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HANFORD ENVIRONMENTAL DOSE
RECONSTRUCTION PROJECT

Monthly Report

September 1990

Prepared for the Technical Steering Panel

Pacific Northwest Laboratory
Richland, Washington 99352

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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.

Project Summary

Progress

Figure 2 shows the status of project milestone activities. The following is a summary of activities conducted by HEDR staff in September 1990:

- Dillard B. Shipler joined Battelle as HEDR Project Manager
- prepared for the Seattle TSP meeting to be held October 11 and 12, 1990
- developed draft task plans for proposed Phase II efforts
- participated in a TSP Communications Subcommittee meeting in Portland
- tabulated the quantity of five green leafy vegetables produced by each Phase I county in 1945 and 1950 from the U. S. Census of Agriculture
- located harvest dates for each vegetable by county, using extension agents, master gardeners, and the Western Garden Book
- provided the DOE-RL Public Reading Room with 25 documents of potential interest/use in the HEDR Project
- wrote a draft 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
- presented the Phase I results to science and math teachers from Puget Sound colleges, universities and high schools at the Pacific Lutheran University
- participated on a panel presentation with newspaper and radio reporters about HEDR media coverage for a local chapter of the Society for Technical Communication
- presented the Phase I results to the Richland Kiwanis Club.

Major Issues and Action Taken

None.

Planned Work for Subsequent Months

Work planned for subsequent months includes

- participate in the TSP meeting to be held in Seattle, October 11-12, 1990
- develop task plans for work approved at the October TSP meeting
- issue revised quality assurance plan to include project-specific data quality objectives
- plan sensitivity/uncertainty analyses for Phase I data and models
- restructure the Phase I dose/uncertainty code to perform sensitivity/uncertainty analyses, to produce dose estimates for individuals, and to ensure that correlations among model pathways and parameters are maintained
- revise the parameterization of the atmospheric model output for input to the dose code to ensure that doses and uncertainties are estimated and reported on sufficiently small temporal and spatial scales to avoid biased dose and uncertainty estimates.

Budget Status

Table 2 outlines costs by task showing labor and non-labor dollars expended. 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 is provided below.

<u>Fiscal Year</u>	<u>Funding^(a)</u>	<u>Actual Costs^(a)</u>
1988	\$2,433K	\$2,323K
1989	3,400K	3,301K
1990	3,733K	3,558K

^(a) HEDR plus TSP costs.

Variance Explanation

\$383K was carried over from FY 1990 to FY 1991 because technical work toward the end of FY 1990 was reduced while initial Phase II planning was being performed.

Capital Status

Capital equipment funding of \$141K was approved and allocated for the purchase of a Geographic Information System. Capital expenditures for FY 1990 were \$48K. Software for the system was purchased with expense funds. The computers and software were delivered and set up in April 1990.

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

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

TABLE 2. Costs through September 30, 1990
(Dollars in Thousands)

	September, 1990			FY 1990 (October, 1989 - September, 1990)			
	Labor \$	Non-Labor \$	Total \$	Labor \$	Non-Labor \$	Total \$	Variance
HEDR Project Tasks							
Project Management (b)	54	42	96	614	238	852	918
Source Terms	2	0	2	129	11	140	150
Environmental Transport	5	-2	3	198	21	219	230
Environmental Monitoring Data	2	2	4	84	21	105	122
Demographics, Agriculture, Food Habits	12	34	46	386	157	543	581
Environmental Pathways and Dose Estimate	5	1	6	306	93	399	414
Information Resources	8	0	8	134	4	138	163
Records Management	8	0	8	67	6	73	77
Quality Assurance (c)			0			0	0
Statistics	18	0	18	189	10	199	210
Technical Coordination	11	0	11	175	11	186	195
Subtotal	125	77	202	2,282	572	2,854	3,060
Contingency							206
						138	138
Subtotal HEDR Project Tasks	125	77	202	2,282	572	2,854	3,198
Technical Steering Panel	0	203	203	1	702	703	743
TOTAL	125	280	405	2,283	1,274	3,557	3,941
							384

- (a) Non-labor dollars include expenses such as travel, publication production, procurements, and subcontracts.
- (b) Project management includes activities such as project control and administration, project communications, subcontract administration, records control, and peer review. September non-labor expenditures are largely attributed to subcontract accruals for outstanding invoices.
- (c) Quality assurance was not direct-charged to the project in FY 1990; it was part of PNL's general and administrative costs.
- (d) 1. \$21K of the \$40K TSP carryover is unaccrued, but known FY 1990 costs, which reduces available carryover.
2. The remainder of the carryover is based on accruals estimating August and September expenses. This figure may change upon receipt of actual invoices.

