Hanford Environmental Dose Reconstruction Project

Monthly Report

August 1990

Prepared for the Technical Steering Panel

DISCLAIMER

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HANFORD ENVIRONMENTAL DOSE
RECONSTRUCTION PROJECT

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August 1990

Prepared for the Technical Steering Panel

Pacific Northwest Laboratory
Richland, Washington 99352

HANFORD ENVIRONMENTAL DOSE
RECONSTRUCTION PROJECT

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Preface

This monthly report summarizes the technical progress and project status for the Hanford Environmental Dose Reconstruction (HEDR) Project being conducted at the Pacific Northwest Laboratory (PNL)^(a) under the direction of a Technical Steering Panel (TSP). The TSP is composed of experts in numerous technical fields related to this project and represents the interests

of the public. The U.S. Department of Energy (DOE) funds the project.

Figure 1 shows the PNL organizational structure of the HEDR Project. Table 1 shows the status of PNL work to comply with directives issued by the TSP.

FIGURE 1. Organizational Structure of the Hanford Environmental Dose Reconstruction Project

^(a)Battelle Memorial Institute operates the Pacific Northwest Laboratory.

TABLE 1. Status of Directives(a)

		<u>Complete</u>	<u>Ongoing</u>	<u>Phase I</u>	<u>Phase II</u>
88-1	(a) Proposals		x		
	(b) Source Terms			x	
88-2	Vegetation			x	x
88-3	Status Reports		x		
88-4	Ground Water			x	x
88-5	Maps	x			
88-6	Resumes	x			
89-1	Indian Tribes			x	
89-2	Bioassay Data			x	x
89-3	Document Handling		x		
89-4	Reactor Purging			x	x
89-5	Phased Approach		x		
89-6	Meeting Materials		x		
89-7	Tech Communication			x	x
89-8	Phase II Planning			x	
89-9	Project QA Plan		x	x	
89-10	Contracts with Tribes			x	
90-1	Project Direction		x		
90-2	Dose Cut-Off Limit		x		

(a) Note: For simplicity, TSP directives are identified here using only key words. The complete directives are available from the TSP.

Executive Summary

The objective of the Hanford Environmental Dose Reconstruction Project is to estimate the radiation doses that populations could have received from nuclear operations at Hanford since 1944. The project is being managed and conducted by the Pacific Northwest Laboratory (PNL) under the direction of an independent Technical Steering Panel (TSP).

The TSP consists of experts in environmental pathways, epidemiology, surface-water transport, ground-water transport, statistics, demography, agriculture, meteorology, nuclear engineering, radiation dosimetry, and cultural anthropology. Included are appointed technical members representing the states of Oregon and Washington, cultural and technical experts nominated by the regional Native American tribes, and an individual representing the public.

The project is divided into the following technical tasks. These tasks correspond to the path radionuclides followed, from release to impact on humans (dose estimates):

- Source Terms
- Environmental Transport
- Environmental Monitoring Data
- Demographics, Agriculture, Food Habits
- Environmental Pathways and Dose Estimates.

The Source Terms Task develops estimates of radioactive emissions from Hanford facilities since 1944. These estimates are based on historical measurements and production information.

The Environmental Transport Task reconstructs the movement of radioactive materials from the areas of release to populations. Movement via the atmosphere, surface water (Columbia River), and ground water is studied.

The Environmental Monitoring Data Task assembles, evaluates, and reports historical environmental monitoring data. A major effort of this task is to separate Hanford as a source of radionuclide concentrations in the environment from concentrations caused by natural sources and nuclear testing fallout.

The Demographics, Agriculture, Food Habits Task develops the data needed to identify the populations that could have been affected by the releases. Population and demographic information are developed for the general population within the study area. This information will also be developed for several special population groups, including Native American tribes in the study area, Army personnel who were stationed at Hanford, Hanford construction workers, and migrant farm workers.

In addition to population and demographic data, the food and water sources and consumption patterns for populations are estimated because they provide a primary pathway for the intake of radionuclides. Historical dairy farming practices and milk distribution systems are studied because milk is a significant pathway for iodine-131 to enter the human body. Cows could have eaten vegetation contaminated with this radionuclide.

The Environmental Pathways and Dose Estimates Task uses the information produced by the other tasks to estimate the radiation doses populations could have received from Hanford radiation.

Project reports and references used in the reports are made available to the public in a public reading room. Project progress is documented in this monthly report, which is available to the public.

Executive Summary

The 2000 Census of the United States is the first time that the Census Bureau has conducted a census of the United States in 20 years. The 2000 Census is a landmark event in the history of the United States and is a testament to the hard work and dedication of the Census Bureau and its staff.

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In addition to the census, the Census Bureau is also conducting a series of studies and surveys to provide more information about the United States and its people. These studies and surveys will provide valuable information about the United States and its people.

The 2000 Census is a landmark event in the history of the United States and is a testament to the hard work and dedication of the Census Bureau and its staff. The 2000 Census is a landmark event in the history of the United States and is a testament to the hard work and dedication of the Census Bureau and its staff.

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Management Summary

Progress

Dillard B. Shipler, formerly of Advanced Sciences, Inc., has accepted the position of HEDR Project Manager; he will begin work in September.

Figure 2 shows the status of project milestone activities. The following major activities were conducted by HEDR staff in August 1990:

- continued to plan potential activities for Phase II
- attended TSP regional public meetings and meetings for the Native Americans to assist the TSP with discussions on the results of Phase I
- received data from the Kalispel Tribe on Native American population diet and lifestyle
- compiled an informal summary of the press coverage of the Phase I work and identified issues for the TSP
- delivered preliminary documentation of the dose estimation computer code to a TSP member at his request
- continued minor enhancements to the HEDR Phase I computer code, including creation of a relational database of input data
- evaluated Phase I dose estimates and their uncertainties for upwind areas on the edges of the Phase I study area to determine the sources of uncertainty that must be addressed in Phase II
- presented the results of Phase I to Westinghouse Hanford Company staff, Hanford Speakers' Bureau members, and to combined classes at Washington State University, Tri-Cities

Major Issues and Action Taken

None.

Planned Work for Subsequent Months

Work planned for subsequent months includes the following:

- continue working with the TSP to plan Phase II activities
- develop guidelines that set forth the minimum contents of the Phase II QA plan
- develop statistical procedures for use with the Geographical Information System.

Budget Status

Figures 2 and 3 show the budget status of the HEDR Project and TSP activities, respectively. A summary of fiscal year expense funding and costs, including both HEDR and TSP, is provided below. Total funds authorized on Figure 2 have been revised to reflect these figures.

