MARTIN MARIETTA AERO C01-00-0213-01	9	1													1
MASON & HANGER-SILAS C01-01-0001-01	316	106	36	5	9	9									72
MASON & HANGER-SILAS C01-02-0001-02	41	26	15	3	3	2	1								22
MONSANTO RESEARCH CO CO1-03-0002-01	790	155	48	22	10	12	1	1							131
ROSS AVIATION. INC. C01-00-0212-01	11		1												1
SANDIA LABORATORIES C01-08-0008-02	104	13	2	2											9
TELEDYNE ISOTOPES C01-00-0211-01	19	5	3	3											5
THE BENDIX CORPORATI C01-04-0003-01	83	10													6
THE ZIA COMPANY C01-05-0005-01	73	45	13	3											18
UNIVERSITY OF CALIFO CO1-05-0004-01	475	327	158	72	50	82	28		2						431

AEC CONTRACTORS

AVERAGE WHOLE BODY EXPOSURES 1974

ALBUQUERQUE OPERATIONS OFFICE

OFFICE	<0.10	0.10 0.25			0.75		2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	TOT >12 MAN-	REM
SUBTOTAL	2469	1922	1 503	403	229	329	104	30	5							2	357

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TABLE 2

ERDA CONTRACTORS AVERAGE WHOLE BODY EXPOSURES 1974

CHICAGO OPERATIONS OFFICE

OFFICE	<0.10	0.10 0.25	0.25 0.50	0.50 0.75	0.75 1.00	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9 	9-10 10-11 11-12	TOTAL >12 MAN-REM
AMES LABORATORY C03-00-0011-01	47	13	19	8	1	3	1	1							28
ARGONNE NATIONAL LAB C03-00-0012-92	601	242	177	79	53	72	21	3	5	2					439
BROOKHAVEN NATIONAL CO3-02-0010-01	944	483	221	84	53	142	66	29	18						874
CHICAGO MISCELLANEOU CO3-00-0013-00	485	48	17	6	4	7	4	5	•	1					108
FERMI NATIONAL ACCEL CO3-01-0135-01	611	283	117	74	58	79	31	16	2	1					487
MASSACHUSETTS INSTIT CO3-00-0035-01	13	5	1												2
PRINCETON UNIVERSITY C03-00-0037-01	43	3													3
SUBTOTAL	2744	1077	552	251	169	303	123	54	29	4					1941

AEC CONTRACTORS

AVERAGE WHOLE BODY EXPOSURES 1974

IDAHO OPERATIONS OFFICE

OFF ICE	<0.10	0.10	0.25 0.50	0.50 0.75	0.75 1.00	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	>12	TOTAL MAN-REM
AEROJET NUCLEAR COMP C05-00-0163-01	179	129	109	64	53	96	46	9	1									454
ALLIED CHEMICAL CORP C05-00-0169-01	41	52	33	21	8	26	10	9										139
ARRINGTON CONSTRUCTI C05-00-0070-01	13	20	13	10	4	7	3	2										44
BIGGERS CONSTRUCTION COS-00-0074-01	5																	
BINGHAM MECHANICAL & CO5-00-0082-01	•	5	1	4	1	1	2											11
C-L ELECTRIC COMPANY C05-80-0075-01	7	2																1
CONSULTANTS & DESIGN CO5-00-0181-01																		
IDAHO MISCELLANEGUS C05-00-0078-00	10	2																1
LEHIGH DESIGN CO I C05-00-0071-01		1	1															1
MORR I SØN-KNUDSEN C05-00-0134-01	9	8	18	6	1													13
ORMOND CONSTRUCTION C05-00-0069-01	1	3	11	4	3	3	1											17
WATERS ASBESTOS & SU C05-80-0156-01	1	6																1
SUBTOTAL	270	228	186	109	70	133	62	20	1									682

