Hanford Environmental Dose Reconstruction Project

Monthly Report

November 1989

Prepared for the Technical Steering Panel

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HANFORD ENVIRONMENTAL DOSE
RECONSTRUCTION PROJECT

Monthly Report

November 1989

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 (structure shown in Figure 1) being conducted at Pacific Northwest Laboratory (PNL) 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. Organizational Structure of the Hanford Environmental Dose Reconstruction Project

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 Pacific Northwest Laboratory under the direction of an independent Technical Steering Panel.

The Technical Steering Panel 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 among the members are appointed technical members representing the States of Oregon and Washington, cultural and technical experts nominated by the Indian tribes in the region, and an individual representing the public.

* This Executive Summary was approved by the Technical Steering Panel in September 1988.

The project is divided into the following technical tasks. These tasks address each of the primary steps in the path from radioactive releases to dose estimates:

- source terms
- environmental transport
- environmental monitoring data
- demographics, agriculture, and food habits
- environmental pathways and dose estimates.

The source terms task will develop estimates of radioactive emissions from Hanford facilities since 1944. These estimates will be based on historical measurements and production information.

The environmental transport task will reconstruct the movement of radioactive materials from the areas of release to populations. Movement via the atmosphere, surface water (Columbia River), and ground water will be studied.

The environmental monitoring task will assemble, evaluate, and report 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 due to natural sources and nuclear testing fallout.

The demographics, agriculture, and food habits task will develop the data needed to determine the populations that could have been affected by the releases. Population and demographic information will be developed for the general population within the study area. This information will also be developed for several special population groups including the Native American Tribes in the study area, Army personnel stationed at Hanford, Hanford construction workers, and migrant farm workers.

In addition to population and demographic data, the food and water consumption patterns and sources of food and water for these populations must be estimated since these provide a primary pathway for the intake of radionuclides.

Historical dairy farming practices and milk distribution systems will be 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 will use the information produced by the other tasks to estimate the radiation doses populations could have received from Hanford.

Project reports, which have been approved by the Technical Steering Panel, and references used in the reports will be made available to the public in a public reading room. Project progress will be documented in monthly reports, which are available to the public.

MANAGEMENT SUMMARY

PROGRESS

This summary covers progress for the month of November 1989.

- completed the following scheduled milestones:
 - 03-B *Radionuclide List Decay Schemes*
 - 05-A *I-131 Sample Vegetation Data*
 - 05-B *Final Fiver and Sediment Monitoring Data*
 - 05-C *Measured River Fish Concentrations*
- held an internal quality assurance (QA) audit the week of November 7, 1989. Members of the TSP QA subcommittee accompanied internal auditors. The audit focused primarily on QA administrative controls and included verification of some of the software control requirements. The audit report will be available in December 1989. Another audit, which will be performed in March 1990, will focus on data traceability of Phase I results.
- continued planning for FY 1990
- continued work on the internal draft of the Phase I summary report
- prepared for the December TSP meeting. One-and-a-half days of the meeting will be dedicated to Battelle staff to report preliminary Phase I information.
- continued internal PNL clearance on several draft reports, which will be submitted to the TSP and become part of the Phase I summary report. Several of these reports were transmitted to the TSP for review and approval.
- continued contract negotiations with the Yakima and Colville Tribes; received proposal from the Coeur d'Alene Tribe; sent Request for Proposal to the Kalispel, Spokane, and Nez Perce Tribes
- continued work on communication strategy by completing the following activities: 1) conducted three focus groups and set up additional focus groups and interviews for December, 2) completed draft report summarizing literature review on risk communication and distributed the report internally for review and comment, and 3) subcontracted work to conduct a content analysis of media reports on HEDR Project

- continued developing computer modules for calculating doses; sent draft report on design code specifications to internal peer review
- continued declassifying early-day, Hanford-originated documents of potential interest/use in the HEDR Project.