<u>Fiscal Year</u>	<u>Funding</u>	<u>Actual Costs</u>
1987	\$ 692K	\$ 693K
1988	2,432K	2,323K
1989	3,400K	3,301K
1990	3,733K	3,152K (a)

Projected HEDR expenditures through August 1990 were \$2,720K. Actual expenditures through August 1990 were \$2,652K.

Variance Explanation

None.

Capital Status

Capital equipment funding of \$141K was approved and allocated for the purchase of a Geographic Information System. The computers and software were delivered and set up in April 1990.

(a)FY90 costs through August 1990.

**FIGURE 2. Project Summary Report - Hanford Environmental
Dose Reconstruction Project**

1. IDENTIFICATION NUMBER: DE-AC06-76RLO 1830		2. PROGRAM/PROJECT TITLE: HANFORD ENVIRONMENTAL DOSE RECONSTRUCTION				3. REPORTING PERIOD: AUGUST 1990								
4a. PARTICIPANT NAME AND ADDRESS: PACIFIC NORTHWEST LABORATORY P. O. BOX 999 RICHLAND, WA 99352		4b. CLIENT NAME AND ADDRESS: DOE/RL RICHLAND WA 99352				5. START DATE: OCTOBER 1989								
						6. COMPLETION DATE: SEPTEMBER 1990								
7. FY 90	8. MONTHS	O	N	D	J	F	M	A	M	J	J	A	S	FY91

9. COST STATUS: a. \$ EXPRESSED IN THOUSANDS b. BUDGET & REPORTING NO./SUB. ACCT NO. 12578 GF0525000 c. FIN. NO. d. ACTUAL COSTS PRIOR YEARS 6317 e. FY BUDGET 2835 * f. TOTAL BUDGET g. FY FUNDS AUTH 3941 ** h. TOTAL FUNDS AUTH 10,257***	
---	--

COSTS	I. PLANNED	250	300	240	250	290	200	190	190	190	420	200	115
	J. ACTUAL	236	290	342	283	227	246	297	184	339	164	135	
	K. VARIANCE	14	10	-102	-33	63	-46	-107	6	-39	256	65	
	L. CUM PLANNED	250	550	790	1040	1330	1530	1720	1910	2100	2520	2720	2835
	M. CUM ACTUAL	236	527	870	1152	1397	1643	1940	2124	2353	2517	2652	
	N. CUM VARIANCE	14	23	-80	-112	-67	-113	-220	-214	-253	3	68	

10. LEGEND: PLANNED ACTUAL _____ FUNDS BUDGETED _____ 90% FUNDS SPENT

* projected FY budget does not include TSP budget **FY funds authorized includes TSP funding and carryover ***excludes capital; FY87-FY90

11. MILESTONES	O N D J F M A M J J A S FY91
01 Phase I Reports*	
03-A Hanford Site Operations and Facilities	Report to TSP 6/89
03-B Radionuclide List Decay Schemes	
03-C Recommendation Regarding Development of Libraries Specific to Hanford for ORIGEN Code	
03-D Description of Chemical Form and Atmospheric Chemistry of Iodine Emissions	
03-E I-131 in Irradiated Fuel at time of Processing from 12-44 Through 12-47	
04-A Preliminary Response to Directive 88-4, Ground Water	Report to TSP 3/89
04-B Atmospheric Modeling Approach	

LEGEND: SCHEDULED TO TSP TIME LINE _____ DEVIATION TIME NOW: _____

COMPLETED DEVIATION PROGRESS _____

12. NAME/SIGNATURE OF PARTICIPANTS PROG/PROJ MANAGER & DATE
WL Templeton, Acting Manager
* TSP rescheduled milestone to July

FIGURE 2. Project Summary Report - Hanford Environmental
Dose Reconstruction Project (Contd.)

FIGURE 3. Project Summary Report - Technical Steering Panel

1. IDENTIFICATION NUMBER: DE-AC06-76RLO 1830		2. PROGRAM/PROJECT TITLE: HANFORD ENVIRONMENTAL DOSE RECONSTRUCTION - TSP						3. REPORTING PERIOD: AUGUST 1990					
4a. PARTICIPANT NAME AND ADDRESS: PACIFIC NORTHWEST LABORATORY P. O. BOX 999 RICHLAND, WA 99352				4b. CLIENT NAME AND ADDRESS: DOE/RL RICHLAND WA 99352				5. START DATE: OCTOBER 1989					
6. COMPLETION DATE: SEPTEMBER 1990													

7. FY 90	8. MONTHS	O	N	D	J	F	M	A	M	J	J	A	S	FY91
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9. COST STATUS:	<div style="display: flex; flex-direction: column; align-items: center;"> <div>675</div> <div>600</div> <div>525</div> <div>450</div> <div>375</div> <div>300</div> <div>225</div> <div>150</div> <div>75</div> </div>													
a. \$ EXPRESSED IN THOUSANDS														
b. BUDGET & REPORTING NO./SUB. ACCT NO. 12578 GF0525000														
c. FIN. NO.														
d. ACTUAL COSTS PRIOR YEARS														
e. FY BUDGET 688														
f. TOTAL BUDGET														
g. FY FUNDS AUTH 688														
h. TOTAL FUNDS AUTH 688 (unburdened)														

COSTS	I. PLANNED	57	57	57	57	57	57	57	57	58	58	58	58
	J. ACTUAL	17	21	30	60	46	39	81	84	27	69	43	
	K. VARIANCE	40	36	27	-3	11	18	-24	-27	31	-11	15*	
	L. CUM PLANNED	57	114	171	228	285	342	399	456	514	572	630	688
	M. CUM ACTUAL	17	38	68	128	174	213	277	361	388	457	500	
	N. CUM VARIANCE	40	76	103	100	111	129	122	95	126	115	130*	

10. LEGEND: PLANNED ----- ACTUAL _____ PROJECTED 90% FUNDS SPENT ▴
 * Variance due to change from manual to automated reporting system

11. MILESTONES	O	N	D	J	F	M	A	M	J	J	A	S	FY91

LEGEND: SCHEDULED ▴	TIME LINE _____	DEVIATION TIME NOW:
COMPLETED ▴	DEVIATION ▾	PROGRESS _____

12. NAME/SIGNATURE OF PARTICIPANTS PROG/PROJ MANAGER & DATE
 WL Templeton, Acting Manager

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Source Terms

Objective

Source terms are the amount and type of radioactive materials released to the environment. Members of the Source Terms Task develop estimates of radioactive emissions since 1944 from Hanford facilities based on historical measurements and production information. Source term estimates are used by Environmental Transport Task members to reconstruct the concentrations of radionuclides in the environment.

