Special Exposure Cohort Petition
under the Energy Employees Occupational Illness Compensation Act

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

OMB Number: 0920-0639 Expires: 05/31/2007

Special Exposure Cohort Petition — Form B

Use of this form and disclosure of Social Security Number are voluntary. Failure to use this form or disclose this number will not result in the denial of any right, benefit, or privilege to which you may be entitled.

General Instructions on Completing this Form *(complete instructions are available in a separate packet)*:

Except for signatures, please **PRINT** all information clearly and neatly on the form.

Please read each of Parts A — G in this form and complete the parts appropriate to you. If there is more than one petitioner, then each petitioner should complete those sections of parts A – C of the form that apply to them. Additional copies of the first two pages of this form are provided at the end of the form for this purpose. A maximum of three petitioners is allowed.

If you need more space to provide additional information, use the continuation page provided at the end of the form and attach the completed continuation page(s) to Form B.

If you have questions about the use of this form, please call the following NIOSH toll-free phone number and request to speak to someone in the Office of Compensation Analysis and Support about an SEC petition: **1-800-356-4674.**

If you are:			
	☐ A Labor Organization,	Start at D	on Page 3
	☐ An Energy Employee (current or former),	Start at C	on Page 2
	☐ A Survivor (of a former Energy Employee),	Start at B	on Page 2
	☐ A Representative (of a current or former Energy Employee),	Start at A	on Page 1

A Representative Information — Complete Section A if you are authorized by an Employee or Survivor(s) to petition on behalf of a class.

A.1 **Are you a contact person for an organization?** ☐ Yes (Go to A.2) ☐ No (Go to A.3)

A.2 **Organization Information:**

_____
Name of Organization

_____
Position of Contact Person

A.3 **Name of Petition Representative:**

_____
Mr./Mrs./Ms. First Name Middle Initial Last Name

A.4 **Address:**

_____
Street Apt # P.O. Box

_____
City State Zip Code

A.5 **Telephone Number:** (____) _____

A.6 **Email Address:** _____

A.7 ☐ Check the box at left to indicate you have attached to the back of this form written authorization to petition by the survivor(s) or employee(s) indicated in Parts B or C of this form. An authorization

If you are representing a Survivor, go to Part B; if you are representing an Employee, go to Part C.

Name or Social Security Number of First Petitioner: _____

B Survivor Information — Complete Section B if you are a Survivor or representing a Survivor.

B.1 Name of Survivor:

Mr./Mrs./Ms. First Name | Middle Initial | Last Name

B.2 Social Security Number of Survivc

B.3 Address of Survivor:

Street | Apt # | P.O. Box

City | State | Zip Code

B.4 Telephone Number of Survivc

B.5 Email Address of Survivor:

B.6 Relationship to Employee: ☐ Spouse ☒ Son/Daughter ☐ Parent ☐ Grandparent ☐ Grandchild

Go to Part C.

C Employee Information — Complete Section C UNLESS you are a labor organization.

C.1 Name of Employee:

Mr./Mrs./Ms. First Name | Middle Initial | Last Name

C.2 Former Name of Employee (e.g., maiden name/legal name change/other):

N/A

Mr./Mrs./Ms. First Name | Middle Initial | Last Name

C.3 Social Security Number of Employee:

C.4 Address of Employee (if living):

N/A

Street | Apt.# | P.O. Box

City | State | Zip Code

C.5 Telephone Number of Employee: ( )

C.6 Email Address of Employee:

C.7 Employment Information Related to Petition:

C.7a Employee Number (if known): One number

C.7b Dates of Employment: Start End

C.7c Employer Name: DuPont, G.E., Hanford Operations, Kaiser Eng, J.A. Jones

C.7d Work Site Location: All 100 Area, 300 Area, 700-1100 are only known Areas, records incomplete

C.7e Supervisor's Name: Unknown

Go to Part E.

D Labor Organization Information — Complete Section D ONLY if you are a labor organization.

D.1 Labor Organization Information:

_____
Name of Organization

_____
Position of Contact Person

D.2 Name of Petition Representative:

_____

D.3 Address of Petition Representative:

_____
Street Apt # P.O. Box

_____
City State Zip Code

D.4 Telephone Number of Petition Representative: (____) - _____

D.5 Email Address of Petition Representative: _____

D.6 Period during which labor organization represented employees covered by this petition (please attach documentation): Start _____ End _____

D.7 Identity of other labor organizations that may represent or have represented this class of employees (if known):

_____

Go to Part E.

E Proposed Definition of Employee Class Covered by Petition — Complete Section E.

E.1 **Name of DOE or AWE Facility:** Hanford

E.2 **Locations at the Facility relevant to this petition:** some known: 100 Area, 300 Area, 700-1100 Areas. Records are incomplete.

E.3 **List job titles and/or job duties of employees included in the class. In addition, you can list by name any individuals other than petitioners identified on this form who you believe should be included in this class:** All Records are incomplete, do not know all classes worked.

E.4 **Employment Dates relevant to this petition:**

Start _____ End _____

Start _____ End _____

Start _____ End _____

E.5 **Is the petition based on one or more unmonitored, unrecorded, or inadequately monitored or recorded exposure incidents?:** Yes [X] No

If yes, provide the date(s) of the incident(s) and a complete description (attach additional pages as necessary):

Go to Part F.

F Basis for Proposing that Records and Information are Inadequate for Individual Dose — Complete Section F.

Complete **at least one** of the following entries in this section by checking the appropriate box and providing the required information related to the selection. You are not required to complete more than one entry.

F.1 [X] I/We have attached either documents or statements provided by affidavit that indicate that radiation exposures and radiation doses potentially incurred by members of the proposed class, that relate to this petition, were not monitored, either through personal monitoring or through area monitoring.

(Attach documents and/or affidavits to the back of the petition form.)

Describe as completely as possible, to the extent it might be unclear, how the attached documentation and/or affidavit(s) indicate that potential radiation exposures were not monitored.

I worked at Hanford from ... to .... There are 10 years with no monitoring for radiation exposure. There are only three years of documented internal dose monitoring.

Please see attached Word document with enclosures.

F.2 [X] I/ We have attached either documents or statements provided by affidavit that indicate that radiation monitoring records for members of the proposed class have been lost, falsified, or destroyed; or that there is no information regarding monitoring, source, source term, or process from the site where the employees worked.

(Attach documents and/or affidavits to the back of the petition form.)

Describe as completely as possible, to the extent it might be unclear, how the attached documentation and/or affidavit(s) indicate that radiation monitoring records for members of the proposed class have been lost, alter[illegible]stroyed.

Out of the 20 years worked at Hanford there are monitoring records for only half of them. There should be more, we assert they were either lost or destroyed. We believe records have been falsified.

Please see attached Word document with enclosures

Part F is continued on the following page.

Special Exposure Cohort Petition
under the Energy Employees Occupational Illness Compensation Act

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

Special Exposure Cohort Petition — Form B

OMB Number: 0920-0639 Expires: 05/31/2007

F.3 ☐ I/We have attached a report from a health physicist or other individual with expertise in radiation dose reconstruction documenting the limitations of existing DOE or AWE records on radiation exposures at the facility, as relevant to the petition. The report specifies the basis for believing these documented limitations might prevent the completion of dose reconstructions for members of the class under 42 CFR Part 82 and related NIOSH technical implementation guidelines.

(Attach report to the back of the petition form.)

F.4 ☑ I/We have attached a scientific or technical report, issued by a government agency of the Executive Branch of Government or the General Accounting Office, the Nuclear Regulatory Commission, or the Defense Nuclear Facilities Safety Board, or published in a peer-reviewed journal, that identifies dosimetry and related information that are unavailable (due to either a lack of monitoring or the destruction or loss of records) for estimating the radiation doses of employees covered by the petition.

(Attach report to the back of the petition form.)

Go to Part G

G Signature of Person(s) Submitting this Petition — Complete Section G

All Petitioners should sign and date the petition. A maximum of three persons may sign the petition.

Signature _____ Date 3-8-06

Signature DAUGHTER OF _____ Date 3-8-06

Signature _____ Date MAIL

Notice: Any person who knowingly makes any false statement, misrepresentation, concealment of fact or any other act of fraud to obtain compensation as provided under EEOICPA or who knowingly accepts compensation to which that person is not entitled is subject to civil or administrative remedies as well as felony criminal prosecution and may, under appropriate criminal provisions, be punished by a fine or imprisonment or both. I affirm that the information provided on this form is accurate and true.

Send this form to: SEC Petition
Office of Compensation Analysis and Support
NIOSH
4676 Columbia Parkway, MS-C-47
Cincinnati, OH 45226

If there are additional petitioners, they must complete the Appendix Forms for additional petitioners. The Appendix forms are located at the end of this document.

Name or Social Security Number of First Petitioner: _____ _____

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SPECIAL EXPOSURE COHORT PETITION

Part F1.

We are petitioning on the basis that certain periods of time were not monitored, and that there were periods of time when there was no monitoring of internal doses.

worked at Hanford for various contractors from see enclosure 1. He was terminated in when he could not pass his physical for work. We know this only by a brief mention in the medical notes requested from Hospital written by one of the doctors who treated him for cancer. He died ag of colon cancer. Mrs. , his wife died in . My sister, co and I, y I. are his only survivors. Our EEOICP claim, number is still going through the process. All supporting documentation of birth certificates, marriage certificates and death certificates has been submitted with the claim. It has been denied twice because the dose reconstruction could not support the 50% as likely as not causation standard. made a FOIA request of the Department of Energy for all employment records, dose records, hand written notes, calculations and any other information. After reviewing the records realized why the claim can't seem to support the 50% standard. There are very limited dose records in the file. There are ten years with no dose monitoring records at all see enclosure 2. The years that are covered, often do not have information for every month, see enclosure 3. In each and every interview my sister and I related the memory of sample canisters on our front porch, yet we were repeatedly told there were no records of internal dose monitoring. However, in reviewing the records, there were two sheets showing internal dose monitoring. The only records for internal dose, Plutonium Inventory Report with Fission Products Inventory Report using the same samples, are for four samples in 1959, enclosure 4, two samples in 1960, and one in 1961, enclosure 5.

The ten years for which there are no dose monitoring records of any type are: 1942, 1943, 1946, 1949, 1950, 1951, 1952, 1953, 1954, and 1955. This information constituted new evidence and a request to rework the dose reconstruction was sent.

Supporting documents:
Enclosure 1, Letter from DOL, dated April 1, 2005 listing dates of employment.
Enclosure 2, REXER77, Radiological Exposure Individual Dosimeter History
Enclosure 3, Hanford Dose Records for 61, note only six months
Enclosure 4, Internal dose records 1959
Enclosure 5, Internal dose records 1960 and 1961

Part F2.

We petition on the basis that records for employees at Hanford were lost or destroyed and falsified.