MAJOR ISSUES AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- complete the following scheduled milestones* in December:
 - 03-C *Recommendation Regarding Development of Libraries Specific to Hanford for ORIGEN^(a) 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 December 1944 through December 1947*
 - 04-B *Atmospheric Modeling Approach*
 - 04-C *Phase I Atmospheric Model and Input Data*
 - 04-D *Phase I Atmospheric Model Results*
 - 04-E *Phase I Surface Water Conceptual Model and Calculations*
 - 06-A *Review of Literature on Public Interaction*
 - 06-B *Phase I Demo Analysis for HEDR Project*
 - 06-C *Phase I Food Consumption Estimates for HEDR Project*
 - 06-D *Initial Description of the Milk Production and Distribution System for the HEDR Phase I Study Area*
 - 07-A *Computer Code Design Specifications*
 - 07-B *Thyroid Data Summary*
 - 12-C *List Dominant Radionuclides*
- continue work to expand existing QA plan to include project-specific data quality objectives
- continue clearing reports documenting Phase I activities and submitting them to TSP

* Reports documenting these activities will be submitted to the TSP for review, comment, and approval in the month indicated above and later included in the Phase I summary report.

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

- continue work on the Phase I summary report
- present preliminary Phase I information at the December TSP meeting
- continue planning for FY 1990
- continue contract negotiations with tribes
- complete literature review of risk communication and deliver final report to the TSP; conduct focus group and individual interviews
- complete the preliminary code implementation
- conduct a sensitivity/uncertainty analysis of the factors being developed to recompute iodine-131 measurements on vegetation
- compare dose estimation and uncertainty analyses for the multiplicative lognormal code with that from the Monte Carlo code for the air and vegetation modules
- continue to identify and collect documents and data of potential interest to the HEDR Project that address activities during the years from reactor startup through 1949.

BUDGET STATUS

Projected expenditures through November 1989 \$ 550K

Actual expenditures through November 1989 \$ 544K

VARIANCE EXPLANATION

None. Two scheduled milestones were delayed: 07-A, *Computer Code Design Specifications* and 12-C, *List Dominant Radionuclides*. Both were due in November and were rescheduled for December to respond to peer review comments as part of the internal clearance process.

CAPITAL STATUS

FY 1990 budget under consideration.

PROJECT SUMMARY REPORT

1. IDENTIFICATION NUMBER: DE-AC076RLO 1830		2. PROGRAM/PROJECT TITLE: HANFORD ENVIRONMENTAL DOSE RECONSTRUCTION										3. REPORTING PERIOD: NOVEMBER 1989					
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		2700															
b. BUDGET & REPORTING NO./SUB. ACCT NO.		2400															
12578 GEO2210110		2100															
c. FIN. NO.		1800															
d. ACTUAL COSTS PRIOR YEARS 6332		1500															
e. FY BUDGET 2650 **		900															
f. TOTAL BUDGET		600															
g. FY FUNDS AUTH projected 2650		300															
h. TOTAL FUNDS AUTH 5829																	
COSTS		I. PLANNED *	250	300	240	250	290	200	190	190	190	190	180	180			
		J. ACTUAL	253	290													
		K. VARIANCE	-3	10													
		L. CUM PLANNED *	250	550	790	1040	1330	1530	1720	1910	2100	2290	2470	2650			
		M. CUM ACTUAL	253	544													
		N. CUM VARIANCE	-3	6													
10. LEGEND: PLANNED ----- ACTUAL _____ PROJECTED FUNDS AUTH. _____ 90% FUNDS SPENT ▴																	
* Projections revised to reflect more accurate spending patterns ** projected FY budget does not include TSP budget																	
11. MILESTONES																	
O N D J F M A M J J A S FY91																	
01 Phase I Report																	
03-A Hanford Site Operations and Facilities																	
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																	
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																	
H A Haerer																	

PROJECT SUMMARY REPORT

PROJECT SUMMARY REPORT - TECHNICAL STEERING PANEL

1. IDENTIFICATION NUMBER: DE-AC076RLO 1830		2. PROGRAM/PROJECT TITLE: HANFORD ENVIRONMENTAL DOSE RECONSTRUCTION - TSP					3. REPORTING PERIOD: NOVEMBER 1989								
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 GEO2210110															
c. FIN. NO.															
d. ACTUAL COSTS PRIOR YEARS															
e. FY BUDGET 688															
f. TOTAL BUDGET															
g. FY FUNDS AUTH															
h. TOTAL FUNDS AUTH 688 (unburdened)															
COSTS		I. PLANNED		57	57	57	57	57	57	57	58	58	58	58	
		J. ACTUAL		17	21										
		K. VARIANCE		40	36										
		L. CUM PLANNED		57	114	171	228	285	342	399	456	514	572	630	688
		M. CUM ACTUAL		17	38										
		N. CUM VARIANCE		40	76										
10. LEGEND: PLANNED ACTUAL _____ PROJECTED FUNDS AUTH. _____ 90% FUNDS SPENT															
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 H A Haerer															