Uncertainty in calculated and measured data can result from many factors. Uncertainties in measured emissions may result from early measurement techniques. For calculated emissions, uncertainties may result from the differences in published variables that are used to perform calculations. By comparing the uncertainty in the available data, Source Term Task staff determine the most accurate method for developing source terms. For time periods where measured values do not exist, source terms are calculated from available information. The proposed methods and results of this task are reviewed, evaluated, and approved by the TSP.

Progress

Activities for this reporting period included the following:

- began preparing a summary report describing the methodology and sources of information used to calculate the quantities of iodine-131 released to the atmosphere during 1944-1947.

Major Problem Areas and Action Taken

None.

Planned Work for Subsequent Months

Work planned for the subsequent months includes the following:

- complete a summary report describing the methodology and sources of information used to calculate the quantities of iodine-131 released to the atmosphere during 1944-1947.

The following activity is proposed for subsequent months and will be performed if approved by the TSP:

- determine the need to conduct sensitivity calculations using ORIGEN2.^(a)

^(a)A. G. Croff. 1980. "ORIGEN2: A Revised and Updated Version of ORIGEN." *Transactions of the American Nuclear Society*, 34:349-350, June 1980.

Environmental Transport

Objective

Members of the Environmental Transport Task reconstruct the movement of radioactive materials (the source term information) from the areas of release to the environment. Radionuclide movement via the atmosphere, Columbia River, and ground water are studied.

To track releases to the atmosphere from Hanford Site operations, meteorological data are needed, including wind speed, wind direction, and other data that affect the dispersion of the releases. Mathematical models are applied to these meteorological data and the source term data to calculate concentrations of radionuclides in the air and on the ground. The TSP reviews, evaluates, and provides direction concerning the proposed models.

Reconstruction of the transport of radionuclides in the Columbia River is based primarily on historical studies of the Columbia River and its tributaries. Computer models are used to reconstruct radionuclide concentrations in the river for time periods when previously published data are limited or unavailable.

The movement of radionuclides in the ground water is reconstructed initially by using ground-water monitoring data to estimate the contribution to the Columbia River exposure pathway. Modeling will be used where previously published data are lacking.

Progress

Activities for this reporting period included the following:

None.

Major Problem Areas and Action Taken

None.

Planned Work for Subsequent Months

The following activities are proposed for subsequent months and will be performed if approved by the TSP:

- atmospheric pathway
 - sensitivity studies for computer-model development
- surface-water pathway
 - conceptual model investigation
 - comparison of mass balance routing calculations to Phase I monitoring data
 - sensitivity study of Phase I results.

Environmental Monitoring Data

Objective

Members of the Environmental Monitoring Data Task assemble, evaluate, and summarize key historical measurements of the concentrations of radionuclides in the environment around the Hanford Site.

Radionuclide concentrations have been measured at various times in air, drinking water, foods, fish, the Columbia River, soil, and in other materials. These measurements are evaluated to estimate their accuracies and then used by Environmental Pathways and Dose Estimates Task staff to estimate radiation doses and by Environmental Transport Task staff to calibrate computer models. Methods to attain this objective are proposed to the TSP for review, evaluation, and approval.

Progress

Activities this reporting period included the following:

None.

Major Problem Areas and Action Taken

None.

Planned Work for Subsequent Months

The following activities are proposed for subsequent months and will be performed if approved by the TSP:

- evaluate sensitivity of dose calculations to accuracy and precision in previously published radionuclide measurements in fish and water from the Columbia River
- determine necessary extent of the database on radionuclides in terrestrial media
- determine the suitability of "green run" air data for use in later project phases.
- examine the magnitude of the effect of Phase I assumptions on 1945-1947 measured concentrations of iodine-131 on vegetation

Environmental Monitoring Data

Objective

Monitor the environment, identify the key environmental problems and assess the impact of the proposed development on the environment. The monitoring programme will be designed to provide a baseline of environmental conditions before the development is constructed and to detect any changes in the environment which may be caused by the development. The monitoring programme will also provide a means of assessing the effectiveness of any measures taken to mitigate the impact of the development on the environment.

Programme

A series of monitoring points will be established at the following locations:

Point 1

Point 2

Point 3

Point 4

Point 5

The following environmental parameters will be monitored at the monitoring points:

Water quality (pH, temperature, dissolved oxygen, etc.)
Air quality (particulate matter, sulphur dioxide, etc.)
Noise levels (day and night)

Water quality (pH, temperature, dissolved oxygen, etc.)
Air quality (particulate matter, sulphur dioxide, etc.)
Noise levels (day and night)

Water quality (pH, temperature, dissolved oxygen, etc.)
Air quality (particulate matter, sulphur dioxide, etc.)
Noise levels (day and night)

Water quality (pH, temperature, dissolved oxygen, etc.)
Air quality (particulate matter, sulphur dioxide, etc.)
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Air quality (particulate matter, sulphur dioxide, etc.)
Noise levels (day and night)

Water quality (pH, temperature, dissolved oxygen, etc.)
Air quality (particulate matter, sulphur dioxide, etc.)
Noise levels (day and night)

Demographics, Agriculture, Food Habits

Objective

Task members develop the demographic, food consumption, and food production information needed to estimate doses.

Demographic information is developed for the general population and for several special population groups that are not adequately represented by the U.S. Census, including Native American tribes, Army personnel stationed at Hanford, some Hanford construction workers, and migrant workers.

In addition to demographic data, the sources and quantities of food and water consumed must be estimated, because food and water provide pathways for the intake of radionuclides.

Airborne radionuclides from the plant stacks may have been deposited on fruits and vegetables. Consumption of these foods provided a pathway for radionuclide transport to humans. The exposure pathways are studied. In addition, milk produced from cows represents a significant food pathway for iodine-131 if the cows ate vegetation contaminated with radionuclides. Dairy farming practices and milk distribution systems are studied to identify the populations that may have consumed potentially contaminated milk.

Consumption of contaminated fish and shellfish is also a food pathway for exposure to radioactive materials. Estimates of the amount of potentially contaminated fish and shellfish consumed from the Columbia River and ocean bays are developed through an extensive review of numerous past studies.

Treated Columbia River water was used by some community members downstream from Hanford. Drinking this water provided a pathway for exposure to radioactive materials. To estimate the doses from this pathway, it is necessary to know the communities using the water, the amount of water withdrawn, the treatment process, the travel time through the system, and the amount of water consumed. Irrigation water use downstream from Hanford is also studied because radioactive materials in the river water could have been deposited on crops consumed by people or animals. Recreational users of the river also could have been exposed to radiation from the river and shoreline. Food and lifestyle habits of Native Americans that differentiate them from the general population will also be considered. Methods to collect data and to estimate population densities and food consumption have been proposed to the TSP for review, evaluation, and approval.

Progress

Activities for this reporting period included the following:

- compiled an informal summary of the press coverage of the preliminary dose estimates and identified issues for the TSP
- received data from the Kalispel Tribe on population, diet and lifestyle
- attended TSP information meetings for Native American tribes.