The other way to account for the ten years of missing dose monitoring records is that the records existed at one time, but have either been lost or destroyed. We believe there also should have been more internal dose monitoring records.

We petition on the bases that records were falsified.

NIOSH was obviously given faulty information on which to base the dose reconstruction. NIOSH letter dated March 15, 2005, enclosure 6 states, "Mr. s assigned to various facilities within the 100 and 300 Area while employed at the Hanford Site. As a carpenter, his duties included building additions to storage tanks and building concrete forms." HW-4.209, Hanford Engineer Works Inter-Department Transfer or Change of Job Classification, effective date , 1948 shows he worked not only in 100 and 300 Areas, but also in 700-1000 Areas as well, enclosure 7. HW-4.209, Hanford Engineer Works Inter-Department Transfer or Change of Job Classification, effective date April 11, 1949 shows he worked not only as a carpenter, but as a maintenance mechanic, enclosure 8. Again, I point out the records are incomplete; therefore he may have worked in other job classifications and other Areas at the Hanford site.

Letter from PNNL dated March 20, 2003, Subject: Priority NIOSH # EEOICP Claim # enclosure 9, states:

"A review of our records shows no indication that ... was monitored for radiation exposure at Hanford during 1955." and "According to our records no internal doses were recorded for this individual while employed or visiting Hanford."

There are no records for nine years in addition to 1955 which shows the above statement to be false. That there were no internal doses recorded for this individual is also false, yet we were told repeatedly there were no internal dose records.

During the Close-Out Interview with Chris W., a licensed health physicist and physician, board certified in radiology, on December 10, 2004, enclosure 10, stated our concern about falsification of records. There was in incident where M a was left in a hot area too long. When I n came home from school, was already home from work. She remembers him being horribly upset and explaining he had been intentionally left exposed too

Part F2. continued

long. There was also a badge incident. There was a random check after the bus ride back from N Area. count was so high they were angry he had been on the buss exposing other people for the entire ride. The ride from N Area was quite long. We asked if there were any abnormalities in the dose records that showed these two incidents. He said no, he could see nothing in the records that would indicate these incidents, no abnormalities at all which was wrong because remembers other incidents too. After this, and I informed him we were formally stating and we wanted him to note we alleged falsification of records. stated he understood. He heard it on a daily basis from this site.

Affidavits from and are also submitted.

Supporting documents:
Enclosure 6, NIOSH Letter
Enclosure 7, HW-4.209, Hanford Engineer Works Inter-Department Transfer or Change of Job Classification, listing some Areas worked
Enclosure 8, HW-4.209, Hanford Engineer Works Inter-Department Transfer or Change of Job Classification, listing change of job classification.
Enclosure 9, Letter from PNNL, March 20, 2003
Enclosure 10, Notes from Close-Out Interview, December 10, 2004
Enclosure 11, Affidavit from
Enclosure 12, Affidavit from

Part F4

We petition on the basis of a technical report by S. Cohen and Associates (SC&A) for the NIOSH Advisory Board, enclosure 13. The Summary of Findings was especially relevant.

A news release, enclosure 14, from Senator Cantwell's office, dated November 17, 2005: Cantwell urged the agency's Advisory Board to review the status of former Hanford workers following an audit suggesting that a possible deficiency in data on worker radiation exposure between 1944 and 1968 may lead officials to underestimate exposure levels.....and found several instances where thousands of workers may be eligible for Special Exposure Cohort (SEC) status.
Supporting documents:
Enclosure 13, Executive Summary with cover letter from Sen. Cantwell
Enclosure 14, News release, Sen. Cantwell's office

U.S. DEPARTMENT OF LABOR
OFFICE OF WORKERS' COMPENSATION PROGRAMS
DIVISION OF ENERGY EMPLOYEES' OCCUPATIONAL ILLNESS COMPENSATION
SEATTLE DISTRICT OFFICE
719 SECOND AVENUE, SUITE 601
SEATTLE, WASHINGTON 98104
TELEPHONE: (206) 373-6750
TOLL-FREE: 1-888-805-3401

April 1, 2005

File Number:
Employee:
Claimant:

Dear Mrs.

This letter is with regard to the status of your claim filed under Part B of the Energy Employees Occupational Illness Compensation Program Act of 2000 (EEOICPA) following receipt of the radiation dose reconstruction from the National Institute of Occupational Safety and Health (NIOSH). The probability of causation (PoC) that your father's colon cancer, diagnosed on , was related to his employment at the Hanford site is currently below 50%.

As we discussed over the telephone today, a review of the claim file indicates that your father reportedly worked at the Hanford site for DuPont (from 8/42 to 5/43) and Kaiser Engineers (from 10/52 to 1/55). Based on all of the available evidence in file, an inquiry was sent to the Health Physicist for the U.S. Department of Labor to determine if additional employment would merit a "rework" of the radiation dose reconstruction. We will contact you in writing to advise you of the status of your claim once a reply is received.

The complete employment history information reported, for consideration of a possible "rework" of the dose reconstruction, is as follows:

Hanford
Hanford
Hanford
Hanford
Hanford

Enclosed is the Social Security Administration Form SSA-581 to complete and return to this office, if you choose. This authorization will only be used to request Social Security records in the event that we need to supplement the employment information previously submitted to establish covered employment. Social Security Administration records are generally not sufficient proof of employment as they only provide the name of the company for which the employee worked and not the specific work site.

You may also submit an Employment History Affidavit (EE-4) completed by someone who has specific knowledge of the DOE related employment (i.e., former supervisors, co-workers or union officials). An EE-4 is enclosed for your convenience.

If you have any questions, please contact our office toll-free at 1-888-805-3401 or in writing at the above address.

Sincerely,

Kelly Reavell
Senior Examiner

Enclosure: SSA-581, Social Security Administration Form
EE-4, Employment History Affidavit

REXER77

RADIOLOGICAL EXPOSURE
Individual Dosimeter History

Hid: SSN: Rex Id:

CC	Pay Id	NC	Begin Dt	End Dt	OC	Shall	Deep	Neut	Ring	Eye	Per End Dt
TT			01/01/1961	12/31/1961		360	150	0	0	0	12/31/1961
TT			01/01/1960	12/31/1960		580	300	0	0	0	12/31/1960
TT			01/01/1959	12/31/1959		750	390	0	0	0	12/31/1959
TT			01/01/1958	12/31/1958		460	460	0	0	0	12/31/1958
TT			01/01/1957	12/31/1957		70	30	0	0	0	12/31/1957
XX			01/01/1957	12/31/1957		0	0	0	0	0	12/31/1957
XX			01/01/1956	12/31/1956		0	0	0	0	0	12/31/1956
XX			01/01/1948	12/31/1948		0	0	0	0	0	12/31/1948
XX			01/01/1947	12/31/1947		330	130	0	0	0	12/31/1947
XX			01/01/1945	12/31/1945		40	10	0	0	0	12/31/1945
XX			01/01/1944	12/31/1944		60	0	0	0	0	12/31/1944

Encl 2

HANFORD OCCUPATIONAL DOSE RECORD FOR PAYROLL NO. DATE PREPARED 2 10 61

SUFFIX CONST.ID SOC.SEC.# SEX CRAFT BIRTHDATE SER.DATE TERM.DATE BIOASSAY SCHEDULE J F M A M J J A S O N D YR

2 2

ADDRESS DIRECTIONS WRICH DATE OF LAST BIOASSAY 09-16-60

DOSE FOR LAST 12 MONTHS

PERIOD ENDING	FILM BADGE DOSIMETERS -B-	-G-	-X-	F-N	S-N	FILM RINGS
01-04-60	33	38				
02-01-60	32	48				
08-12-60	86	49				
09-09-60	35	74				
10-07-60	48	49				
11-04-60	21	33				
13-3..-60	23	12				

CURRENT CALENDAR YEAR TOTAL DERMA- 581 PENET- 303 GAMMA- 3.3

	-B-	-G-	-X-	F-N	S-N
OCCUPATIONAL DOSE EXCLUDING HANFORD EXPOSURE					
ACCUMULATED OCCUPATIONAL DOSE	667	3192			

Encl 3

EMPLOYEE PAY NUMBER---

PLUTONIUM INVENTORY REPORT

SAMPLING DATE	CD CODE	INI	ORG. CODE	G R	RTN SP. CD.	N S C	SAMPLE IDENT.	L S C	SAMP VOL. MLS.	T Y P	ANA DATE	A N A	SLIDE #	TOT TRK OBS	EXP. TIME MIN.	UNCORR D/M	AVE SPK YLD	CORR. D/M	SPK YLD	BL TR	EML YLD	MICRO CURIES PU
3-31-59	20		2						0800	U	4- 9-9	1	14225	0000	10042	.0000	089	2.4992-				1.126 8-
6- 2-59	20		6						1500	U	6-23-9	1	14502	C004	10059	9.2773-089		1.0422-				4.695 9-
8-18-59	20		1						0800	U	8-26-9	4	14772	C000	10077	.0000	091	2.4992-				1.126 8-
11-10-59	20		1						1300	U	11-23-9	1	15192	0000	10065	.0000	089	2.4992-				1.126 8-

FISSION PRODUCTS INVENTORY REPORT

SAMPLING DATE	CD CODE	INI	ORG CODE	C R	RTN SPC CODE	NC SAMP CODE	SAMP. IDENT	L S C	VOL. IN MLS.	T	ANALYSIS DATE	TOTAL C/M	B.G. C/M	BL. C/M	SPK YLD	CNT TM.	CORR. C/M	DATE CTD	TM. CTD	PAR. ISO. ANA.	MICRO-CURIES OF FP
3-31-59	20		2						0800	U	4- 9-9	.0000-	0161			10	4.0001-	04109	103		3.165 5-
6- 2-59	20		6						1500	U	6-23-9	.0000-	0159			10	1.1000	06249	102		3.165 5-
8-18-59	20		1						0800	U	8-26-9	.0000-	0163			10	2.4000	08279	110		3.165 5-
11-10-59	20		1						1300	U	11-23-9	.0000-	0160			10	8.0001-	11249	095		3.165 5-

Encl 4

EMPLOYEE PAY NUMBER--

PLUTONIUM INVENTORY REPORT

SAMPLING DATE	CD CODE	INI	ORG. COD.	G R	RTN SP. CD.	N S C	SAMPLE IDENT.	L S C	SAMP VOL. MLS.	T Y P	ANA DATE	A N A	SLIDE #	TOT TRK OBS	EXP. TIME MIN.	UNCORR D/M	AVE SPK YLD	CORR. D/M	SPK YLD	BL TR	EML YLD	MICRO CURIES PU
2- 9-60	20			1					0800	U	2-18-0	4	15577	0004	10071	9.2663-090		1.0292-087		10	53	4.637 9-
9-16-60	20			2					1100	U	9-29-0	2	16638	0004	10054	9.2823-093		9.9813-096		01	53	4.496 9-
2-28-61	20			2					1200	U	3-10-1	2	17605	0006	10017	1.3972-090		1.5522-090		02	51	6.994 9-

FISSION PRODUCTS INVENTORY REPORT

SAMPLING DATE	CD CODE	INI	URG CODE	G R	RTN SPC CODE	NO SAMP CODE	SAMP. IDENT	L S C	VOL. IN MLS.	S T	ANALYSIS DATE	TOTAL C/M	B.G. C/M	BL. C/M	SPK YLD	CNT TM.	CORR. C/M	DATE CTD	TM. CTD	PAR. ISO. ANA.		MICRO-CURIES OF FP
2- 9-60	30			1					0800	U	2-18-0	.0000- 0162				10	1.8000	02190	120			3.065 9-
9-16-60	30			2					1100	U	9-29-0	.0000- 0170				10	1.0000	09300	093		N	3.065 9-
2-28-61	30			2					1200	U	3-10-1	.0000- 0167				10	1.0000	03131	111			3.065 9-

Encl 5

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

NIOSH Tracking Number:

National Institute for Occupational Safety and Health
Robert A. Taft Laboratories
4676 Columbia Parkway
Cincinnati, OH 45226-1998
Phone: 513-533-6800
Fax: 513-533-6817

March 15, 2005

Dear

This letter is to provide you with information on the status of the claim you filed under the Energy Employees Occupational Illness Compensation Program Act (NIOSH Tracking Number 3374).