TSP carryover	40
Unaccrued FY 1990 expenses	-21
Total available TSP carryover	19

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: SEPTEMBER 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:		675 600 525 450 375 300 225 150 75															
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 (unburdened)																	
f. TOTAL BUDGET																	
g. FY FUNDS AUTH 743 (burdened)																	
h. TOTAL FUNDS AUTH 1504 (burdened)																	

COSTS	I. PLANNED	57	57	57	57	57	57	57	57	57	58	58	58	113
	J. ACTUAL	17	21	30	60	46	39	81	84	27	69	43	203	
	K. VARIANCE	40	36	27	-3	11	18	-24	-27	31	-11	15*	-90	
	L. CUM PLANNED	57	114	171	228	285	342	399	456	514	572	630	743	
	M. CUM ACTUAL	17	38	68	128	174	212	277	361	388	457	500	703	
	N. CUM VARIANCE	40	76	103	100	111	12	122	95	126	115	130	40	

10. LEGEND: PLANNED ACTUAL ——— PROJECTED ——— 90% FUNDS SPENT ▴

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

COMPLETED DEVIATION	TIME LINE PROGRESS	DEVIATION TIME NOW:
------------------------	-----------------------	------------------------

12. NAME/SIGNATURE OF PARTICIPANTS PROG/PROJ MANAGER & DATE
DB Shipler

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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

- continued 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

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

- evaluate in greater depth, and reduce uncertainty in, list of dominant radionuclides
- finalize Phase I estimates of iodine-131 releases from 1944-1947, including comparing HEDR and Anderson estimates
- provide source term input to the project uncertainty/sensitivity analyses.

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

- met with a member of the TSP to discuss potential activities for the Atmospheric Transport Subtask.

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:

- perform sensitivity studies for atmospheric transport portion of project model to identify necessary model refinements
- determine the contribution of radionuclides from groundwater to the Columbia River and determine the potential for radionuclide migration off the Hanford Site via groundwater

- develop a conceptual model of the Hanford Reach portion of the Columbia River
- complete a literature review of information associated with radionuclides in the Columbia River
- conduct sensitivity analyses to identify the dominant river transport processes to be included in the dose estimate model

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

No technical activities occurred this month.

Major Problem Areas and Action Taken

None.

Planned Work for Subsequent Months

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

- examine the effect of simplifying assumptions made in Phase I in generating the preliminary reconstructed 1945-1947 concentrations of iodine-131 on vegetation. These reconstructed vegetation data were used for comparison to modeled results.

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

- tabulated the quantity of five green leafy vegetables produced by each Phase I county in 1945 and 1950 from the U. S. Census of Agriculture. The census lists only asparagus, broccoli, cabbage, lettuce/romaine, and spinach
- located harvest dates for each vegetable by county, using extension agents, master gardeners, and the Western Garden Book.

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:

- collect remaining preliminary data on Native American populations, food consumption and lifestyles for use in tribal dose calculations
- publish, in the open scientific literature, task work associated with methods, approaches, and results of demographic and audience analyses and the milk model
- conduct uncertainty analyses in Phase I data on demographics, food consumption, Native Americans, and the milk model.

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

No technical activities occurred this month.

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:

- document iodine-131 transfer factors used in Phase I

- restructure HEDR computational model to incorporate changes necessary for future uses
- evaluate sensitivity of dose estimates to changes in model structure
- evaluate the need for age-dependent dose factors (infant to adult) from ICRP Publication 56, and develop pre-natal dose factors
- continue Phase I dose estimation efforts with input from Native American tribes and Fred Hutchinson Cancer Research Center.
- evaluate thyroid/whole body count data as part of uncertainty analysis of Phase I dose estimates.