		STATUS OF DIRECTIVES			
		Complete	Ongoing	Phase I	Phase II
8 8 - 1	(a) Proposals		X		
	(b) Source Terms			X	
8 8 - 2	Vegetation			X	X
8 8 - 3	Status Reports		X		
8 8 - 4	Ground Water			X	X
8 8 - 5	Maps	X			
8 8 - 6	Resumes	X			

STATUS OF DIRECTIVES				
		Ongoing	Phase I	Phase II
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	

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Organization of the Project
Health, Safety, and Environment Project

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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 will develop estimates of radioactive emissions since 1944 from Hanford facilities based on historical measurements and production information. Source term estimates will be 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, from the differences in the published variables that are used to perform calculations. By comparing the uncertainty in the available data, task staff will determine the most accurate method for developing source terms. For time periods where measured values do not exist, source terms must be calculated from available information. The proposed methods and results of this task will be reviewed, evaluated, and approved by the TSP.

PROGRESS

Activities for this reporting period included the following:

- continued internal PNL clearance on several draft reports, which will be submitted to the TSP and become part of the Phase I summary report
- met with the chair of the TSP subcommittee on source terms to discuss Source Term Task activities and scope of future activities
- completed Milestone 03-B, *Radionuclide List Decay Schemes*, due to the TSP November 1989.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- complete the following scheduled milestones

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*

- present Source Terms Task information at the December TSP meeting
- document fuel dissolution dates at the PUREX Plant, 1984-1986, from identified records.

Environmental Transport

OBJECTIVE

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

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

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

The movement of radionuclides in the ground water will be initially reconstructed by using ground-water monitoring data to estimate the contribution to the surface-water pathway. As in the case of the surface-water pathway, some modeling might be required where data are lacking.

PROGRESS

Activities for this reporting period included the following:

- continued preparing individual reports that will become part of the Phase I report: 1) a description of the atmospheric modeling approach, 2) a

description of the atmospheric model and input data used for Phase I, 3) a summary of the Phase I atmospheric modeling results, and 4) a description of the Columbia River conceptual model and concentration estimates for Phase I

- prepared presentations on the atmospheric and surface-water pathways for the December TSP meeting.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

WORK PLANNED FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- complete the following scheduled milestones
 - 04-B *Atmospheric Modeling Approach*
 - 04-C *Phase I Atmospheric Model and Input Data**
 - 04-D *Phase I Atmospheric Model Results*
 - 04-E *Phase I Surface Water Conceptual Model and Calculations*
- present information on the atmospheric and surface-water pathways at the TSP meeting scheduled for December.

** 04-C and 04-D have been combined into a single report.

Environmental Monitoring Data

OBJECTIVE

Members of the Environmental Monitoring Data Task will assemble, evaluate, and summarize key historical measurements of the concentrations of radionuclides in the environment around Hanford. Radionuclide concentrations have been measured at various times in such media as air, drinking water, foods, fish, the Columbia River, soil and in other sample materials. These measurements will be 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 will be proposed to the TSP for review, evaluation, and approval.

PROGRESS

Activities for this reporting period included the following:

Milestones 05-A, *I-131 Sample Vegetation Data*, 05-B, *Final River and Sediment Monitoring Data*, and 05-C, *Measured River Fish Concentrations*, due November 1989 and complete:

- draft data tables and selected descriptive text were transmitted to the TSP for review and approval. Data summaries were for gross beta activity (assumed to be iodine-131) on vegetation for 1945 through 1947, radionuclide concentrations in river and drinking water for 1964 through 1966, and radionuclide concentrations in fish flesh for 1964 through 1966.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- present information on environmental measurements of the Columbia River and vegetation monitoring data for 1945 through 1947 at the December TSP meeting
- continue work on uncertainty in instrument conversion factors.