Major Problem Areas and Action Taken

None.

Planned Work for Subsequent Months

Work planned for subsequent months includes the following:

- continue preparation for Phase II activities.

Environmental Pathways and Dose Estimates

Objective

Task members use calculated and measured concentrations of radionuclides provided by members of the Environmental Transport Task and the Environmental Monitoring Data Task to calculate doses to populations, typical individuals, and specific individuals. These calculations include doses via direct transfer of radionuclides from concentrations in air and water to people (via breathing, drinking, immersion, etc.). The calculations also include doses from radionuclide concentrations in air and water transferred through environmental pathways, such as soil, plants, animals, and fish, to people. All significant decisions on exposure models and input parameters are presented to the TSP for review, evaluation, and approval.

Progress

Activities for this reporting period included the following:

- delivered preliminary computer code documentation for dose estimation to a TSP member following PNL intellectual property clearance of software
- continued minor enhancements to the HEDR Phase I computer code, including creation of a relational database of input data.

Major Problem Areas and Action Taken

None.

Planned Work for Subsequent Months

The following activities are proposed for subsequent months and will be performed if approved by the TSP:

- estimate Native American doses
- perform sensitivity analysis calculations
- evaluate sensitivity of dose estimates to changes in model structure
- evaluate the need for age-dependent dose factors.

Information Resources

Objective

Members of the Information Resources Task work with the other task members to meet information needs, including ensuring that all data referenced in the reports are publicly available and establishing a microcomputer-based tracking system for ready retrieval of historical information.

Progress

Activities for this reporting period included the following:

- added new citations to the tracking system that now numbers more than 3,500 publications
- provided the DOE-RL Public Reading Room with 10 documents of potential interest/use in the HEDR Project. A title listing of these reports is attached in Appendix A
- filled information requests from the TSP and HEDR task members.

Major Problem Areas and Action Taken

None.

Planned Work for Subsequent Months

Planned work for subsequent months includes the following:

- make necessary arrangements to determine the existence or non-existence of Hanford Site-originated documents that were transferred to

the corporate headquarters of General Electric during the years 1946 through 1964

- continue to add input to the information resources tracking data base
- continue to provide documents to the DOE-RL Public Reading Room in an orderly, timely fashion
- develop a list of Hanford-originated raw data logs/notes of potential interest/use to the HEDR Project
- continue to identify and collect significant documents that address silver reactor capabilities, performance, and incidents
- watch for information that may explain in detail, and support data in, "green run" document HW-17381 DEL
- identify significant documents that address fuel element failures that occurred in now decommissioned Hanford Production Reactors
- continue to identify and collect documents and/or data of potential interest/use to the HEDR Project that address activities during the years from reactor startup through 1949.

Records Management

Objective

Members of the Records Management Task provide storage and control of completed project records, maintain an automated inventory of all project documentation, and provide a reference service to project staff and the TSP.

Progress

Activities for this reporting period included the following:

- received and processed project records
- transferred three record packages to the DOE-RL Public Reading Room (21 documents totalling 1,303 pages).

Major Problem Areas and Action Taken

None.

Planned Work for Subsequent Months

Work planned for subsequent months includes the following:

- continue processing incoming project records
- continue transferring processed project records to the DOE-RL Public Reading Room.

Records Management

Objective

Members of the Records Management team will provide advice and support to departments in the management and retention of records in accordance with the Records Management Policy and the Records Management Plan.

Provision

A dedicated team of records management staff will be provided to support the following:

- Records and processed records
- Records and processed records
- Records and processed records
- Records and processed records
- Records and processed records

Major Problem Areas and Action

1. Records

2. Records

Planned Work for Subsequent Months

Records

Work planned for the next month includes the following:

- Records and processed records
- Records and processed records
- Records and processed records
- Records and processed records
- Records and processed records

Quality Assurance

Objective

The objective of this task is to ensure continuous quality assurance (QA) support and coordination with all project tasks. This objective is met through the identification and documentation of QA requirements in the form of a QA Plan and periodic monitoring of project activities during the life of the project to ensure compliance with these requirements.

Progress

Activities for this reporting period included the following:

- continued working with technical staff to develop data quality objectives that will be included as part of Phase II QA Plan.
- wrote second draft of HEDR-TP-4, "HEDR Data Quality Objectives."

Major Problem Areas and Action Taken

None.

Planned Work for Subsequent Months

Work planned for subsequent months includes the following:

- issue remaining HEDR procedures: HEDR-TP-3, "HEDR Documentation of Critical Decisions" and "HEDR-TP-4, "HEDR Data Quality Objectives"
- develop guidelines that set forth the minimum contents of the Phase II QA plan.

Quality Assurance

Objective

The objective of this task is to ensure compliance with all relevant standards. This includes the development of a quality assurance plan, the implementation of the plan, and the monitoring of the plan's effectiveness. The plan should be designed to ensure that the project is completed on time, within budget, and to the satisfaction of the client.

Planned Work for Subsequent Months

Work planned for subsequent months includes the development of a quality assurance plan, the implementation of the plan, and the monitoring of the plan's effectiveness.

Issues regarding the development of the plan, the implementation of the plan, and the monitoring of the plan's effectiveness will be discussed during the next meeting.

Developing guidelines for the next meeting will be a priority.

Progress

Work planned for the reporting period includes the development of a quality assurance plan, the implementation of the plan, and the monitoring of the plan's effectiveness.

Work planned for the reporting period includes the development of a quality assurance plan, the implementation of the plan, and the monitoring of the plan's effectiveness.

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Work planned for the reporting period includes the development of a quality assurance plan, the implementation of the plan, and the monitoring of the plan's effectiveness.

Taken

Notes

Statistics

Objective

Task members provide statistical support to members of technical tasks and develop and apply sensitivity and uncertainty analyses. Sensitivity analyses will be used to identify parameters with the greatest influence on dose estimates. Using sensitivity analyses results, project staff can focus resources where the benefit in terms of accurate dose estimates is greatest. Uncertainty analyses enable task leaders to determine the extent to which the accuracy and precision of the dose estimates are influenced by accuracy and precision in the input parameters.

Progress

Activities this reporting period included the following:

- worked with staff from the Centers for Disease Control and the Fred Hutchinson Cancer Research Center to revise a previous conference paper on statistical aspects of the HEDR Project to include a section on the thyroid study. The new version, "Statistical Aspects of the Hanford Environmental Dose Reconstruction Project and the Hanford Thyroid Disease Study," will be published in the journal Radiation Research
- evaluated Phase I dose estimates and their uncertainties for upwind areas on the edges of the Phase I study area to determine the sources of uncertainty that must be addressed in Phase II
- continued documenting Phase I statistical calculations.