The National Institute for Occupational Safety and Health's (NIOSH) Office of Compensation Analysis and Support (OCAS) has completed a reconstruction of the radiation dose for your claim, conducted a closing interview with you, and received a properly signed OCAS-1 form. Enclosed you will find a copy of the final NIOSH Report of Dose Reconstruction under the Energy Employees Occupational Illness Compensation Program Act (EEOICPA).

We have forwarded a copy of the enclosed final dose reconstruction report to the appropriate Department of Labor (DOL) District Office of the Office of Workers' Compensation Programs for their use in adjudicating your claim. We have also sent a copy of this report to the Department of Energy.

If you have any additional questions regarding your claim, please feel free to contact us toll-free at 1-800-35-NIOSH (1-800-356-4674). You can also email us at ocas@cdc.gov or contact our office directly at (513) 533-6800. Additional information on OCAS can also be found on our Web site at http://www.cdc.gov/niosh.

Sincerely yours,

Larry J. Elliott, MSPH, CIH
Director
Office of Compensation Analysis and Support

Enclosures

cc: File

Encl 6

NIOSH OCAS

NIOSH Report of Dose Reconstruction under the Energy Employees Occupational Illness Compensation Program Act (EEOICPA)

NIOSH ID:	Social Security No.	DOL District Office
		Seattle

Energy Employee Name: *Last* *First* *Middle* *Date of Birth*

Covered Employment:

Hanford Site
Richland, WA
Location

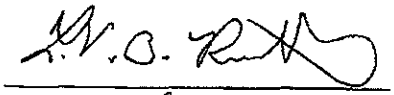
Cancer:

Colon *Type* | 153.0 *ICD Code* | 1961 *Date of Diagnosis*

Calculations Performed By: Alfred W. Steedley *Name* — 11/17/2004 *Date*

Peer Review Completed By: Mickey M. Hunacek *Name* — 11/17/2004 *Date*

Dose Reconstruction Approved By:



Signature — 11/23/2004 *Date*

LaVon B. Rutherford, CHP
Name

Introduction

The Energy Employees Occupational Illness Compensation Program Act of 2000 (EEOICPA), Executive Order No. 13179 and the Radiation Dose Reconstruction Rule (42 CFR 82)[1]

EEOICPA established a compensation program to provide a lump sum payment of $150,000 and medical benefits as compensation to covered employees suffering from designated illnesses incurred as a result of their exposure to ionizing radiation, beryllium, or silica while in the performance of duty for the Department of Energy and certain of its vendors, contractors, and subcontractors. This legislation also provided for payment of compensation to certain survivors of these covered employees.

In Presidential Executive Order No. 13179, the President designated the U.S. Department of Labor to administer this program for claims by current and former employees of nuclear weapons production facilities and their survivors who seek compensation for cancers caused by radiation exposures sustained in the performance of duty. The Executive Order also directed the Department of Health and Human Services to estimate (reconstruct) the radiation doses received by these employees. The Department of Labor uses the reconstructed radiation dose in evaluating whether the employee's cancer was at least as likely as not related to employment at the facilities covered by EEOICPA. To fulfill the responsibilities assigned to the Department of Health and Human Services, the National Institute for Occupational Safety and Health's (NIOSH) Office of Compensation Analysis and Support (OCAS) completes dose reconstructions using the methods described in the Radiation Dose Reconstruction Rule (42 CFR 82)[1] for the Department of Labor's use in making compensation decisions.

The Purpose of Radiation Dose Reconstruction

A radiation dose reconstruction is used to estimate the radiation dose received by the specific organ(s) in which a worker developed cancer, particularly when radiation monitoring data are unavailable, incomplete, or of poor quality. Even in instances when radiation dosimetry data are available, they rarely specify dose to an organ and often are based on monitoring procedures that do not meet modern standards.

The basic principle of dose reconstruction is to characterize the occupational radiation environment to which a worker was exposed using available worker and/or workplace monitoring information. In cases where radiation exposures in the workplace environment cannot be fully characterized based on available data, default values based on reasonable scientific assumptions are used as substitutes.

EEOICPA recognized that the process of estimating radiation doses would require dealing with uncertainties and limited data and thus required that the government establish methods for arriving at reasonable estimates of radiation dose received by an individual who was not monitored or inadequately monitored for exposures to radiation, or for whom exposure records are missing or incomplete. To the extent that the science and data involve uncertainties, these uncertainties are typically handled to the advantage, rather than to the detriment, of the claimant. NIOSH has used the best available science to develop the methods and guidelines for dose

reconstruction. These methods have been reviewed and commented upon by the public, including experts in the field of dose reconstruction, and the Presidentially-appointed Advisory Board on Radiation and Worker Health.

How Radiation Doses Are Reconstructed

NIOSH reconstructs radiation doses by evaluating all available, appropriate data relevant to the employee's radiation exposure. Some examples of data that may be included in the dose reconstruction include, but are not limited to, internal dosimetry (such as results from urinalysis), external dosimetry data (such as film badge readings), workplace monitoring data (such as air sample results), workplace characterization data (such as type and amount of radioactive material processed), and descriptions of the type of work performed at the work location.

Although the specific methods used for each dose reconstruction may vary, after a claim has been referred by the Department of Labor to NIOSH for a dose reconstruction, NIOSH typically requests the worker's personal radiation monitoring information from the Department of Energy. Upon receipt of the requested information, at least one voluntary informational interview with the claimant and/or survivors is conducted and a copy of the interview report is sent for review. After all of the necessary and available information is gathered, a dose is estimated, using the methods in the Radiation Dose Reconstruction Rule. After a NIOSH health physicist reviews the information, methods, and results, the claimant receives a draft copy of the dose reconstruction report followed by a concluding interview, during which the claimant can add any additional relevant information that may affect the dose reconstruction. If the claimant certifies that he/she has completed providing information and that the record for dose reconstruction should be closed, a final dose reconstruction report is sent to the claimant, the Department of Labor, and the Department of Energy.

As applied in the EEOICPA, dose reconstructions must rely on information that can be developed on a timely basis and on carefully stated assumptions. Therefore, the guiding principle in conducting these dose reconstructions is to ensure that the assumptions used are fair, consistent, and well-grounded in the best available science, while ensuring that uncertainties in the science and data are handled to the advantage, rather than to the detriment, of the claim when feasible. When dose information is not available, is very limited, or the dose of record is very low, NIOSH may use the highest reasonably possible radiation dose, based on reliable science, documented experience, and relevant data, to complete a claimant's dose reconstruction. In other instances, NIOSH may not need to complete fully a dose reconstruction because a partial dose reconstruction results in an estimated dose which produces a probability of causation of 50% or greater.

How Radiation Dose Reconstructions Are Used in Final Compensation Determinations

The results of an employee's dose reconstruction are used by the Department of Labor to determine the probability that a worker's cancer was "at least as likely as not" due to his/her occupational exposure to ionizing radiation during employment at a covered facility. Criteria and guidelines for making this determination are established by EEOICPA and the Probability of Causation Guidelines (42 CFR 81).[2] The dose reconstruction is not the final determination of a claim, but rather an interim product that is used by the Department of Labor in making its final

decision. Final determinations are made by the Department of Labor based on standards determined by EEOICPA and its implementing regulations.

Dose Reconstruction Overview

The Office of Compensation Analysis and Support has performed a dose reconstruction for [redacted] in accordance with the applicable requirements of the Energy Employees Occupational Illness Compensation Program Act. Information provided by the Department of Labor (DOL) indicates that Mr. [redacted] worked at the Hanford Site from [redacted] 1943, through [redacted] 1951, and intermittently from [redacted] 1955, through [redacted] 1961. He was diagnosed with colon cancer in 1961.

The majority of Mr. [redacted] radiation exposure was received during employment as a carpenter. Mr. [redacted]'s dose reconstructed under the Energy Employees Occupational Illness Compensation Program Act of 2000 was 36.045 rem to the colon. The dose was calculated only for this organ because of the specific type of cancer associated with this claim.

For the purposes of this dose reconstruction, [redacted] was given an overestimate of radiation dose using claimant-favorable assumptions related to radiation exposure and intake, based on current science, documented experience, and relevant data. Even under these assumptions, NIOSH has determined that further research and analysis will not produce a level of radiation dose resulting in a probability of causation of 50% or greater. In accordance with 42 CFR 82.10(k),[1] NIOSH has determined that sufficient research and analysis have been conducted to consider this dose reconstruction complete. Per the requirements of 42 CFR 82.10(j),[1] only the dose incurred up to the point of cancer diagnosis was included in this dose reconstruction.

Information Used

During this dose reconstruction, the primary data source was the dosimetry records obtained from the Department of Energy (DOE). In addition, specific parameters were applied to the dosimetry records in order to assign organ dose based on information in the External Dose Reconstruction Implementation Guideline[3] and the Internal Dose Reconstruction Implementation Guideline.[4] ORAU Technical Information Bulletins and Technical Basis Documents were also used in this dose reconstruction (see References). In instances in which specific information was lacking, parameters were selected that maximized the dose estimate.

In addition to the above information, the record of the computer assisted telephone interview was reviewed carefully by the dose reconstructor. The information provided was considered in the dose estimation process. Additional information on the evaluation of the interview is provided in subsequent sections of this report.