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

- added new citations to the tracking system that now numbers more than 3,700 publications
- provided the DOE-RL Public Reading Room with 25 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

- 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

- received and processed project records
- transferred one package of records to the DOE-RL Public Reading Room (nine documents totalling 183 pages).

Major Problem Areas and Action Taken

None.

Planned Work for Subsequent Months

Work planned for subsequent months includes

- continue processing incoming project records
- continue transferring processed project records to the DOE-RL Public Reading Room
- review technical procedures RMP-1 and RMP-2 and update if necessary.

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

- continued working on expanding existing QA plan to include project-specific data quality objectives that will be included as part of Phase II planning.

Major Problem Areas and Action Taken

None.

Planned Work for Subsequent Months

Work planned for subsequent months includes

- issue remaining HEDR procedures: HEDR-TP-3, "HEDR Documentation of Critical Decisions" and "HEDR-TP-4, "HEDR Data Quality Objectives"
- issue revised QA Plan to include project specific Data Quality Objectives
- issue new and revised QA procedures for implementing QA requirements.

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

- continued to develop methods for quantifying the uncertainty in dose estimates caused by space/time variability and lack of knowledge of model parameter values. A computational procedure was developed to graphically show both types of uncertainty. These graphs were used to investigate further the need to re-parameterize the outputs of the air dispersion model to avoid inflated estimates of dose and their uncertainties in census divisions near mountainous areas to the west of the Hanford Site. These computations illustrate the difficulty of getting good estimates of dose on the boundary of the Phase I study area in upwind and mountainous areas where dose estimates were low
- wrote a draft 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. The results show the necessity of revising the dose/uncertainty code to obtain more accurate dose estimates.

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:

- restructure the Phase I dose/uncertainty code to produce dose estimates for individuals and to ensure that correlations among model pathways and parameters are maintained
- revise the parameterization of the atmospheric model output for input to the dose code to ensure that doses and uncertainties are estimated and reported on sufficiently small temporal and spatial scales to avoid biased dose and uncertainty estimates
- conduct sensitivity and uncertainty analyses
- assist other project tasks to identify when statistical and sensitivity analyses are needed and how to conduct them
- finish QA documentation of the Phase I statistical analysis procedures and results.

Project Technical Coordination

Objective

The objective of the Project Technical Coordination Task is to provide technical overview of the project to ensure that appropriate technical activities are planned, that appropriate information is generated, and that technical task work is integrated effectively for performing the final dose calculations.

Progress

Activities this reporting period included

- acquired data from the International Atomic Energy Agency (IAEA) in Vienna, Austria, regarding the Coordinated Research Project on Validation of Model Predictions (VAMP), and discussed the data and projected schedule for testing with IAEA staff. HEDR staff reaffirmed the commitment to prepare data for other VAMP participants to model the results of the 1940s Hanford releases
- presented the results of HEDR Phase I to the Richland Kiwanis Club on September 26

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:

- prepare code design specifications for Phase II computational model
- coordinate and implement project sensitivity and uncertainty analyses to identify the most critical parameters and assumptions for generating the most accurate dose estimates
- continue coordinating efforts with thyroid disease study personnel
- 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.

Appendix A

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

Appendix A

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

BNWL-B-323	Hanford Environmental Surveillance Routine Program Master Schedule - CY 1974. 4 p.	12/31/73
HEDL-SA-3257-FP	Chemical Analysis Developments for Fusion Materials Studies. 17 p.	04/01/85
HW-3-2621	Calculation of Changes in Specific Activity of Plutonium as a Function of Neutron Exposure of Pile Uranium. 4 p.	06/18/45 •
HW-3-2667	Use of Low Concentrations of Lanthanum & Hydrofluoric Acid in the Lanthanum Fluoride Product Precipitation. 3 p.	06/19/45 •
HW-3-2754	100-F Unit Purge June 16, 1945. 4 p.	06/16/45
HW-3-3226	Determination of the Specific Activity of 265 gt Plutonium. 3 p.	11/12/45 •
HW-7-991-DEL	Hanford Engineer Works Monthly Report November 1944 95 p.	12/09/44 •
HW-10284	Ruptured Slug - Tube 1165-F 100-F Area. 8 p.	06/28/48
HW-12574	Proposed Radiobiological-Ecological Survey of the Columbia River. 5 p.	02/09/49
HW-12575	Supplement to HW-12574. 6 p.	02/21/49
HW-19059	Removal of Ruptured Slug from Tube 1572-D. 7 p.	10/06/50
HW-21015	Ruptured Slugs. 2 p.	05/07/51
HW-21074	Review of Columbia River Studies Program - H.I. Development Division. 7 p.	05/10/51
HW-24089	Calculation of Radiation & Shielding. 25 p.	11/26/51
HW-24800-97	Aquatic Biology Laboratory (Construction History to December 31, 1951). 15 p.	01/01/52