Major Problem Areas and Action Taken

None.

Planned Work for Subsequent Months

Work planned for subsequent months includes the following:

- continue to develop plans to restructure the Phase I dose code to be more efficient and improve dose estimates
- conduct sensitivity and uncertainty analyses
- write a report on the results of the computer simulations conducted to quantify the effects of the modular construction of the Phase I Monte Carlo air-pathway dose model on the distributions of dose estimates
- finish QA documentation of the statistical analysis procedures and results that were developed/obtained for the Phase I report
- conduct statistical analyses and summarizations of whole-body-counter data on schoolchildren and adults in the Richland-Pasco-Kennewick area that were obtained in the 1960s to help validate the HEDR dose model. Conduct similar analyses for gross-beta thyroid counts of Hanford workers in the mid-1940s

- develop statistical procedures for use with the recently acquired Geographic Information System.

- develop a glossary of statistical and uncertainty-analysis terms.

Project Technical Coordination

Objective

The objective of the Project Technical Coordination Task is to provide a general technical overview of the project to ensure that appropriate information is generated from the technical tasks for performing the final dose calculations.

Progress

Activities this reporting period included the following:

- presented the results of Phase I to interested staff of Westinghouse Hanford company and to students at Washington State University, Tri-Cities.
- discussed data transfer with representatives of the Fred Hutchinson Cancer Research Center.

Major Problem Areas and Action Taken

None.

Planned Work for Subsequent Months

The following activities are proposed for subsequent months and will be performed if approved by the TSP:

- continue coordinating efforts with thyroid disease study personnel
- continue defining the overall structure of the needed HEDR database and the type of data needed for smooth project integration
- work with the International Atomic Energy Agency Coordinated Research Program on Validation of Model Predictions (VAMP) to validate portions of the HEDR model and to obtain independent estimates of certain doses
- begin training on and implementation of the HEDR Geographic Information System for routine analyses.

Appendix A

**Hanford-Site-Originated Documents
of Potential Interest/Use to the HEDR Project -
Placed in the DOE-RL Public Reading Room During August 1990**

Appendix A

Hanford Site Originated Documents of Potential Interest/Use to the HEDR Project - Placed in the DOE/RL Public Reading Room During August, 1990

BNWL-2220	Index - Summarized Wind Data. 181 p.	09/30/77
HW-3-3462	Bombardment of Sources for Health Instrument Calibrations. 3 p.	03/12/46
HW-2733	Unconfined Underground Radioactive Waste & Contamination. 20 p.	01/19/53
HW-30337	Review of Exhaust Ventilation Air Filtration Requirements for PUREX. 11 p.	12/23/53
HW-66147	Inventory - Radioactive Liquid Waste to Ground 200 Areas - 1945-1959. 12 p.	07/28/60
HW-74095-S2	Hazards Summary Report Supplement 2 Supplemental Information in Support of Higher Power Levels at the K Reactors. 13 p.	01/06/65
HW-83710	Control of Underground Radioactive Materials in Deactivated Reactor Areas. 19 p.	10/07/64
NUREG/CR-4000 Vol. 1	The MESORAD Dose Assessment Model Volume 1: Technical Basis. 100 p.	01/31/86
NUREG/CR-4000 Vol. 2 (PNL-5219)	The MESORAD Dose Assessment Model Volume 2: Computer Code. 374 p.	10/31/87
PNL-4369	User's Guide to the MESOI Diffusion Model - Version 1.1 (for Data General Eclipse S/230 with AFOS). 182 p.	09/30/82

Appendix B

HEDR Publications - To Date

Appendix B

HEDR Publications - To Date

	Title	Author	Date Issued	Publication No.	Additional Information	Status
	Hanford Environmental Dose Reconstruction Project Monthly Report	HEDR Project Office	Ongoing	PNL-6450 HEDR	Monthly report; cleared one time for documentation	Periodic report; TSP approval not necessary
	Draft Summary Report	HEDR Staff	7/90	PNL-7410 HEDR	Available from TSP	Released 7/12/90 by the TSP (draft)
	Draft Air Pathway Report	HEDR Staff	7/90	PNL-7412 HEDR	Available from TSP	Released 7/12/90 by the TSP (draft)
B.1	Draft Water Pathway Report	HEDR Staff	7/90	PNL-7411 HEDR	Available from TSP	Released 7/12/90 by the TSP (draft)
	Initial Communication Survey Results for the HEDR Project	Beck, DM	7/90	PNL-7423 HEDR	WSU omnibus survey of WA State residents; HEDR questions	To TSP for review 7/90
	QA Audit Report of the HEDR Project-Data Tracability, A-90-15	Pratt, RC	7/90	PNL-7428 HEDR		To TSP for review 7/90
	A Preliminary Examination of Audience-Related Communications Issues: Hanford Environmental Dose Reconstruction Project	Holmes, CW	4/90	PNL-7231 HEDR		PNL addressing TSP comments
	MESOILT2, A Lagrangian Trajectory Climatological Dispersion Model	Ramsdell, JV	4/90	PNL-7340 HEDR		PNL addressing TSP comments
	Population Estimates for Phase I	Beck, DM	2/90	PNL-7263 HEDR		PNL addressing TSP comments
	Estimates of Food Consumption	Callaway	2/90	PNL-7260 HEDR		PNL addressing TSP comments

HEDR Publications - To Date

Title	Author	Date Issued	Publication No.	Additional Information	Status
Soil Ingestion by Dairy Cattle	Darwin, RF	2/90	PNL-SA-17918 HEDR		For possible use later in project; TSP approval not required
Computational Model Design Specification for Phase I of the Hanford Environmental Dose Reconstruction Project	Napier, BA	2/90	PNL-7274 HEDR		PNL addressing TSP comments
Estimates of Columbia River Radionuclide Concentrations: Data for Phase I Dose Calculations	Richmond, MC; Walters, WH	1/90	PNL-7248 HEDR		PNL addressing TSP comments
Evaluation of Thyroid Radioactivity Measurement Data From Hanford Workers, 1944-1946	Ikenberry, R	1/90	PNL-7254 HEDR		PNL addressing TSP comments
I-131 in Irradiated Fuel at Time of Processing from December 1944 Through December 1947	Morgan, LG	1/90	PNL-7253 HEDR		PNL addressing TSP comments
Work Plan for the Hanford Environmental Dose Reconstruction Project	Haerer, HA	12/89	PNL-6696 HEDR REV 1		TSP approved; published 12/89
Uncertainties in Source Term Calculations Generated by the ORIGEN2 Computer Code for Hanford Production Reactors	Heeb, CM	12/89	PNL-7223 HEDR		PNL addressing TSP comments
Selection of Dominant Radionuclides for Phase I of the HEDR Project	Napier, BA	12/89	PNL-7231 HEDR		PNL addressing TSP comments
Atmospheric Transport and Dispersion Modeling for the Hanford Environmental Dose Reconstruction Project	Ramsdell, JV	12/89	PNL-7198 HEDR		PNL addressing TSP comments