Dose Estimate

External Dose

External dose is received from radiation originating outside the body and is typically measured by dosimetry worn on the body. Radiation dose measured on a film badge or a thermoluminescent dosimeter (TLD) may have been delivered quickly (acute exposure) or slowly over the period of time that the employee was exposed (chronic exposure). External dose records received from the Department of Energy were reviewed and found to be sufficient for the external dose reconstruction. The external dose to the colon was calculated using the model for that organ.[8]

was assigned to various facilities within the 100 and 300 Areas while employed at the Hanford Site. As a carpenter, his duties included building additions to storage tanks and building concrete forms. was exposed to photon radiation and potentially exposed to neutron radiation while working in these areas.

For the purpose of estimating probability of causation, all photon doses, except on-site ambient, are assumed to be acute and all neutron doses are assumed to be chronic, as this maximizes probability of causation.[3] On-site ambient doses are assumed to be chronic.

Radiation Type, Energy, and Exposure Geometry

For the purposes of this dose reconstruction, the distribution of exposure geometry and radiation energies was selected to maximize dose. This exposure assumes 100% Anterior-Posterior geometry. In accordance with the External Dose Reconstruction Implementation Guideline,[3] dose conversion factors were used to calculate the colon dose from exposure to photon and neutron radiation. For photon radiation, 100% 30–250 keV energy range with a claimant-favorable organ dose conversion factor of 1.000 was applied. For neutron radiation, a 100% 100 keV – 2 MeV energy range, with a claimant-favorable organ dose conversion factor of 1.000 and an ICRP correction factor of 1.91, was applied in accordance with the Technical Basis Document for the Hanford Site – Occupational External Dosimetry.[5]

Dosimeter Dose

Individual dosimeter results were used to reconstruct se. Corrections to the reported doses were applied as described above in accordance with the Technical Basis Document for the Hanford Site – Occupational External Dosimetry.[5]

Missed Dose

In accordance with the External Dose Reconstruction Implementation Guideline,[3] a potential missed dose was assigned to each zero dosimeter reading to maximize the potential external doses received by . A missed dose represents the dose that could have been received but may not have been recorded due to the dosimeter detection limits or site reporting practices.

Throughout his employment at the Hanford Site s typically on a varying dosimeter change-out schedule. The total number of zero dosimeter readings assigned was 99 for photons and 99 for neutrons. These numbers were maximized to ensure that all possible instances of a zero badge reading were accounted for in this dose reconstruction. Based on information

provided in the Hanford Site External Dosimetry Technical Basis Document,[5] this results in a maximum potential missed dose f 3.960 rem from photons and 18.682 rem from neutrons. Per the requirements of the External Dose Reconstruction Implementation Guideline,[3] this value was used as the 95th percentile of a lognormal distribution for the purpose of calculating probability of causation.

On-Site Ambient Dose

Although was monitored for ionizing radiation doses periodically during his employment at the Hanford Site, on-site ambient doses were assessed as part of this dose reconstruction for all years of employment. This accounts for any doses from stack releases or other radiation sources that may inadvertently have been subtracted from the dosimeter readings. The on-site ambient doses assigned were based on the maximum annual on-site ambient external doses reported for any area of the site (as described in Attachment E of the External Dose Reconstruction procedure[6]) and an assumed average of 50 hours worked per week throughout the employment period,[6] up to the date of cancer diagnosis. The total on-site ambient dose assigned was 3.483 rem.

Occupational Medical Dose

In addition to the estimated dose received from site operations, the dose received from diagnostic X-ray procedures that were required as a condition of employment was also included in the overall dose to the colon, as modeled by that organ. Based on information in Attachment E of the External Dose Reconstruction procedure[6] and an assumed annual X-ray procedure each year of employment, up to the date of cancer diagnosis, a total X-ray dose of 4.226 rem was assigned. This X-ray dose is considered claimant favorable as it likely exceeds the true X-ray dose to the colon. Also, a multiplication factor of 1.3 has been applied to ensure claimant favorability and account for uncertainty.

Internal Dose

Internal dose is caused by radioactive materials that are taken into the body. A chronic intake is an intake of radioactive material that occurs over an extended period of time (typically weeks or longer). An acute intake is an intake of radioactive material that occurs over a short period of time (typically minutes to hours). Regardless of the rate at which the intake occurs, the internal dose received from radioactive materials having long half-lives occurs over an extended period of time and is, therefore, considered chronic. The internal dose to the colon was determined by using the model for that organ.[8]

Assigned internal doses are based on the information provided in the Technical Information Bulletin: Maximum Internal Dose Estimates for Certain Complex Claims.[7] Although part of Mr. employment period is outside of the applicable dates as specified in this Technical Information Bulletin, the methodology applies because of 's low external radiation dose results and his low potential for internal exposure as an carpenter.

Internal dose monitoring records for radionuclides other than tritium were reviewed. All measurement results for non-naturally occurring radionuclides showed an activity less than the level of detection for the given radionuclides and bioassay method. However, to account for any incidental dose that may have been received but not documented, internal dose was assigned

based on a hypothetical intake. This assumed intake included each of the radionuclides likely to result in significant internal dose at the Hanford Site.

Applying the hypothetical intake to the colon (which is a maximizing assumption) and calculating organ dose in accordance with the Technical Information Bulletin: Maximum Internal Dose Estimates for Certain Complex Claims,[7] a total internal dose of 8.256 rem was assigned. This assigned dose is an overestimate of the actual internal doses received.

Dose from Radiological Incidents

The record of the telephone interview was evaluated carefully by the dose reconstructor. It was mentioned in the interview that the employee was involved in an incident while working at the Hanford Site; he was restricted because his dose was over the allowable limit several times. He received urine and fecal monitoring for a long time after the incidents. It was also mentioned that there was concern with the validity of DOE's records, based on local perceptions. Along with the available monitoring records, the claimant-favorable assumptions applied in this dose reconstruction would take into account dose associated with any radiological work activities and any potential radiation doses received during an incident.

Uncertainty

Except for missed dose, point estimates (constant values) were used for organ dose input into the NIOSH-Interactive RadioEpidemiological Program (NIOSH-IREP). Missed doses were divided by 2 and a lognormal distribution was applied in accordance with the NIOSH External Dose Reconstruction Implementation Guideline.[3]

Possible Overestimate of Radiation Dose

There are a number of reasons to believe that this dose estimate represents a larger dose than true radiation dose received while working at the Hanford Site. The most important reasons for this include:

- Claimant-favorable dose conversion factors were used to convert potential whole body dose to dose to the colon. Had more realistic dose conversion factors been used, the estimated dose to the colon would have been smaller.

- Internal doses were estimated by using claimant-favorable assumptions regarding a hypothetical intake that was unlikely to have occurred. The actual internal doses received by would have been considerably smaller than those calculated using these assumptions.

- The actual doses to the colon from occupational medical X-ray procedures are likely to be smaller than were calculated based on the maximizing assumptions used in this dose reconstruction.

- The external on-site ambient doses estimated fr likely much larger than any ambient doses that were unmonitored or unrecorded.

Summary

; was exposed to various sources of radiation during his employment at the Hanford Site. The estimated dose to M s 36.045 rem.

The reported dose is a significant *overestimate* of M. occupational radiation dose which will support claim determination.

Attachment 1 contains the IREP dose reconstruction summary sheets that will be used by the Department of Labor to make the final probability of causation determination of the claim.

References

1. 42 CFR 82, *Methods for Radiation Dose Reconstruction Under the Energy Employees Occupational Illness Compensation Program Act of 2000*; Final Rule, Federal Register/Vol.67, No. 85/Thursday, May 2, 2002, p 22314.

2. 42 CFR 81, *Guidelines for Determining the Probability of Causation Under the Energy Employees Occupational Illness Compensation Program Act of 2000*; Final Rule, Federal Register/Vol.67, No. 85/Thursday, May 2, 2002, p 22296.

3. NIOSH, (2002) *External Dose Reconstruction Implementation Guideline, Rev 1*, OCAS-IG-001, National Institute for Occupational Safety and Health, Office of Compensation Analysis and Support, Cincinnati, Ohio.

4. NIOSH, (2002) *Internal Dose Reconstruction Implementation Guideline, Rev 0*, OCAS-IG-002, National Institute for Occupational Safety and Health, Office of Compensation Analysis and Support, Cincinnati, Ohio.

5. ORAU Team, ORAUT-TKBS-0006-6, *Technical Basis Document for the Hanford Site – Occupational External Dosimetry, Rev 01*, January 9, 2004.

6. ORAU Team, ORAUT-PROC-0006, *External Dose Reconstruction, Rev 00*, June 27, 2003.

7. ORAU Team, ORAUT-OTIB-0002, *Technical Information Bulletin: Maximum Internal Dose Estimates for Certain DOE Complex Claims, Rev 01*, January 10, 2004.

8. ORAU Team, ORAUT-OTIB-0005, *Technical Information Bulletin: IMBA Organ, External Dosimetry Organ, and IREP Model Selection by ICD-9 Code, Rev 01*, January 23, 2004.

ATTACHMENT 1: IREP Input Tables

PERSONAL INFORMATION								
Claimant Name	NIOSH ID #	Claimant SSN	DOL District Office	Gender	Birth Year	Year of Diagnosis	Cancer Model	Should all model be run?
						1961	Colon	No

CLAIMANT CANCER DIAGNOSIS						
	Primary Cancer #1	Primary Cancer #2	Primary Cancer #3	Secondary Cancer #1	Secondary Cancer #2	Secondary Cancer #3
Cancer Type	colon	N/A	N/A	N/A	N/A	N/A
Date of Diagnosis	1961	N/A	N/A	N/A	N/A	N/A