Demographics, Agriculture, Food Habits

OBJECTIVE

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

Demographic information will be 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 pathways will be studied. In addition, milk produced from cows represents a significant food pathway for iodine-131 if the cows were fed vegetation contaminated with radionuclides. Dairy farming practices and milk distribution systems will be studied to locate 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 will be 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 usage downstream from Hanford will also be studied because the radioactive materials in the river water could have been deposited on crops consumed by people or animals. Recreational users of the river could also 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:

- sent Request for Proposal for a work order that will develop a work plan for data collection to the three tribes with contracts (Kalispel, Spokane, and Nez Perce)
- received proposal from Coeur d'Alene Tribe
- continued contract negotiations with Yakima and Colville Tribes.
- reviewed declassified excerpts of Hanford Works Monthly Reports to collect information on milk and ice cream sales for 1944 through 1949. Excerpts were pulled together to form a new document that will then be referenced as the source of the information.

Milestone 06-E, *Strategies and Approaches for Interactions Between the Public and the HEDR Project*, due February 1990:

- pretested focus group format for audience analysis, conducted three focus groups, and set up additional focus groups and interviews for December
- completed draft report of literature review on risk communication and distributed report internally for review and comment
- placed subcontract with the Battelle Human Affairs Research Center in Seattle to conduct a content analysis of media reports on HEDR.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- complete the following scheduled milestones:
 - 06-A *Review of Literature on Public Interaction*
 - 06-B *Phase I Demography Analysis for HEDR Project*
 - 06-C *Phase I Food Consumption Estimates for HEDR Project*
 - 06-D *Initial Description of the Milk Production and Distribution System for the HEDR Phase I Study Area*
- complete audience analysis as background for developing communication strategies
- present information at December TSP meeting.

2. Result information as of December 1995

continued to be

continued to be

for the year ended

for the year ended

for the year ended

for the year ended

for the year ended

for the year ended

for the year ended

for the year ended

for the year ended

for the year ended

Environmental Pathways and Dose Estimates

OBJECTIVE

Task members will 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 will include doses via direct transfer of radionuclides from concentrations in air and water to people (via breathing, drinking, immersion, etc.). The calculations will also include doses via 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 will be presented to the TSP for review, evaluation, and approval.

PROGRESS

Activities for this reporting period included the following:

Milestone 07-B, *Thyroid Data Summary*, due December 1989:

- began preparing a report summarizing and analyzing the data.

Milestone 0706 A-E, *Preliminary Dose Estimates*, due September 1989 and rescheduled for completion in April 1990:

- continued progress on developing the computer modules for calculating the doses. Continued coding on modules three, four, and five, which together comprise the milk model.

Milestone 07-A, *Computer Code Design Specifications*, due November 1989 and rescheduled for completion in December 1989:

- sent draft report on design code specifications to internal peer review. Their comments/changes will be incorporated and the report will be released after the review process has been completed.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for the subsequent months includes the following:

- complete the following scheduled milestones

07-A *Computer Code Design Specifications*

07-B *Thyroid Data Summary*

- present information regarding bioassay data, vegetation data calculations and monitoring data comparisons at the December TSP meeting
- complete the preliminary code implementation
- provide initial estimates of dose for a limited subset of cases.

Information Resources

OBJECTIVE

Members of the Information Resources Task will 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:

- declassified 48 early-day, Hanford-originated documents of potential interest/use in the HEDR Project and provided them to appropriate task leaders and the public domain
- continued to search for documents that address silver reactor capabilities, performance, and incidents
- continued to search for documents containing pertinent information of stack filter samples and scrubber samples during 1946 through 1949
- added new citations to the tracking system that now numbers 2900
- provided the DOE-RL Public Reading Room with 27 documents of potential interest/use in the HEDR Project
- identified, and provided to HEDR staff, documents that address fuel failures at Hanford from 1948 through 1970
- identified a series of documents addressing contamination control of the Columbia River from 1961 through 1970
- identified additional boxes stored at Federal Records Center, Seattle, which might contain useful environmental data for 1946 through 1949.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Planned work for subsequent months includes the following:

- 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
- identify documents that present information on stack filter samples and scrubber samples for 1946 through 1949
- watch for information that may explain in detail, and support data in, "green run" document HW-17381 DEL
- develop a chronology addressing stack gas disposal as reported in selective issues of technical progress letters
- develop a listing of citations addressing the radioactivity of reactor effluent and the impact of fuel failures on the radioactivity
- make necessary arrangement to determine the existence or non-existence of Hanford Site-originated documents that were transferred to the corporate headquarters of du Pont and General Electric during the years 1944 through 1964
- 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 five packages of records to the DOE-RL Public Reading Room
- drafted revisions to the project Records Inventory and Disposition Schedule (RIDS) and five task RIDS.