HEDR Publications - To Date

	Title	Author	Date Issued	Publication No.	Additional Information	Status
	Atmospheric Transport Modeling and Input Data for Phase I of the Hanford Environmental Dose Reconstruction Project	Ramsdell, JV; Burk, KW	12/89	PNL-7199 HEDR		PNL addressing TSP comments
	Fission-Product Iodine During Early Hanford-Site Operations: Its Production and Behavior During Fuel Processing, Off-Gas Treatment, and Release to the Atmosphere	Burger, LL	12/89	PNL-7210 HEDR		PNL addressing TSP comments
	The Hanford Environmental Dose Reconstruction Project: Background Information	Byram, SJ	12/89	PNL-SA-17658 HEDR	For use with focus groups	TSP approval not required
B.3	Summary of Literature Review of Risk Communication	Byram, SJ	12/89	PNL-7226 HEDR		PNL addressing TSP comments
	Milk Cow Feed Intake and Milk Production and Distribution Estimates for Phase I	Beck, DM	12/89	PNL-7227 HEDR		PNL addressing TSP comments
	Preliminary Summaries for Vegetation, River and Drinking Water and Fish Radionuclide Concentration Data (DRAFT)	Woodruff, RK	11/89	PNL-SA-17641 HEDR		To TSP for review 12/89
	Radionuclide Sources and Radioactive Decay Figures Pertinent to the HEDR Project	Heeb, CM	10/89	PNL-7177 HEDR		PNL addressing TSP comments
	Estimations of Traditional Native American Diets in the Columbia Plateau	Hunn, ES; Bruneau, CL	8/89	PNL-SA-17296		Reviewed by tribes
	Summary of Workshop on Milk Production and Distribution, November 30, 1988-HEDR Project	Beck, DM, et al.	7/89	PNL-6975 HEDR		To TSP 8/89
	A History of Major Hanford Operations Involving Radioactive Material	Ballinger, MY; Hall, RA	6/89	PNL-6964 HEDR		TSP reviewed; PNL addressing comments

HEDR Publications - To Date

Title	Author	Date Issued	Publication No.	Additional Information	Status
Feasibility of Using ¹²⁹ I Concentrations in Human Tissue to Estimate Radiation Dose from ¹³¹ I	McCormack, WD	4/89	PNL-6889 HEDR		TSP approved 9/89; published 1989
Summary Report of HEDR Workshop on Sensitivity and Uncertainty Analysis	Sagar, B; Liebetrau, AM	3/89	PNL-SA-16804 HEDR	Summary of workshop held January 16-18, 1989	Sent to Till 3/89-no written response provided to PNL
Response to TSP Directive 88-4, Ground-Water Contamination Data	Freshley, MD	3/89	PNL-6847 HEDR		TSP received 3/89; no written response provided to PNL
Demographic, Agricultural, Food Consumption, and Lifestyle Research for the Hanford Environmental Dose Reconstruction Project	Beck, DM, et al.	2/89	PNL-6834 HEDR	Incorporates earlier TSP comments	TSP received 3/89; no written response provided to PNL
Proposed Approach for Developing Information on Population Food Consumption and Lifestyles of Native Americans in the HEDR Study Area	Rhoads, RE; Bruneau, CL	1/89	PNL-6803 HEDR	Working document	TSP comments were incorporated into PNL-6834 HEDR
Hanford Environmental Dose Reconstruction	Bruneau, CL	1/89	PNWD-1323 HEDR	Informational brochure used in PNL's work with Tribes	TSP approval not required
Hanford Environmental Dose Reconstruction Project - Work Plan	Haerer, HA	9/88	PNL-6696 HEDR	Superseded by new work plan	TSP approved

Appendix C

HEDR Presentation Handouts to the TSP - To Date

Appendix C

HEDR Presentation Handouts to the TSP - to Date

Title	Author	Date Issued	Publication No.	Additional Information
Hanford Environmental Dose Reconstruction Project - Phase I Report	Haerer, HA	5/90	PNL-18304 S HEDR	Presented at the workshop, "Public Health Aspects of Hanford Health Studies, A Workshop for State, Local, and Tribal Health Officials," June 6, 1990
Detailed Example Calculations for HEDR, Phase I	Napier, BA	2/90	PNL-SA-17913 HEDR	Presented at the TSP mtg, Feb 15-17, 1990, Richland, WA
Communications Directive	Rhoads, RE	2/90	PNL-SA-17903 S HEDR	Presented at the TSP mtg, Feb 15-17, 1990, Richland, WA
HEDR Project Report to the TSP	Haerer, HA	2/90	PNL-SA-27904S HEDR	Presented at the TSP mtg, Feb 15-17, 1990, Richland, WA
Hanford Environmental Dose Reconstruction Project	Haerer, HA	12/89	PNL-SA-17661S HEDR	Presented at the TSP mtg, December 11-13, 1989, Richland, WA
Communications Directive	Rhoads, RE	12/89	PNL-SA-17653 S HEDR	Presented at the TSP mtg, December 11-13, 1989, Richland, WA
Preliminary Evaluation of Thyroid Bioassay Data from Hanford Workers, 1944-1946	Ikenberry, T; Napier, BA	12/89	PNL-SA-17670 S HEDR	Presented at the TSP mtg, December 11-13, 1989, Richland, WA
Overview of Project Model - Air Pathway	Napier, BA	12/89	PNL-SA-17673 HEDR	Presented at the TSP mtg, December 11-13, 1989, Richland, WA
Source Terms - Air Pathway Source Terms - Surface-Water Pathway	Morgan, LG	12/89	PNL-SA-17657 HEDR	Presented at the TSP mtg, December 11-13, 1989, Richland, WA
Atmospheric Transport Model	Freshley, MD	12/89	PNL-SA-17662 S HEDR	Presented at the TSP mtg, December 11-13, 1989, Richland, WA
Environmental Monitoring Data: Vegetation, 1945-1947	Woodruff, RK	12/89	PNL-SA-17671 HEDR	Presented at the TSP mtg, December 11-13, 1989, Richland, WA