EXPOSURE INFORMATION

Number of exposures: 121

Exposure #	Exposure Year	Exposure Rate	Radiation Type	Dose Distribution Type	Parameter 1	Parameter 2	Parameter 3
1	1945	acute	photons E=30-250ke	Constant	0.010	0.000	0.000
2	1946	acute	photons E=30-250ke	Constant	0.130	0.000	0.000
3	1947	acute	photons E=30-250ke	Constant	0.050	0.000	0.000
4	1957	acute	photons E=30-250ke	Constant	0.034	0.000	0.000
5	1958	acute	photons E=30-250ke	Constant	0.462	0.000	0.000
6	1959	acute	photons E=30-250ke	Constant	0.393	0.000	0.000
7	1960	acute	photons E=30-250ke	Constant	0.303	0.000	0.000
8	1961	acute	photons E=30-250ke	Constant	0.150	0.000	0.000
9	1945	chronic	trons E=100keV-2	Constant	0.047	0.000	0.000
10	1946	chronic	trons E=100keV-2	Constant	0.613	0.000	0.000
11	1947	chronic	trons E=100keV-2	Constant	0.236	0.000	0.000
12	1957	chronic	trons E=100keV-2	Constant	0.160	0.000	0.000
13	1958	chronic	trons E=100keV-2	Constant	2.180	0.000	0.000
14	1959	chronic	trons E=100keV-2	Constant	1.854	0.000	0.000
15	1960	chronic	trons E=100keV-2	Constant	1.429	0.000	0.000
16	1961	chronic	trons E=100keV-2	Constant	0.708	0.000	0.000
17	1944	chronic	alpha	Constant	0.150	0.000	0.000
18	1945	chronic	alpha	Constant	0.091	0.000	0.000
19	1946	chronic	alpha	Constant	0.085	0.000	0.000
20	1947	chronic	alpha	Constant	0.080	0.000	0.000
21	1948	chronic	alpha	Constant	0.077	0.000	0.000
22	1949	chronic	alpha	Constant	0.075	0.000	0.000
23	1950	chronic	alpha	Constant	0.074	0.000	0.000
24	1951	chronic	alpha	Constant	0.073	0.000	0.000
25	1952	chronic	alpha	Constant	0.072	0.000	0.000
26	1953	chronic	alpha	Constant	0.071	0.000	0.000
27	1954	chronic	alpha	Constant	0.071	0.000	0.000
28	1955	chronic	alpha	Constant	0.070	0.000	0.000
29	1956	chronic	alpha	Constant	0.070	0.000	0.000
30	1957	chronic	alpha	Constant	0.070	0.000	0.000
31	1958	chronic	alpha	Constant	0.070	0.000	0.000
32	1959	chronic	alpha	Constant	0.069	0.000	0.000
33	1960	chronic	alpha	Constant	0.069	0.000	0.000
34	1961	chronic	alpha	Constant	0.069	0.000	0.000
35	1944	chronic	photons E>250keV	Constant	1.519	0.000	0.000
36	1945	chronic	photons E>250keV	Constant	0.152	0.000	0.000
37	1946	chronic	photons E>250keV	Constant	0.042	0.000	0.000
38	1947	chronic	photons E>250keV	Constant	0.016	0.000	0.000
39	1948	chronic	photons E>250keV	Constant	0.008	0.000	0.000
40	1949	chronic	photons E>250keV	Constant	0.005	0.000	0.000
41	1950	chronic	photons E>250keV	Constant	0.003	0.000	0.000
42	1951	chronic	photons E>250keV	Constant	0.002	0.000	0.000
43	1952	chronic	photons E>250keV	Constant	0.002	0.000	0.000
44	1953	chronic	photons E>250keV	Constant	0.001	0.000	0.000
45	1954	chronic	photons E>250keV	Constant	0.001	0.000	0.000
46	1955	chronic	photons E>250keV	Constant	0.001	0.000	0.000
47	1956	chronic	photons E>250keV	Constant	0.001	0.000	0.000
48	1957	chronic	photons E>250keV	Constant	0.000	0.000	0.000
49	1958	chronic	photons E>250keV	Constant	0.000	0.000	0.000
50	1959	chronic	photons E>250keV	Constant	0.000	0.000	0.000
51	1960	chronic	photons E>250keV	Constant	0.000	0.000	0.000
52	1961	chronic	photons E>250keV	Constant	0.000	0.000	0.000
53	1944	chronic	electrons E>15keV	Constant	4.458	0.000	0.000
54	1945	chronic	electrons E>15keV	Constant	0.193	0.000	0.000
55	1946	chronic	electrons E>15keV	Constant	0.091	0.000	0.000
56	1947	chronic	electrons E>15keV	Constant	0.065	0.000	0.000
57	1948	chronic	electrons E>15keV	Constant	0.052	0.000	0.000
58	1949	chronic	electrons E>15keV	Constant	0.043	0.000	0.000
59	1950	chronic	electrons E>15keV	Constant	0.036	0.000	0.000
60	1951	chronic	electrons E>15keV	Constant	0.030	0.000	0.000
61	1952	chronic	electrons E>15keV	Constant	0.025	0.000	0.000

62	1953	chronic	electrons E>15keV	Constant	0.021	0.000	0.000
63	1954	chronic	electrons E>15keV	Constant	0.018	0.000	0.000
64	1955	chronic	electrons E>15keV	Constant	0.015	0.000	0.000
65	1956	chronic	electrons E>15keV	Constant	0.013	0.000	0.000
66	1957	chronic	electrons E>15keV	Constant	0.011	0.000	0.000
67	1958	chronic	electrons E>15keV	Constant	0.009	0.000	0.000
68	1959	chronic	electrons E>15keV	Constant	0.008	0.000	0.000
69	1960	chronic	electrons E>15keV	Constant	0.007	0.000	0.000
70	1961	chronic	electrons E>15keV	Constant	0.006	0.000	0.000
71	1944	acute	photons E=30-250kv	Lognormal	0.029	1.520	0.000
72	1945	acute	photons E=30-250kv	Lognormal	0.840	1.520	0.000
73	1947	acute	photons E=30-250kv	Lognormal	0.340	1.520	0.000
74	1948	acute	photons E=30-250kv	Lognormal	0.160	1.520	0.000
75	1956	acute	photons E=30-250kv	Lognormal	0.120	1.520	0.000
76	1957	acute	photons E=30-250kv	Lognormal	0.220	1.520	0.000
77	1958	acute	photons E=30-250kv	Lognormal	0.200	1.520	0.000
78	1959	acute	photons E=30-250kv	Lognormal	0.040	1.520	0.000
79	1961	acute	photons E=30-250kv	Lognormal	0.040	1.520	0.000
80	1944	chronic	trons E=100keV-2(	Lognormal	0.094	1.520	0.000
81	1945	chronic	trons E=100keV-2(	Lognormal	3.963	1.520	0.000
82	1947	chronic	trons E=100keV-2(	Lognormal	1.604	1.520	0.000
83	1948	chronic	trons E=100keV-2(	Lognormal	0.755	1.520	0.000
84	1956	chronic	trons E=100keV-2(	Lognormal	0.566	1.520	0.000
85	1957	chronic	trons E=100keV-2(	Lognormal	1.038	1.520	0.000
86	1958	chronic	trons E=100keV-2(	Lognormal	0.944	1.520	0.000
87	1959	chronic	trons E=100keV-2(	Lognormal	0.189	1.520	0.000
88	1961	chronic	trons E=100keV-2(	Lognormal	0.189	1.520	0.000
89	1943	chronic	photons E=30-250kv	Constant	0.130	0.000	0.000
90	1944	chronic	photons E=30-250kv	Constant	0.130	0.000	0.000
91	1945	chronic	photons E=30-250kv	Constant	0.252	0.000	0.000
92	1946	chronic	photons E=30-250kv	Constant	0.159	0.000	0.000
93	1947	chronic	photons E=30-250kv	Constant	0.157	0.000	0.000
94	1948	chronic	photons E=30-250kv	Constant	0.150	0.000	0.000
95	1949	chronic	photons E=30-250kv	Constant	0.205	0.000	0.000
96	1950	chronic	photons E=30-250kv	Constant	0.072	0.000	0.000
97	1951	chronic	photons E=30-250kv	Constant	0.072	0.000	0.000
98	1955	chronic	photons E=30-250kv	Constant	0.345	0.000	0.000
99	1956	chronic	photons E=30-250kv	Constant	0.461	0.000	0.000
100	1957	chronic	photons E=30-250kv	Constant	0.350	0.000	0.000
101	1958	chronic	photons E=30-250kv	Constant	0.415	0.000	0.000
102	1959	chronic	photons E=30-250kv	Constant	0.225	0.000	0.000
103	1960	chronic	photons E=30-250kv	Constant	0.186	0.000	0.000
104	1961	chronic	photons E=30-250kv	Constant	0.186	0.000	0.000
105	1943	acute	photons E=30-250kv	Constant	0.260	0.000	0.000
106	1944	acute	photons E=30-250kv	Constant	0.260	0.000	0.000
107	1945	acute	photons E=30-250kv	Constant	0.260	0.000	0.000
108	1946	acute	photons E=30-250kv	Constant	0.520	0.000	0.000
109	1947	acute	photons E=30-250kv	Constant	0.520	0.000	0.000
110	1948	acute	photons E=30-250kv	Constant	0.520	0.000	0.000
111	1949	acute	photons E=30-250kv	Constant	0.260	0.000	0.000
112	1950	acute	photons E=30-250kv	Constant	0.260	0.000	0.000
113	1951	acute	photons E=30-250kv	Constant	0.013	0.000	0.000
114	1955	acute	photons E=30-250kv	Constant	0.260	0.000	0.000
115	1955	acute	photons E=30-250kv	Constant	0.026	0.000	0.000
116	1956	acute	photons E=30-250kv	Constant	0.260	0.000	0.000
117	1957	acute	photons E=30-250kv	Constant	0.013	0.000	0.000
118	1958	acute	photons E=30-250kv	Constant	0.260	0.000	0.000
119	1959	acute	photons E=30-250kv	Constant	0.013	0.000	0.000
120	1960	acute	photons E=30-250kv	Constant	0.260	0.000	0.000
121	1961	acute	photons E=30-250kv	Constant	0.260	0.000	0.000

OTHER ADVANCED FEATURES			
Sample Size	Random Seed		
2000	99		
User Defined Uncertainty Distribution			
Dose Distribution Type	Parameter 1	Parameter 2	Parameter 3
Lognormal	1.000	1.000	0.000

HW-4.209

HANFORD ENGINEER WORKS

Inter-Department Transfer or Change of Job Classification

Non-Exempt Employees

Send Original To: Weekly Payroll Division

Send Copy To: Personnel Division

Name _____ Payroll No. _____ Age _____
(Name in full)

Effective Date of Change June 13, 1949

	Payroll No.	Department	Job Classification	Rate
Present		Community Public Works	Carpenter "B"	$78.00 (Prof. $85.90)
New		Community Public Works	Carpenter "B"	$78.00 (Prof. $81.90)

1. Reason for Change: Completion of temporary work near 100-F Area, and returning to full time employment 700-1100 Area.

2. Present Duties: Carpenter - Community Public Works

3. New Duties: Carpenter - Community Public Works

4. Continuous Service Date: May 12, 1943

5. Length of Time on Present Classification: _____ years and 10 months

RECORD OF EMPLOYMENT			
Quality	F	Very Good -	VG
Quantity	F	Good - -	G
Attendance	G	Fair - -	F
Cooperation	G	Poor - -	P
Reliability	F		

CLEARANCES	
Medical	✓
Stores	

Approved _____
SUPERINTENDENT OR
ASSISTANT SUPERINTENDENT

Date: JUN 13 1949

Approved _____
ORIGINAL SIGNED BY
E. J. TAGAN
WORKS MANAGER OR
ASSISTANT WORKS MANAGER

Encl 7

HANFORD ENGINEER WORKS

Inter-Department Transfer or Change of Job Classification

Non-Exempt Employees

SPECIAL CHANGE-OVER FORM

Send Original To: Weekly Payroll Division

Send Copy To: Personnel Division

Name _____ Payroll No. _____ Age _____
(Name in full)

Effective Date of Change APRIL 11, 1949

	Payroll No.	Department	Job Classification	Rate	
Present	_____	_____	Maint. Mech B	$1.30	52.00
New	_____	_____	Carp Jrn	_____	52.00

1. Reason for Change: CHANGE OF CLASSIFICATION AND/OR RATE OF PAY IN ACCORDANCE WITH CHANGE OF WAGE RATE SYSTEM

2. Present Duties: _____

3. New Duties: _____

4. Continuous Service Date: _____

5. Length of Time on Present Classification: _____ years and _____ months

RECORD OF EMPLOYMENT	
Quality _____	Very Good - VG
Quantity _____	Good - - G
Attendance _____	Fair - - F
Cooperation _____	Poor - - P
Reliability _____	

CLEARANCES
Medical _____
Stores _____

Approved _____
SUPERINTENDENT OR ASSISTANT SUPERINTENDENT

Date: _____

Approved _____
WORKS MANAGER OR ASSISTANT WORKS MANAGER

Approved C. C. TALLMAN
Labor Relations and Wage Rates

Encl 8

STRICTLY PRIVATE

DATE:

TO:

FROM: COMPLETE

SUBJECT: **PRIORITY NIOSH #**
EEOICP Claim #

The Hanford Radiological Exposure Records have been searched for all radiological exposure material relating to This information has been copied and is attached. As in the past, we have not sanitized the documents but have indicated those needing attention with a "flag" on the right-hand side of the page.