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
- prepare revised RIDS on project and task level
- 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 the following:

- performed an internal QA audit with no major finding or observations identified. This audit focused primarily on QA administrative controls but also included verification of some of the software control requirements. The audit report will be made available in December. The Project Manager requested that Battelle's internal audit group perform an audit in March, 1990 that would focus on data traceability of Phase I results.
- began work to expand existing QA plan to include project-specific data quality objectives
- continued to provide QA program implementation guidance to project staff in areas of computer software modeling, databases, and internal/external review of Phase I results.

MAJOR PROBLEM AREAS AND ACTIONS TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- continue working with HEDR staff to expand existing QA Plan to include project-specific data quality objectives as directed by the TSP
- perform data traceability review of Phase I report
- continue to perform surveillance of software control requirements
- issue remaining HEDR procedures: HEDR-TP-3, *HEDR Documentation of Critical Decisions* and HEDR-TP-4, *HEDR Data Quality Objectives*.

Statistics

OBJECTIVE

Task members will provide statistical support to members of technical tasks and will 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:

- continued to write a computer code to conduct dose estimation and uncertainty/sensitivity analyses using the multiplicative lognormal (ML) method. Results from this approximate method will be compared with results obtained from the Monte Carlo (MC) dose estimation/uncertainty analysis code to determine whether the two codes provide essentially the same estimates of doses and their uncertainties. If so, the ML code will be used in conjunction with the MC code during Phase II to more efficiently evaluate uncertainties and sensitivities of dose estimates.
- continued to develop computational techniques needed for the ML code
- presented the invited paper "Sensitivity and Uncertainty Analysis for Environmental Dose Reconstruction" at the Workshop on Uncertainty Analysis in Accident Consequence Assessment held in Santa Fe, NM on November 13-16, 1989
- continued developing a strategy for conducting uncertainty/sensitivity analyses during Phase II

- assisted HEDR staff with the statistical presentation and interpretation of Hanford Worker thyroid measurements made in the mid-1940s
- attended a meeting November 27-28, 1989, at the Environmental Measurements Laboratory in New York City of the National Cancer Institute (NCI) Task Group on Exposure of American People to Iodine-131 from Nevada Test Site Fallout. The purpose of the meeting was to provide technical review and direction for project personnel to complete the uncertainty analysis for the final report to NCI. Participation in these meetings provides opportunities for communication with experts in uncertainty/sensitivity analysis.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- conduct a sensitivity analysis of the conversion factor being developed to recompute iodine-131 measurements on vegetation that were originally made in 1945-1947. This sensitivity analysis complements the uncertainty analysis conducted on this conversion factor in October.
- develop and implement the strategy for Phase II sensitivity/uncertainty analyses
- compare dose estimation and uncertainty analyses for the multiplicative lognormal code with that from the Monte Carlo code for the air and vegetation modules
- verify the multiplicative lognormal dose-estimation, uncertainty analysis code to make sure it meets QA requirements.

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:

- prepared and began internal clearance of a draft report on the HEDR Monte Carlo computer program calculational system design requirements and design specifications. Initiated internal clearance process on draft report.
- continued to assist the Environmental Monitoring Data and Statistics Task staff in converting original vegetation sample counting data to activity-per-unit mass.

Milestone 12-C, *List Dominant Radionuclides*, due November 1989 and rescheduled for December 1989.

- initiated internal clearance of the draft report, which will be released after peer review comments have been addressed.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for the subsequent months includes the following:

- complete the following scheduled milestone:

12-C *List Dominant Radionuclides*

- travel to Vienna, Austria, to participate in planning meetings for a major computer code intercomparison and validation effort sponsored by the International Atomic Energy Agency. Will attempt to gather information and support for the validation of portions of the HEDR Monte Carlo computational code.
- present information outlining the HEDR Phase I calculational process at the December TSP meeting
- continue defining the overall structure of the needed HEDR data base and the type of data needed for smooth project integration.