AEC CONTRACTORS

AVERAGE WHOLE BODY EXPOSURES 1974

NEVADA OPERATIONS OFFICE

OFFICE	<0.10		0.25 0.50		0.75 1.00	1-2	2-3	3-4	4-5	5-6 	6-7	7-8	8-9	9-10	10-11	11-12	>12	TOTAL MAN-REM
AIR RESOURCES LABORA CO6-90-0159-01																		
BIRDWELL DIVISION OF CO6-00-0214-01	10	1	1															1
CER GEONUCLEAR C06-00-0215-01																		
DEFENSE NUCLEAR AGEN C06-00-0027-91	43	7	1															4
EG&G. INC. C06-90-0028-91	17	2	4															3
ENVIRONMENTAL PROTEC CO6-00-0116-01	• ,	3																1
FENIX & SCISSON. INC C06-00-0113-01	1																	
HALLIBURTON SERVICES CO6-00-0131-01																		
HOLMES & NARVER, INC C06-00-0029-01	4																	
NEVADA MISCELLANEOUS C06-00-0157-00	52	22	27	8														22
REYNOLDS ELECTRICAL C06-00-0093-01	93	26	15	3		2												20
SPERRY-SUN WELL SURV C06-00-0150-01																		
U. S. DEPARTMENT OF C06-00-0216-01	2																	
WACKENHUT SERVICES. CO6-00-0118-01	3																	
ESTINGHOUSE ELECTRI C06-00-0217-01	3	1	1	1	2	3												8
SUBTOTAL	232	62	49	12	2	5												58

TABLE 5

AEC CONTRACTORS

AVERAGE WHOLE BODY EXPOSURES

DAK RIDGE OPERATIONS OFFICE

OFFICE	<0.10	0.10 0.25	0.25	0.50 0.75	0.75 1.00	1-2	2-3	3-4	4-5	5-6 	6-7	7-8	8-9 	9-10 10-11	11-12	>12	TOTAL MAN-REN
COMPARATIVE ANIMAL R CO8-00-0044-01	40	6															3
GOODYE AR ATOMIC CORP CO8-04-0049-01	117	43	24	1	1	3											28
NATIONAL LEAD COMPAN CO8-01-0047-01	332	183	99	29	10	8	1										127
OAK RIDGE ASSOCIATED C08-00-0128-01	478	18															27
PUERTO RICO NUCLEAR C08-05-0046-02	141	18	1											t ••			11
RMI COMPANY C08-00-0043-01	27	17	3														5
RUST ENGINEERING COM COB-00-0045-01	1589	51	16	•	1												98
UNION CARBIDE CORPOR CO8-00-0042-01	91	38	12		1	1											18
UNION CARBIDE CORPOR CO8-00-0042-02	4840	723	220	39	17	12											508
UNION CARBIDE CORPOR CO8-00-0042-03	1086	287	134	75	35	33	7	1									303
UNION CARBIDE GORPOR C08-00-0042-04	148	63	30	18	5	1											47
SUBTOTAL	8889	1447	539	166	70	58	8	1									1175

TABLE 6

AEC CONTRACTORS

AVERAGE WHOLE BODY EXPOSURES 1974

PITTSBURGH NAVAL REACTORS OFFICE

OFFICE	<0.10	0.10 0.25	0.25	0.50 0.75	0.75 1.00	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10 1	0-11	11-12	>12	TOTAL MAN-REM)
DUQUESNE LIGHT COMPA C09-02-0051-01	173	62	50	28	17	15												93	í
WEST INGHOUSE ELECTRI CO9-00-0050-02	786	251	214	117	56	61	18											422	:
WESTINGHOUSE ELECTRI C09-01-0050-01	71	53	53	25	12	7												69	,
SUBTOTAL	1030	366	317	170	85	83	18											585	,

TABLE 7

AEC CONTRACTORS AVERAGE WHOLE BODY EXPOSURES 1974

RICHLAND OPERATIONS OFFICE

OFFICE	<0.10			0.50 0.75	0.75 1.00	1-2	2-3	3-4	4-5	5-6	6-7	7-8 	8-9	9-10 10-1	1 11-12	TOTAL >12 MAN-RE	
ATLANTIC RICHFIELD H C10-00-0052-01	86	222	238	140	85	130	24	1								55	3
AUTOMATION INDUSTRIE C10-00-0205-01	8	18	2			1											6
BATTELLE MEMORIAL IN C10-00-0013-02	345	204	54	25	6	23	9	3								16	2
HANFORD ENGINEERING C10-00-0142-01	94	124	63	36	28	29	2									14	6
J. A. JONES CONSTRUC C10-00-0058-01	55	106	95	43	34	96	69	4								44	•
UNITED NUCLEAR INDUS C10-00-0055-01	35	39	55	42	30	88	168	31	5							76	5
SURTOTAL	623	713	507	286	183	367	272	39	5							207	4