Per your request, I have attached the following items relating to

1) Contractor Work History,
2) Individual Dosimeter History,
3) Hanford Occupational Lifetime Totals by Year, and
4) Bioassay Results and In Vivo Record.

Due to a reevaluation doses, there were dose corrections made. All radiation dose adjustment sheets are attached.

The x-ray dose recorded in 1959 shows 59 for each month. This is assumed to be a programming error, and is really a print-out of the year. In 1959 it was Hanford practice to report Whole Body (penetrating) Dose as the sum of the gamma dose plus the neutron dose and 35% of the x-ray dose. The value printed for the calendar year gamma total is actually a total of gamma dose plus 35% of the x-ray dose. The skin dose (derma) was calculated as the sum of the whole body dose and the remaining 65% of the x-ray dose. The x-ray dose total for 1959 should be 0 mrem.

A review of our records shows no indication that was monitored for radiation exposure at Hanford during 1955.

According to our records no internal doses were recorded for this individual while employed or visiting Hanford.

If you need additional information, please give me a call o .

xc Personal Exposure File

Encl 9

FOIA #2002-0004 Summary was processed on October 17, 2001.

An EEOICP Claim was completed on April 18, 2002.

Priority NIC as processed on March 20, 2003.

If you have any questions regarding Mi records, please contact me at

cc

Close out interview with Chris W., 10 December 2004, 1100 to 1300

Chris gave his credentials including licensed health physicist and physician, board certified in radiology.

The first item we discussed was the time frame of Aug 1942 to May 1943. This time frame was not included in the dose reconstruction. He went through the computer records and found the Personnel Security Questionnaire which listed the date and name of employment. The first date worked at Hanford was 8/42 to 5/43 for DuPont as a carpenter at Hanford. The second date is 5/43 to 4/51 for DuPont and General Electric as a carpenter at Hanford. Chris recommended we contact the Department of Labor (DOL) to notify them of the additional time and request another dose reconstruction.

In the first interview with Brad, we had asked for 42 CFR 81 and 82. Chris directed us to the CDC web site to access that information.

both requested copies of the close out interviews. Chris explained that the interviews were not taped. We could request copies of the phone logs through the Freedom of Information Act to David Sundin of OCAS at email ocas@cdc.gov. We would need to identify ourselves, exactly which documents we were requesting and a return address or email address. We should also included our social security number and the NIOSH case number

The next question was what amount of REM would equal 50 percent or greater. There were so many factors for probability of causation: time, age, latency, target organ, race of claimant, gender, Hispanic, Indian, African American, etc. Then we discussed the fact that . was Chris recommended we ask the DOL if this would be a factor. Chris also said the dose reconstruction people were right next door. He stated that cancer and REM are noncorralative factors.

We discussed diagnostic procedures and how they differed today from the 1960s. For instance cancer was simply listed as colon cancer. It did not state transverse, ascending, descending etc. We discussed the numbers and types of cases and claims filed. He explained the differences between a case and claims. The case was the employee, the claims were survivors.

He stated the dose reconstruction report was preliminary only! It was developed from assumptive information based on available records. Then they make a threshold for which cases would be 50 percent above or below. None of the claims that have been approved so far have gone through NIOSH. There are 25 plus types of cancers that are accepted case would not have made it to the current point if the type of cancer he had was not an accepted cancer.

Discussed dose reconstruction. Chris referred us to page seven. Again expressed concern about falsification of records. There was the incident where was left in a hot area too long. When . came home from school was extremely upset. She remembers him being horribly upset and explaining he had been intentionally left exposed too long. There was also a badge incident. There was a random check after the bus ride back from ; count was so high they were angry he had been on the buss exposing other people for the entire ride. The ride from N area was quite long. Some of the employees

Encl 10

played poker. enough money to buy a set of china and silverware for his wife. We know many of the records were falsified. explained that her former sister-in-law had worked at Hanford in the 80s. The sister-in-law said the badge information was routinely falsified. Chris stated he heard those stories daily toc ated we and were formally stating we know there was falsification of records and information. Chris stated he understood. He hears it on a daily basis from this site and others. We asked what could be done about it. He recommended if the claim was denied, send in the OCAS form and appeal the denial. The denial could not be appealed with out the OCAS form. The case could be administratively closed if we did not respond and sign the form. However we were not to sign the form until we had submitted the additional information to the DOL. He stated we would need a new dose reconstruction report and a new OCAS form since we now had additional employment time. The case is currently in a "pending" state due to our questions.

Chris stated there were about 12 pages of dose reconstruction from 1944. There were no bio information, no urine or fecal samples. He said it was unfortunate that due to cost restraints they did not monitor everybody. n stated there had to have been bio records! Both y remember seeing the sample boxes on our front porch all the time. There was medicine in the refrigerator he had to drink. Again, many records destroyed or falsified.

remembere ring a mole removed from his neck. I examined thyroi n remembers neck being swollen from his thyroid. However, there is no mention of thyroid in the records. Chris told us to inform the DOL we thought had thyroid cancer also. We looked through the records from

Under MICROSCOPIC: The skin tumor consists of shallow, papillary folds. The epidermis in this region is thin and shows hyperpigmentation of the basal layer. The sinus tract is lined by chronic granulation tissue. The lymph node is hyperplastic and shows prominent germinal centers. No evidence of tumor tissue is apparent.

Under PATHOLOGIC DIAGNOSIS: Lymphoid hyperplasia of lymph node.
Abdominal sinus tract.
Basal cell papilloma of the skin.

As a physician, Chris interpreted the records to show tha had two additional primary cancers. He said the statement under MICROSCOPIC "No evidence of tumor tissue is apparent" meant there was no evidence of metastic tumor tissue from the colon. The record did not say benign. The lymphoid hyperplasia and the basal cell papilloma were two additional primary cancers.

Chris explained the REM meant radiation exposure in man. RAD meant radiation exposure in any other entity. We discussed thyroid cancers and diseases as have thyroid problems.

In summary, Chris again advised us to contact the DOL since there was a. additional employment time and b. additional primary cancers. He instructed us to request a new dose reconstruction and case review.

AFFIDAVIT
SPECIAL EXPOSURE COHORT
HANFORD SITE
RICHLAND, WASHINGTON

_ _ _, do swear that:

a. I remember specimen containers from Hanford routinely on our front porch. These containers were on many porches in Richland and the surrounding area. I was familiar as to what they were. I also remember something in the refrigerator that was related to the specimen samples.

NIOSH requested the dose reconstruction information from the Department of Energy (DOE). They received a computer summary from Hanford Radiological Exposure Reporting System (REX). REX did not contain any internal dose monitoring. My _ requested a complete copy of the file from the Department of Labor (DOL). There was no internal exposure data.

_y made a Freedom of Information Act (FOIA) request of the DOE for all dosimetry data, all documents and supporting documents related to his employment, all handwritten calculations, all yearly dose sheets, all punch cards, all personal radiation exposure history forms, and any and all other information regarding my _ _eived employment records and badge dosimetry records, insurance records and Inter Department records showing changes in job classifications and transfers to different Areas at the Hanford site. There were also internal dose information, though only for 1959, 1960 and 1961. There was a letter dated March 20, 2003, the letter states, "A review of our records shows no indication that _ was monitored for radiation exposure at Hanford during 1955." There are nine years with no dose records, not just 1955. _ worked at Hanford from 1942 to 1961.

Therefore, I assert that most internal dosimetry records have been lost or misplaced. I also assert that the radiation monitoring records are in error and incomplete.

b. I clearly remember one event, _ was already home when I came home from school. He was in the back yard, screaming and crying because he had been over exposed. The incident was discussed many times while I was growing up.

None of the information provided indicates an over exposure that we can determine. I described the back yard incident in each interview regarding this claim. We (my sister _ ne) have asked for information about this specific incident of the health physicists that interviewed us as part of the investigative process. They did not see any incidents of over exposure in any of the records at their disposal.

Encl 11

I remember coming home from school two other times when our father was home because he had been overexposed. The family took weekend trips to Whidbey Island to relieve er's anxiety at these times. These were easily remembered trips during my childhood. I remember my parents planning to start a construction business in order to get away from the hazardous work environment. They were anxious times a child easily remembers.

Therefore, I assert the records have been falsified.

Our father talked at the dinner table about working at the n where they were making concrete forms to pour more concrete around leaking radioactive tanks. They worked under pouring water in special suits for 20 minute intervals.

C. The employment records from DOE were in error. On Form AEC-1, PERSONNEL SECURITY QUESTIONNAIRE, listed all his employment and periods of unemployment from school in 1931 to June 1960. DOE's records do not match. After strenuous objections, I received a letter from DOL, dated April 1, 2005, copy enclosed, with "corrected" employment dates.

Therefore, I assert that the records are in error and incomplete.

STATE OF TEXAS)
: ss.
COUNTYOF ARRANSAS)

On February 28, 2006, personally appeared before me, a Notary Public

who acknowledged to me that she executed the foregoing

instrument.

DAPHNE KIRCHHARR
NOTARY PUBLIC
State of Texas
Comm. Exp. 04-05-2008

AFFIDAVIT
SPECIAL EXPOSURE COHORT
HANFORD SITE
RICHLAND, WASHINGTON

I, [redacted] do swear that:

a. I remember specimen containers from Hanford routinely on our front porch. These containers were on many porches in Richland and the surrounding area. I was familiar as to what they were. I also remember something in the refrigerator that was related to the specimen samples.

NIOSH requested the dose reconstruction information from the Department of Energy (DOE). They received a computer summary from Hanford Radiological Exposure Reporting System (REX). REX did not contain any internal dose monitoring. I requested a complete copy of the file from the Department of Labor (DOL). There were no internal exposure data.