HEDR Presentation Handouts to the TSP - to Date

Title	Author	Date Issued	Publication No.	Additional Information
Preliminary Calculated and Measured Concentrations of Iodine-131 in Vegetation for Phase I	Napier, BA	12/89	PNL-SA-17674 HEDR	Presented at the TSP mtg, December 11-13, 1989, Richland, WA
Milk Production and Distribution	Beck, DM	12/89	PNL-SA-17649 S HEDR	Presented at the TSP mtg, December 11-13, 1989, Richland, WA
Overview of Project Model - Surface-Water Pathway	Napier, BA	12/89	PNL-SA-17672 HEDR	Presented at the TSP mtg, December 11-13, 1989, Richland, WA
Surface-Water Pathway	Freshley, MD	12/89	PNL-SA-17660 S HEDR	Presented at the TSP mtg, December 11-13, 1989, Richland, WA
Environmental Measurements - Columbia River	Poston, TM; Dirkes, R	12/89	PNL-17669 HEDR	Presented at the TSP mtg, December 11-13, 1989, Richland, WA
Phase II Planning	Haerer, HA	12/89	PNL-17661 S HEDR	Presented at the TSP mtg, December 11-13, 1989, Richland, WA
Discussion with TSP Subcommittee on Communication Strategy	Rhoads, RE	10/89	PNL-SA-17475 HEDR	Presented at the TSP Subcommittee meeting on Communication Strategy, October 5, 1989, Portland, OR
Surface Water Exposure Pathways	Napier, BA; Poston, TM	10/89	PNL-SA-17502 S HEDR	Presented at the TSP meeting, October 12-14, 1989, Portland, OR
HEDR Project Report to the TSP	Haerer, HA	10/89	PNL-SA-17501 HEDR	Presented at the TSP mtg, Oct 12-14, 1989, Portland, OR
Methods for Presenting Results to the Public	Rhoads, RE	8/89	PNL-SA-17368 HEDR	Presented at the TSP meeting, September 6, 1989, Portland, OR
HEDR Project Report to the TSP July 21, 1989	Haerer, HA	7/89	PNL-SA-17218 HEDR	Presented at the TSP mtg, July 21, 1989, Richland, WA
Radionuclides Transported by the Columbia River	Freshley, MD	7/89	PNL-SA-17235 HEDR	Presented at the TSP mtg, July 21, 1989, Richland, WA

HEDR Presentation Handouts to the TSP - to Date

Title	Author	Date Issued	Publication No.	Additional Information
Defining Demographic Categories for Phase I	Napier, BA; Beck, DM	5/89	PNL-SA-17035 HEDR	Presentation handout for the TSP mtg, May 18-20, 1989, Toppenish, WA
HEDR Project Report to the TSP for May 1989 Public Meeting	Haerer, HA	5/89	PNL-SA-17032 HEDR	Presented at the TSP mtg, May 18-20, 1989, Toppenish, WA
Task 6 - Population, Food Consumption and Lifestyles	Rhoads, RE	3/89	PNL-SA-16785 HEDR	Presented at the Native American Workshop, March 14-15, 1989, Richland, WA
HEDR Native American Population, Food Consumption and Lifestyle Study - Data Requirements	Bruneau, CL	3/89	PNL-SA-16784 HEDR	Presented at the Native American Workshop, March 14-15, 1989, Richland, WA
Hanford Environmental Dose Reconstruction Project - Report to the Technical Steering Panel	Haerer, HA	3/89 HEDR	PNL-SA-16794	Presented at the TSP meeting, March 17, 1989, Spokane, WA
Availability of I-131 Vegetation Data	Price, KR	1/89	PNL-SA-16573 HEDR	Presented at HEDR workshop on Sensitivity and Uncertainty Analysis, January 16-18, 1989, Pasco, WA
Atmospheric Pathway	Ramsdell, JV	1/89	PNL-SA-16565 HEDR	Presented at the HEDR workshop on Sensitivity and Uncertainty Analysis, January 16-18, 1989, Pasco, WA
HEDR Demography, Agriculture, and Lifestyle Research	Beck, DM	1/89	PNL-SA-16568 HEDR	Presented at the HEDR workshop on Sensitivity and Uncertainty Analysis, January 16-18, 1989, Pasco, WA
Aspects of Sensitivity/Uncertainty Analysis in the HEDR Project	Sagar, B.	1/89	PNL-SA-16571 HEDR	Presented at the HEDR Workshop on Sensitivity and Uncertainty Analysis, January 16-18, 1989, Pasco, WA
HEDR Demography, Agriculture, and Lifestyle Research	Beck, DM	1/89	PNL-SA-16568 HEDR	Presented at the HEDR Workshop on Sensitivity and Uncertainty Analysis, January 16-18, 1989, Pasco, WA
Surface Water Transport Uncertainty	Walters, W.	1/89	PNL-SA-16572 HEDR	Presented at the HEDR Workshop on Sensitivity and Analysis, January 16-18, 1989, Pasco, WA

HEDR Presentation Handouts to the TSP - to Date

Title	Author	Date Issued	Publication No.	Additional Information
Source Terms	Morgan, LG	1/89	PNL-SA-16566 HEDR	Presented at the HEDR Workshop on Sensitivity and Uncertainty Analysis, January 16-18, 1989, Pasco, WA
Experience with Gress and Swats	Picpho, MG	1/89	PNL-SA-16567 HEDR	Presented at the HEDR Workshop on Sensitivity and Uncertainty Analysis, January 16-18, 1989, Pasco, WA
Purpose of Workshop	Gilbert, D.	1/89	PNL-SA-16569 HEDR	Presented at the HEDR Workshop on Sensitivity and Uncertainty Analysis, January 16-18, 1989, Pasco, WA
Example of Sensitivity/Uncertainty Analysis	Streng, DL	1/89	PNL-SA-16570 HEDR	Presented at the HEDR Workshop on Sensitivity and Uncertainty Analysis, January 16-18, 1989, Pasco, WA
Estimated Quantity of 131I Contained in Irradiated Fuel at Time of Fuel Processing, CY 1944-1945	Jackson, PO; Morgan, LG	11/88	PNL-SA-16398 HEDR	Presented at the TSP mtg, November 11-12, 1988, Olympia, WA

Appendix D

HEDR-Related Publications

Note: This appendix lists publications that present aspects of dose reconstruction in the open scientific literature; TSP approval is not required.