APPENDIX A

Communications Log

COMMUNICATIONS LOG - NOVEMBER 1989

INITIATED BY	CONTACT	AFFILIATION	TYPE	SUBJECT
PNL/W. Haerer	John Till	TSP, Chairman	Telephone	Ongoing discussions re:HEDR Project
PNL/W. Haerer	Bernard Shleien	TSP, Executive Secretary	Telephone	Ongoing discussions re:HEDR Project
JS Stohr	Bonnie Dennis	PNL	Telephone	Ongoing discussions re: meeting planning
TSP/M Robkin	Larry Morgan	PNL	Telephone	Visit to Richland week of 11/6/89
PNL/L. Morgan	Bernard Shleien	TSP	Telephone	Determine what iodine info he needed
TSP/B. Shleien	Larry Morgan	PNL	Telephone	Indicated which values he needed
TSP/ M. Robkin	Larry Morgan	PNL	Telephone	List of items discussed at meeting
TSP/ M. Robkin	Larry Morgan	PNL	Meeting	Planning/Scoping for Source Terms for FY 90
PNL/R. Cuello	Delbert Barth	TSP	Telephone	Upcoming visit to discuss HEDR data quality objectives
PNL/B. Dennis	Bernard Shleien	TSP	Telephone	Criteria for approving TSP invoices; Communications logs
FH/S. Davis	Russ Rhoads	PNL	Telephone	Arrange meeting to discuss Phase I information
PNL/ R. Rhoads	Scott Davis	Fred Hutchinson	Telephone	Arrange meeting to discuss Phase I information
PNL/R. Rhoads	Mary Lou Blazek	TSP	Telephone	Recommend brief news conference to start TSP meeting
Tribes/D. Bonga	Carol Bruneau	PNL	Telephone	RFP for Work Order to develop work plan
Tribes/D. Saluskin	Carol Bruneau	PNL	Telephone	Contract negotiations

COMMUNICATIONS LOG - NOVEMBER 1989

INITIATED BY	CONTACT	AFFILIATION	TYPE	SUBJECT
Tribes/L. Ackerman	Carol Bruneau	PNL	Telephone	Salary documentation for Colville contract
Tribes/A. Fredin	Carol Bruneau	PNL	Telephone	Documentation for contract
TSP/D. Walker	Carol Bruneau	PNL	Telephone	Progress with tribes
PNL/C. Bruneau	David Ernst	Spokane Tribe	Telephone	Work Order to develop Work Plan
Tribes/D. Seyler	Carol Bruneau	PNL	Telephone	Contract

APPENDIX B

List of HEDR and HEDR-Related Materials

Note: *HEDR materials* were presented to the TSP as project milestones or as handouts accompanying a presentation at a public meeting.

HEDR-related materials present aspects of dose reconstruction in the open scientific literature; TSP approval is not required.

LIST OF HEDR REPORTS/PAPERS/PRESENTATION HANDOUTS TO THE TSP - TO DATE

Title	Author	PNL Clear. Clearance		Additional Information	Status
		Date	No.		
Hanford Environmental Dose Reconstruction Project Monthly Report	Haerer, HA	ongoing	PNL-6450 HEDR	Monthly report-cleared one time for documentation	Periodic report; TSP approval not necessary
Hanford Environmental Dose Reconstruction Project - Work Plan	Haerer, HA	9/88	PNL-6696 HEDR	Superseded by new work plan	TSP approved
Proposed Approach for Developing Information on Population Food Consumption and Lifestyles of Native Americans in the HEDR Study Area	Rhoads, RE, and Bruneau, CL	10/88	PNL-6803 HEDR	Working document	TSP comments were incorporated into PNL-6834 HEDR
Summary Report of HEDR Workshop on Sensitivity and Uncertainty Analysis	Sagar, B., and Liebetrau, AM	1/89	PNL-SA-16804 HEDR	Summary of workshop held January 16-18, 1989	Sent to Till 3/89 - no written response provided to PNL
Demographic, Agricultural, Food Consumption, and Lifestyle Research for the Hanford Environmental Dose Reconstruction Project	Beck, DM, Rhoads, RE, Harkreader, SA, Bruneau, CL, Darwin, RF, and Eckert, RL	3/89	PNL-6834 HEDR	Incorporates TSP comments	TSP received 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
Defining Demographic Categories for Phase I	Napier, BA, and Beck, DM	5/89	PNL-SA-17035 HEDR	Presentation handout for the TSP mtg, May 18-20, '89, Toppenish, WA	Handout; approval not required
Work Plan for the Hanford Environmental Dose Reconstruction Project	Haerer, HA	12/89	PNL-6696 HEDR REV 1		TSP approved; published 12/89
A History of Major Hanford Operations Involving Radioactive Material	Ballinger, MY, and Hall, RA	7/89	PNL-6964 HEDR		TSP reviewed; PNL addressing comments
Feasibility of Using 129I Concentrations in Human Tissue to Estimate Radiation Dose From 131I	McCormack, WD	10/89	PNL-6889 HEDR		TSP approved 9/89
Hanford Environmental Dose Reconstruction	Bruneau, CL	1989	PNWD-1323 HEDR	Informational brochure used in PNL's work with Tribes	TSP approval not required