I made a Freedom of Information Act (FOIA) request of the DOE for all dosimetry data, all documents and supporting documents related to his employment, all handwritten calculations, all yearly dose sheets, all punch cards, all personal radiation exposure history forms, and any and all other information regarding my father. There was internal dose information, though very limited. Therefore, I assert that most internal dosimetry records have been lost or misplaced. There were nine years of employment at Hanford for which there were no records of radiation dose monitoring of any kind. I assert that the radiation monitoring records are in error and incomplete.

[redacted], clearly remembers that [redacted] was already home when she came home from school one day. He was in the back yard and distraught and crying because he had been over exposed. I have heard about this incident the whole time I was growin

None of the information provided indicates an over exposure that we can determine. [redacted] described the back yard incident in each interview regarding this claim. We have asked this of the health physicists that interviewed us as part of the close-out interview process. He did not see any incidents of over exposure, nor were there any internal dose records for him to review. Therefore, I assert the records have been falsified.

Date: 3-8-06

STATE OF OREGON)
: ss
COUNTY OF HOOD RIVER)

On March 8, 2006, personally appeared before me, a Notary Public, [redacted] who acknowledged to me that she executed the forgoing instrument.

OFFICIAL SEAL
BRAD RYHLICK
NOTARY PUBLIC-OREGON
COMMISSION NO. 382760
MY COMMISSION EXPIRES JULY 18, 2008

[redacted] 3/8/06

Encl 12

MARIA CANTWELL
WASHINGTON

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FAX: (202) 228-0514

United States Senate

WASHINGTON, DC 20510-4705

February 15, 2006

COMMITTEES:
COMMERCE, SCIENCE, AND TRANSPORTATION
ENERGY AND NATURAL RESOURCES
INDIAN AFFAIRS
SMALL BUSINESS

Dear

Thank you for contacting my office regarding your request for the executive summary of the audit regarding Hanford EEOICP cases. I appreciate hearing from you about this, and have enclosed informational material on this matter.

I hope you find this information useful in resolving your concerns. Should you need any further assistance on this or any other matter, please do not hesitate to contact my office in the future.

Sincerely,

Maria Cantwell
United States Senator

Encl 13

PLEASE REPLY TO:

☐ U.S. FEDERAL COURTHOUSE
WEST 920 RIVERSIDE, SUITE 697
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FAX: (425) 303-8351

☐ 950 PACIFIC AVENUE
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TACOMA, WA 98402
(253) 572-2281
FAX: (253) 572-5879

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1.0 EXECUTIVE SUMMARY

S. Cohen and Associates (SC&A, Inc.) evaluated the following documents related to historical occupational exposures at the Hanford Site: ORAUT-TKBS-0006-1, *Technical Basis Document for the Hanford Site – Introduction* (Scalsky 2004ba); ORAUT-TKBS-0006-2, *Technical Basis Document for the Hanford Site – Site Description* (Selby 2004); ORAUT-TKBS-0006-3, *Technical Basis Document for the Hanford Site – Occupational Medical Dose* (Scalsky 2003); ORAUT-TKBS-0006-4, *Technical Basis Document for the Hanford Site –Occupational Environmental Dose* (Savignac 2003); ORAUT-TKBS-0006-5, *Technical Basis Document for the Hanford Site – Occupational Internal Dose* (Bihl 2004); and ORAUT-TKBS-0006-6, *Technical Basis Document for the Hanford Site – Occupational External Dosimetry* (Fix 2004). The evaluations focused on the completeness, technical accuracy, adequacy of data, and compliance with stated objectives, as stipulated in the *SC&A Standard Operating Procedure for Performing Site Profile Reviews* (SC&A 2004) approved by the Advisory Board on Radiation and Worker Health (Advisory Board) on March 18, 2004. (A fifth objective, "consistency among various site profiles," was limited to a comparison with the Savannah River Site Profile.) Although SC&A is aware that there was a recent Rev. 01 to ORAUT-TKBS-0006-4 in April 2005, this Rev. 01 has not been evaluated in this report.

In addition, SC&A evaluated and made use of technical information bulletins (TIBs) that relate to the Hanford Site Profile:

- ORAUT-OTIB-0002, *Technical Information Bulletin – Maximizing Internal Dose Estimates for Certain DOE Complex Claims* (Rollins 2004)
- ORAUT-OTIB-0007, *Technical Information Bulletin – Occupational Dose from Elevated Ambient Levels of External Radiation* (Strome 2003)

The National Institute for Occupational Safety and Health (NIOSH) Technical Basis Documents (TBDs), which together constitute the NIOSH site profiles for specific U.S. Department of Energy (DOE) and Atomic Weapons Employer sites, are designed to support the conduct of individual dose reconstructions under the Energy Employees Occupational Illness Compensation Program Act of 2000 (EEOICPA). This is accomplished by compiling and analyzing data such as those related to facility operations and processes over time, radiological source term characterization, chemical and physical forms of the radionuclides, historic workplace conditions and practices, and incidents and accidents involving potential exposures. As the support contractor to Advisory Board, SC&A has been charged with independently evaluating the approach taken in NIOSH site profiles (encompassing TBDs and supporting TIBs) to gauge their adequacy, completeness, and validity. This information will be used by the Advisory Board to advise the Secretary of Health and Human Services on the scientific validity and quality of dose reconstruction efforts performed.

These TBDs are used by NIOSH, along with individual dose data provided by DOE and information gathered in interviews with claimants, to reconstruct doses for Hanford employees (including contractor and subcontractor employees). This review is designed to fulfill the objectives set by the Advisory Board for assessing the accuracy and adequacy of the Hanford Site Profile to serve as the main set of TBD documents that informs dose reconstruction for claimants. For instance, it provides the data on the limits of detection of radiation monitoring

methods as well as descriptions of facilities and processes that resulted in the worker exposures. The site profile also provides direction for assigning internal and external doses to monitored and unmonitored workers.

Hanford was and remains a complex operation involved in numerous missions, each of which has its own unique exposure hazards. Occupational risks of exposure to ionizing radiation are generally defined by Hanford's past and current missions:

(1) Production of nuclear weapons materials and nuclear energy research and development (1943–1990)

(2) Environmental restoration, waste management, nuclear material stabilization, and facility decontamination and decommissioning for permanent site closure (1990–2033)[1]

In the context of these missions, facilities of concern include:

- "Nine graphite-moderated, light-water cooled reactors were constructed near the Columbia River in the Hanford 100 Areas over a period of 20 years commencing in 1943 (Carlisle 1996). The production reactors were used to produce plutonium by irradiating metallic uranium fuel elements with neutrons during the fission reaction in the reactor core. Other defense-related radionuclides that were experimented with included: irradiation of thorium to produce ^{233}U, irradiation of depleted uranium to produce ^{240}Pu, irradiation of neptunium targets to produce ^{238}Pu, and irradiation of americium to produce medical grade ^{238}Pu."[2] Radiological hazards included external photon, beta, and neutron exposure from fission products and neutron radiation, and internal exposure to fission and activation products.[3]

- Seven physical testing, research, and demonstration reactors.

- Five chemical separation plants and associated fuel separation facilities, including the T and B plants, the REDOX plant, the PUREX plant, and U Plant, where radiological hazards included potential for internal and external exposure to a variety of radionuclides.[4]

- "Three facilities for fuel fabrication, i.e., the Uranium Metal Fuels Fabrication facility, the Uranium Metal Extrusion facility, and the Fuel Cladding facility. There were also two

[1] U.S. Department of Energy, *Performance Management Plan for the Accelerated Cleanup of the Hanford Site*, DOE/RL-2002-47, Rev. D., page ii.

[2] Selby, J, Technical Basis Document for Hanford Site – Site Description, ORAUT-TKBS-0006-2, Revision 00, PC-1, Oak Ridge Associated Universities, Oak Ridge, TN, December 29, 2004.

[3] U.S. Department of Energy, Hanford Site Waste Management Units Report, DOE/RL-80-30, Revision 12, January 2003.

[4] Chemical separation activities included: (1) Bismuth Phosphate (BiP04) Process (1944-1956), (2) REDOX Process (1952-67); (3) Solvent uranium extraction from waste tanks (1952-1958); (4) PUREX Process (1956-1972, 1983-1990); and (5) Radiocesium and radiostrontium solvent extraction from high-level tank wastes (1968-1985).

support facilities; the Uranium Storage and Oxide Burner facility and the Reactor Fuel Manufacturing Pilot Plant."[5]

- "Two plutonium finishing facilities, 231-Z (Plutonium Isolation Building) and 234-5Z (Plutonium 18 Finishing Plant Complex) operated at Hanford from 1945 to present. The latter is still involved in 19 plutonium stabilization efforts as a part of the Hanford cleanup program. Both of these complexes are located in the 200-W Area."[6]
- Twenty-one research, development, and testing facilities where a variety of exposures to radioisotopes occurred.
- Waste handling and storage facilities, one in each of the 200-W and 200-E areas, a trench facility, a settling tank area, an evaporator facility, chemical separations exhaust filtration facilities, and three liquid waste handling buildings, all providing a potential for external and internal exposure, as well as exposures via the environmental transport pathway.
- Some 2,710 waste disposal sites and burial grounds in the 100, 200, 300, and 1100 Areas, currently being characterized and remediated.[7] The preponderance of these sites poses radiation exposure risks.
- High-level radioactive waste (HLW) storage in 177 large underground tanks.[8] High-level radioactive tank waste stabilization and removal from underground tanks, scheduled for processing and disposal over the next 30 years, pose ongoing risks of exposure to radionuclides.
- An estimated 2,750 surplus facilities, many of which are contaminated with radionuclides, are either scheduled or are now undergoing deactivation, decontamination, and decommissioning.[9]

It has not been possible within the time and resources available for this review to examine all aspects of the site profile in detail due to the immense complexity and long history of the Hanford facilities, and the many changes that have occurred over the decades. SC&A has selected certain issues for detailed discussion because they may significantly affect dose reconstruction.

Based upon a review process, which included not only a review of the TBDs and supporting TIBs and documentation, but also interviews with the authors of the documents and site experts,

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[5] Scalsky, E. D., Technical Basis Document for the Hanford Site Introduction, ORAUT-TKBS-0006-1, Rev. 01, January 9, 2004, page 5.

[6] Selby, J., Technical Basis Document for Hanford Site –Site Description, ORAUT-TKBS-0006-2, Rev. 00, October 2, 2003, page 14.

[7] U.S. Department of Energy, Hanford Site Waste Management Units Report, DOE/RL-80-30, Revision 12, January 2003.

[8] Between 1944 and 1988, some 530 million gallons of high-level wastes containing more than 800 megacuries (uncorrected for decay) were generated at Hanford. High-level wastes stored at Hanford currently contain approximately 194 megacuries in 54 million gallons or 204,000 cubic meters.