Appendix D

HEDR-Related Publications

Title	Author	Date Issued	Publication No.	Audience	Status
<u>Planned Materials</u>					
Demographic Forecasting Using Trends from Radio Correlation Variables	Beck and Pittinger			Demography (journal) or Journal of Rural Society	Planning for 1990
Reconstructing Historical Milk Prod/Dist Systems	Beck, DM			Journal of Health Physics	Planning for 1990
Reconstructing Food consumption Habits: The Backcasting Method	Callaway, M; Carr, D.			Journal of Health Physics	Planning for 1990
Experience in Collaborative Research with Native American Tribes*	Bruneau, CL; Rhoads, RE			Journal (not yet determined)	Planning for 1990
Uncertainty in 64-66 Data on Fish, Water, and Sediment	Poston, TM			Health Physics Society Mtg, Anaheim, CA	Planning for 1990
Communicating Radiation Dose Estimates to Affected Populations	HEDR Staff			Journal of the Society for Risk Analysis	Planning for 1990
Reconstructing Demography of Native Americans*	Beck, DM; Bruneau, CL			Journal of Rural Sociology	Planning for 1990
Fish Concentration Ratios	Poston, TM			Journal (not yet determined)	Planning for 1990
Using the Ratio-Correlation Methods for Backcasting	Beck, DM; Swanson	Spring/91		Chapter in applied demog book	To be published Spring 1991
<u>Completed Materials</u>					
Atmospheric Modeling for Dose Reconstruction at Hanford	Ramsdell, V	7/90		American Nuclear Society 1990 Winter Meeting	Abstract Submitted 7/90

HEDR-Related Publications

Title	Author	Date Issued	Publication No.	Audience	Status
Statistical Aspects of the Hanford Environmental Dose Reconstruction Project and the Hanford Thyroid Disease Study	Gilbert, RO et al.		PNL-SA-18396 HEDR	American Statistical Association Conference on Radiation and Health, July 8-12, 1990, Copper Mountain, CO	Presented 7/90
Statistical Aspects of Reconstructing the I-131 Dose to the Thyroid of Individuals Living Near the Hanford Site in the mid-1940s	Gilbert, RO et al.	3/90	PNL-SA-17384	Workshop: Statistics of Human Radiation Exposure to Ionizing Radiation, April 2-4, 1990, Oxford, UK	Presented 4/90
Reconstruction of Hanford Vegetation Monitoring Data for Dose Reconstruction for 1945-1947	Woodruff, RK; Mart, E; Hanf, RW	1/90	PNL-SA-17760 A HEDR	1990 Health Physics Society Meeting, June 24-28, 1990, Anaheim, CA	Presented 6/90
Uncertainty Analysis of the Conversion Factor for Historic Iodine-131 Gross Beta Vegetation Measurements	Streng, DL et al.	12/89	PNL-SA-17713 HEDR	1990 Health Physics Soc. Mtg, June 24-28, 1990, Anaheim, CA	Presented 6/90
Sensitivity and Uncertainty Analyses for Environmental Dose Reconstruction	Sagar et al.	11/89		Workshop on uncertainty, Nov 13-16, 1989, Santa Fe, NM	Presented 11/89
The Identification of Terrain-Induced Circulations Using Principal Components	Skyllingstad, ED and Schwartz, MN	10/89	PNL-SA-17164 HEDR	American Meteorological Society Conference on Probability and Statistics, October 1-5, 1989, Monterey, CA	Presented 10/89
Mathematical and Statistical Aspects of Reconstructing Doses to Individuals Living Near the Hanford Site Since the 1940s	Liebetau, AM et al.	10/89	PNL-SA-17498 HEDR	SIAM Conference on Applied Probability in Science and Engineering, March 5-7, 1990, New Orleans, LA	Presented 3/90
Temporal Variations in Atmospheric Dispersion at Hanford	Ramsdell, JV	9/89	PNL-SA-17375 HEDR	Hanford Symposium on Health and the Environment, Oct 16-19, 1989, Richland, WA	Presented 10/89

HEDR-Related Publications

Title	Author	Date Issued	Publication No.	Audience	Status
The Hanford Environmental Dose Reconstruction Project: Overview	Haerer, HA et al.	9/89	PNL-SA-16859 HEDR	Hanford Symposium on Health and the Environment, Oct 16-19, 1989, Richland, WA	Presented 10/89
The Hanford Environmental Dose Reconstruction Project: Technical Approach	Napier, BA et al.	9/89	PNL-SA-16874 HEDR	Hanford Symposium on Health and the Environment, October 16-19, 1989 Richland, WA	Presented 10/89
The Hanford Environmental Dose Reconstruction Project: The Role of Applied Sociology	Beck, DM	4/89	PNL-SA-16880 HEDR	Pacific Sociological Association Meeting, April 13-16, 1989, Reno, NV	Presented 4/89
Potential Applications of Geographical Information Systems for Analyzing Hanford Environmental Dose Reconstruction Data	Stephan, JG, et al.	3/89	PNL-SA-16767 HEDR	Regional Symposium of the HPS Computer Applications in Health Physics, March 16-17, 1989 Richland, WA	Presented 3/89
Estimating Atmospheric Dispersion for Reconstruction of Doses from Hanford Operations	Ramsdell, JV	4/88	PNL-SA-15818 HEDR	69th Annual Meeting of the Pacific Division of the American Association for the Advancement of Science, June 19-23, 1988, Corvallis, OR	Presented 6/88

*All publications addressing Native American research will be reviewed and approved by the appropriate tribes.

Appendix E

Communications Log

Appendix E
Communications Log - July 1990

Initiated By/Affiliation	Contact/Affiliation	Type	Subject
W Templeton/PNL	J Till/TSP, Chairman	Phone	Ongoing discussions re: HEDR Project
W Templeton/PNL	B Shleien/TSP	Phone	Ongoing discussions re: HEDR Project
S Finch/PNL	J Stohr/TSP	Phone	Ongoing discussions re: meeting planning
S Finch/PNL	B Roberts/Golder, Associates	Phone	Contract extension
B Barry/Yakima Indian Nation	T Nelson/PNL	Phone	Request for Phase I reports and news clips
A McMakin/PNL	J Stohr/TSP	Phone	Report disclaimer
W Farris/Public	A McMakin/PNL	Phone	Phase I reports
J Daer/PNL	J Stohr/TSP	Phone	Resumes
J Stohr/TSP	J Daer/PNL	Phone	Reimbursement of expenses
B Shleien/TSP	S Finch/PNL	Phone	Accrual process for FY 1990
B Shleien/TSP	S Finch/PNL	Phone	HEDR financial information
B Shleien/TSP	S Finch/PNL	Phone	Contract modifications/limitations
J Stohr/TSP	S Finch/PNL	Phone	Invoice payments
S Davis/TSP	S Finch/PNL	Phone	Status of invoice
S Finch/PNL	S Davis/TSP	Phone	Invoice payments
P Ryan/Oregon DOE	S Finch/PNL	Phone	Contract modifications
S Finch/PNL	B Shleien/TSP	Phone	Verify contract modifications with Oregon DOE
L Morgan/PNL	M Robkin/TSP	Phone	Request for a report
B Napier/PNL	P Myers/Fred Hutchinson Cancer Research Center	Phone	Dietary data transfer
B Shleien/TSP	S Gydesen/PNL	Phone	Draft TSP proposal related to declassification

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