LIST OF HEDR-RELATED PAPERS/PRESENTATIONS

Title	Author	PNL Clear. Clearance		Audience	Status
		Date	No.		
Estimating Atmospheric Dispersion for Reconstruction of Doses from Hanford Operations	Ramsdell, JV	6/88	PNL-SA-15818 HEDR	Presented at the 69th Annual Meeting of the Pacific Division of the American Association for the Advancement of Science, June 19-12, 1988 Corvallis, OR	Presented 6/88
Potential Applications of Geographical Information Systems for Analyzing Hanford Environmental Dose Reconstruction Data	Stephan, JG, Napier, BA, Baker, DA, and Millard, WD	3/89	PNL-SA-16767 HEDR	Presented at the Regional Symposium of the HPS Computer Applications in Health Physics, March 16-17, 1989 Richland, WA	Presented 3/89
The Hanford Environmental Dose Reconstruction Project: The Role of Applied Sociology	Beck, DM	4/89	PNL-SA-16880 HEDR	Presented at the Pacific Sociological Association Meeting, April 13-16, 1989 Reno, NV	Presented 4/89
Temporal Variations in Atmospheric Dispersion at Hanford	Ramsdell, JV	9/89	PNL-SA-17375 HEDR	Presented at the Hanford Symposium on Health & the Environment, Richland, WA Oct 16-19	Presented 10/89
The Hanford Environmental Dose Reconstruction Project: Overview	Haerer et al.	9/89	PNL-SA16859 HEDR	Presented at the Hanford Symposium on Health and the Environment, October 16-19, Richland, WA	Presented 10/89
The Hanford Environmental Dose Reconstruction Project: Technical Approach	Napier, BA	9/89	PNL-SA-16874 HEDR	Presented at the Hanford Symposium on Health & the Environment Richland, WA, Oct 16-19	Presented 10/89
Principle Component Analysis for Atmospheric Modeling	Skyllingstad, ED	10/89	PNL-SA-17164 HEDR	Conference on Probability & Statistics (Am Met Soc), Monterey, CA Oct 1-6	Presented 10/89
The Identification of Terrain-Induced Circulations Using Principal Components	Skyllingstad, ED and Schwartz, MN	10/89		Presented at the American Meteorological Society Conference on Probability and Statistics, October 1-5, 1989 Monterey, CA	Presented 10/89
Demographic Forecasting Using Trends from Ratio 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

LIST OF HEDR-RELATED PAPERS/PRESENTATIONS

Title	Author	PNL Clear. Date	Clearance No.	Audience	Status
Sensitivity and Uncertainty Analyses for Environmental Dose Reconstruction	Sagar, et al.	11/89		Presented at a workshop on uncertainty, Nov 13-16, 1989, Santa Fe, NM	To be presented 11/89
Reconstructing Food Consumption Habits: The Backcasting Method	Callaway and Carr			Journal of Health Physics	Planning for 1990
Statistical Aspects of Reconstructing the I-131 Dose to the Thyroid of Individuals Living Near the Hanford Site in the mid-1940s	Gilbert, RO	9/89		Workshop: Statistics of Human Radiation Exposure to Ionizing Radiation, April 2-4, 1990, Oxford, UK	Abstract submitted to workshop
Using the Ratio-Correlation Methods for Backcasting	Beck and Swanson	Spring/90		Chapter in applied demog book	to be published Spring '90
Experience in Collaborative Research with Native American Tribes *	Bruneau, CL, and 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
Uncertainties/Biases in 45-47 Vegetation Measurements	Mart, EI, and Woodruff, RK			Health Physics Soc. Mtg	Planning for 1990 or 1991
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, and Bruneau, CL			Journal of Rural Sociology	Planning for 1990
Fish Concentration Ratios	Poston, TM			Journal (not yet determined)	Planning for 1990

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

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