• Declassified by new directive

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

HW-30306	Radiological Sciences Dept - Annual R&D Report - FY 1953. 15 p.	12/15/53
HW-36014	Isotopic Dilution of P-32 in the River. 3 p.	04/04/55
HW-38469-RD	Chemical Contamination of Drinking Water by Sodium Dichromate at Low River Flows. 5 p.	08/05/55
HW-40545	Tentative Procedure for the Carrier-Free Determination of Np-239 in Reactor Effluent Water. 2 p.	12/22/55
HW-40699	Radioactive Contamination in Reactor Effluent Using Unfiltered Columbia River Water as a Coolant. 20 p.	12/28/55
HW-52410	Radioactivity in 100-Area Water. 11 p.	09/09/57
HW-56001-E	Internal Decontamination with Turco 4306-B Disposal Aspects. 17 p.	01/29/59
UNI-732	UNI Reactor & Fuels Production Facilities 1976 Effluent Release Report. 28 p.	03/14/77
UNI-1261	UNI Reactor & Fuels Production Facilities 1978 Effluent Release Report. 29 p.	03/01/79
UNI-1701	UNC Nuclear Industries Reactor & Fuels Production Facilities 1980 Effluent Release Report. 30 p.	03/12/81

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)
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 Traceability, 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
MESOIL T2, 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
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 129I Concentrations in Human Tissue to Estimate Radiation Dose from 131I	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

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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 Uncertainty 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 Swals	Piepho, 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	Srengce, 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	Strenge, 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	Liebetrau, 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 - September, 1990

Initiated By/Affiliation	Contact/Affiliation	Type	Subject
D Shipler/PNL	J Till/TSP, Chairman	Phone	Ongoing discussions re: HEDR Project
D Shipler/PNL	B Shleien/TSP	Phone	Ongoing discussions re: HEDR Project
D Shipler/PNL	C Fryhle/Pacific Lutheran University	Phone	Presentation at Pacific Lutheran University
D Shipler	B Roberds/Golder Associates	Phone	HEDR decision planning
S Finch/PNL	J Stohr/TSP	Phone	Ongoing discussions re: meeting planning
P Ryan/Oregon DOE	S Finch/PNL	Phone	Accrual information and questions
R Morrill/TSP	S Finch/PNL	Phone	Status of prior invoices
S Finch/PNL	B Roberds/Golder Associates	Phone	Schedule a meeting
S Finch/PNL	R Morrill/TSP	Phone	Invoice payments
S Finch/PNL	C Fryhle/Pacific Lutheran University	Phone	Presentation at Pacific Lutheran University
S Finch/PNL	J Stohr/TSP	Phone	Request for Phase I booklets for handouts at Pacific Lutheran University
D Walker/TSP	S Finch/TSP	Phone	Status of invoice
S Finch/PNL	N Germond/TSP	Phone	Verify contract modification amount
S Finch/PNL	J Till/TSP	Phone	Verify accrual amount
M Saporito/FHCRC	B Napier/PNL	Phone	Data transfer
BA Napier/PNL	H Koehler/IAEA	Visit	VAMP Test #1
J Ruttenber/CDC	R Napier/PNL	Phone	Selection of "unexposed" counties
V Nguyen/TSP	C Bruneau/PNL	Phone	Status of Native American Task Force
D Powaukee/Nez Perce Tribe	C Bruneau/PNL	Phone	FY 1990 Funds

- END -

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12 / 28 / 90