[9] U.S. Department of Energy, Office of Environmental Management, Linking Legacies, Chapter Five, Surplus Facilities, http://legacystory.apps.em.doe.gov/text/link/link5.htm.

SC&A has identified a number of issues. These issues are sorted into the following categories, in accordance with SC&A's review procedures:

(1) Completeness of data sources
(2) Technical accuracy
(3) Adequacy of data
(4) Consistency among site profiles
(5) Regulatory compliance

Following the introduction and a description of the criteria and methods employed to perform the review, the report discusses the strengths of the TBD, followed by a description of the major issues identified during our review. The issues were carefully reviewed with respect to the five review criteria. Several of the issues were designated as findings because they represent deficiencies in the TBDs that need to be corrected, and which have the potential to substantially impact at least some dose reconstructions.

1.1 SUMMARY OF STRENGTHS

For the purpose of reconstructing internal doses based on historical operations, NIOSH compiled an enormous amount of data describing the radioactive materials and operations at the various facilities and their associated processes.

Attachment D.3 of the internal dosimetry TBD includes a series of eight tables that provide guidance to dose reconstructors for assigning inhalation intakes of various radionuclides when the results of urinalysis are below the MDA. The intakes, in units of dpm/d, are normalized to an MDA of 1 dpm/d (based on a 24-hour urine sample). The tables also list cumulative intakes, in both dpm and pCi, based on exposure durations of 1 to 50 years. A second set of 11 tables provides similar guidance for whole body counters, normalized to an MDA of 1 nCi. These tables are helpful for dose reconstructions for claimants who worked at the Hanford Site, and are carried out to 50 years. According to the internal dosimetry TBD, plutonium urinalysis started in September 1946 (page 13), reliable uranium urinalysis started sometime in 1948 (page 24), and routine fission product urinalysis started in January 1947 (page 27). These urinalysis data were available in the late 1940s and generally provide a better means than air sampling data for the dose reconstructors to determine daily and cumulative intakes. However, some limitations of the data, discussed below, need to be factored in.

The use of the hypothetical intake described in ORAUT-OTIB-0002 (Rollins 2004) by NIOSH likely overestimates the dose to nonradiological workers and minimally exposed workers. For sites with reactors, such as Hanford, each claimant is assigned 28 radionuclides considered representative of potential sources of intake.

In compiling the atmospheric source terms for deriving outdoor occupational exposures, NIOSH made a concerted effort to compile the source term data needed to reconstruct the doses to unmonitored workers. This applies especially to the early period, prior to 1968.

1.2 SUMMARY OF FINDINGS

Finding 1: The NIOSH-derived neutron-to-photon dose ratios for use in pre-1972 neutron dose reconstruction are technically deficient and based on nonconservative assumptions, making them claimant unfavorable for use in dose reconstruction. For many Hanford workers, neutron exposure contributed a large fraction of the total dose derived from external radiation. In fact, when they are adjusted to account for the current International Commission on Radiological Protection (ICRP) neutron-weighting factor, neutron doses at the Hanford 200 and 300 Area plutonium facilities dominate the external dose. SC&A found various combinations of deficiencies that include: (1) the use of inappropriate data, (2) the use of incomplete or insufficient data, (3) the use of unconfirmed assumptions, and (4) the failure to account for critical variables, which limits the use of extrapolated data over time. It is also clear that historic neutron exposures to reactor workers in many areas are not adequately characterized.

Finding 2: The lack of bioassay data during the early period makes it difficult to properly quantify internal doses during that period. It is particularly a problem when dealing with the potentially high exposures that occurred during that time. Plutonium bioassay did not begin until September 1946; uranium bioassay did not begin until the first half of 1948. Fission product urinalysis data are unreliable until 1948. Uncertainties in the actual bioassay techniques and instruments used to quantify internal dose and the MDAs used in the years following 1946 need to be more thoroughly evaluated. Use of air monitoring data as a surrogate for worker intake during this early period is insufficiently substantiated, particularly given the lack of a basis for the assumed statistical distributions.

Finding 3: No guidance or direction for the dose reconstructor is provided regarding how adjustments are to be made or uncertainty factors calculated based on film badge and thermoluminescent dosimeter (TLD) error data provided in the TBD. In fact, no adjustments are recommended in recorded penetrating or gamma dose, with the exception of penetrating dose recorded for the two-element dosimeter used prior to 1957 for workers in the 200 Area. Likewise, adjustment factors are lacking for the large variety of exposure geometries experienced by workers at Hanford.

Finding 4: There is a significant potential for missed internal dose at Hanford that is insufficiently addressed in the TBD. Issues not adequately addressed include estimation of uncertainties for bioassay measurements prior to 1981, uncertainty corrections for whole-body counting prior to 1986 (and even default radionuclides until 1993), and potential contribution of radioactive contaminants in recycled uranium. The uncertainties in the case of plutonium in vivo counts are especially large. While the TBD recognizes the problem, the approach for dealing with them is not scientifically persuasive and does not appear to be consistently claimant favorable.

Finding 5: Modeling of occupational exposures due to Hanford environmental releases is not as claimant favorable as it should be, because the RACHET puff advection model is apparently not being applied to daily episodic airborne releases. Given that there were a number of relatively large short-term, ground-level, and elevated atmospheric releases at Hanford, it is important that these are modeled as hourly, not continuous annual releases, as indicated by Tables A-1 through A-21 of the TBD (Scalsky 2003). Lack of adequate parametric modeling of episodic releases also presents a significant potential for missed dose if releases are treated as continuous releases,

e.g., plutonium releases from the T and B reprocessing plants, ^{103}Ru and ^{106}Ru releases from the REDOX plant, and fission product releases as part of the Green Run and other operational release episodes.

Finding 6: The Tank Farm characterization in the TBD (Bihl 2004) is inadequate for dose reconstruction guidance in several respects. The list of radionuclides cited in the TBDs is incomplete, increasing the potential for missed dose. The site profile relies primarily on ORIGEN calculations to identify radionuclides that occur in large quantities and has not consulted field characterization data to verify the calculations (see Attachment 2 of this report). The TBD also does not reflect a complete description and characterization of past and current environmental restoration and waste management operations from which radiation exposure is likely to result.

Finding 7: Hanford was involved in both minor and major special campaigns, most notably those involving production of thorium and polonium. NIOSH needs to provide a detailed revision in the Hanford Occupational Internal and External Dosimetry TBDs to properly account for doses from the production of ^{233}U in the 100, 200 and 300 Areas, particularly in the 1960s to 1970s during peak production of ^{233}U. For workers exposed to thorium in the 1950s and 1960s, NIOSH needs to confirm such thorium exposures by urinalysis data for individual claimants, and dose reconstructors should carefully review potential doses in the 1960s and 1970s from irradiated thorium.

Finding 8: The TBD is incomplete with respect to remediation and disposal sites. Although NIOSH has included descriptions of key production and storage facilities, they have not addressed the numerous environmental waste streams and cribs that have been cleaned up in the past at Hanford disposal sites (e.g., ERDF). These areas pose radiological risks to those workers involved in the remediation and disposal process. Also, as these areas continue to age, the radionuclides of concern may be different from those in the original operations. Dose reconstructors need to take into account the risks associated with these areas at the Hanford site and the variability in radionuclide concentrations.

Finding 9: The method of locating, evaluating, and integrating incident data into the dose reconstruction is not clear in the Hanford TBDs. The Hanford occupational internal dose TDB (Bihl 2004) gives no specific information as to the spread of contamination in the reactor building, 231-Z Plutonium Isolation Facility, concentrator buildings, and uranium metal fabrication shops during the period 1943–1946. NIOSH should search for records that can provide additional information on doses resulting from accidents and incidents.

1.3 OPPORTUNITIES FOR IMPROVEMENT

Oro-Nasal Breathing: NIOSH should take into account oro-nasal breathing in the estimation of inhalation and ingestion doses. The dose conversion factors for light and heavy breathing should take account of the fact that many workers switch from nasal to oro-nasal breathing as the work becomes heavier. An upward adjustment to the percentage of heavy exercise and the consideration of oro-nasal breathing would ultimately increase the total uptake of radioactive material and be more claimant favorable given the uncertainties involved.

From: Castellano, Isaac (Cantwell) [Isaac_Castellano@cantwell.senate.gov]
Sent: Friday, November 18, 2005 4:06 PM
To:
Subject: FW: Cantwell Wins Review of Hanford Worker Benefits Status

Isaac Castellano
Office of U.S. Senator Maria Cantwell
State Outreach Assistant/Constituent Services Representative
206-220-6400
206-220-6404 Fax

Every Monday, Maria provides a brief outline about her work in the Senate and issues of importance to Washington state. If you are interested in subscribing to this update, please visit her website at: http://gp1d.senate.gov/mailman/listinfo/cantwell-weekly-update .

U.S. SENATOR MARIA CANTWELL
WASHINGTON

FOR IMMEDIATE RELEASE
NOVEMBER 17, 2005

CONTACT: **CHARLA NEUMAN**
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Cantwell Wins Review of Former Hanford Worker Benefits Status

WASHINGTON, DC – Thursday, U.S. Senator Maria Cantwell (D-WA) applauded the National Institute for Occupational Safety and Health (NIOSH) for their decision to review the benefits available to former Hanford workers. Cantwell requested the review in a letter sent to NIOSH on October 3 after reading an audit of available radiation exposure data. In a letter to Cantwell, NIOSH committed to discussing the audit's findings and re-evaluating the benefits status of former Hanford workers at their January meeting in Oak Ridge, Tennessee.

"This is the right decision," said Cantwell. **"Right now, we don't know the full extent of workers' exposure to toxins. We need to review the situation to make sure all former Hanford employees get the help they need. Some of these workers have waited years for help. Without this review, we might wrongly deny worker's compensation to thousands of deserving individuals who have already waited too long."**

Cantwell urged the agency's Advisory Board to review the status of former Hanford workers following an audit suggesting that a possible deficiency in data on worker radiation exposure between 1944 and 1968 may lead officials to underestimate exposure levels. The audit, prepared by S. Cohen &

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Associates (SC&A, Inc.) for the NIOSH Advisory Board and released in June, reviewed the Hanford site profile, a case history of activities at the Hanford nuclear facility, and found several instances where thousands of workers may be eligible for Special Exposure Cohort (SEC) status. SEC status would make former employees automatically eligible for workers' compensation.

Specifically, the June report by SC&A, Inc. found potentially significant exposures of reactor workers to unmeasured neutrons and unplanned airborne releases of radionuclides. The report also noted inconsistencies over time in recording worker radiation exposure, and insufficient measurements taken for internal exposure to recycled uranium. Insufficient or inconsistent data could make it impossible to determine the actual exposure level of former workers through dose reconstruction. Without dose reconstruction, SEC status would be former workers' only hope of compensation for their work related injuries or illnesses.

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