AEC CONTRACTORS

AVERAGE WHOLE BODY EXPOSURES 1974

SAN FRANCISCO OPERATIONS OFFICE

OFFICE	<0.10	0.10	0.25	0.50 0.75	0.75	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10 10	-11 11-1:	>12	TOTAL MAN-REM
ATGMICS INTERNATIONA C11-00-0060-01	69	14	6	2	1	3											15
STANFORD LINEAR ACCE C11-00-0062-01	59	24	11	6		1											17
UNIVERSITY OF CALIFO C11-00-0004-02	796	157	71	20	11	9	3										137
UNIVERSITY OF CALIFO C11-00-0004-03	697	110	52	16	3	13	2										111
UNIVERSITY OF CALIFO C11-00-0004-04	11				1												1
UNIVERSITY OF CALIFO C11-00-0004-05	6	3	4	•	1	2	2	3									24
UNIVERSITY OF CALIFO C11-00-0004-06																	
UNIVERSITY OF CALIFO C11-00-0004-07	6	11	19	7													14
SUBTOTAL	1644	319	163	55	17	28	7	3									318

AEC CONTRACTORS

AVERAGE WHOLE BODY EXPOSURES 1974

SCHENECTADY NAVAL REACTORS OFFICE

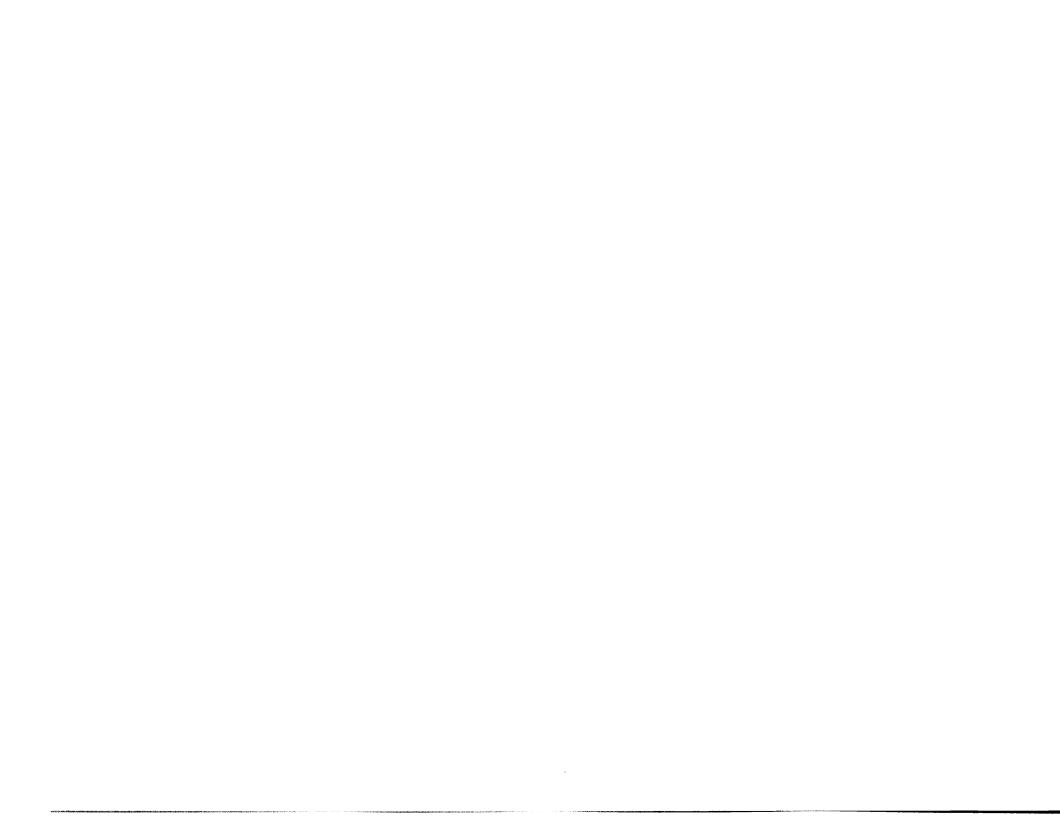
OFF ICE	<0.10	0-10 0-25			0.75 1.00	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10 10-11	11-12	TOTAL >12 MAN-REM
GENERAL ELECTRIC COM C13-00-0006-06	431	182	99	39	25	53	18									261
SUBTOTAL	431	182	99	39	25	53	16									261

AEC CONTRACTORS

AVERAGE WHOLE BODY EXPOSURES 1974

SAVANNAH RIVER OPERATIONS OFFICE

OFF I CE	<0.10	0.10 0.25	0.25 0.50	0.50 0.75	0.75 1.00	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	>12	TOTAL MAN-REN
E. I. DU PONT DE NEM C14-00-0063-01	1649	475	407	302	186	297	77	2										1315
E. I. DU PONT DE NEM C14-00-0063-02	245	86	57	24	16	25	4											125
SAVANNAH RIVER ECOLO C14-00-0064-01	14																	1
SUBTOTAL	1908	561	464	326	202	322	81	2										1441



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			•	

