PNL-6450-31-HEDR
UC-707

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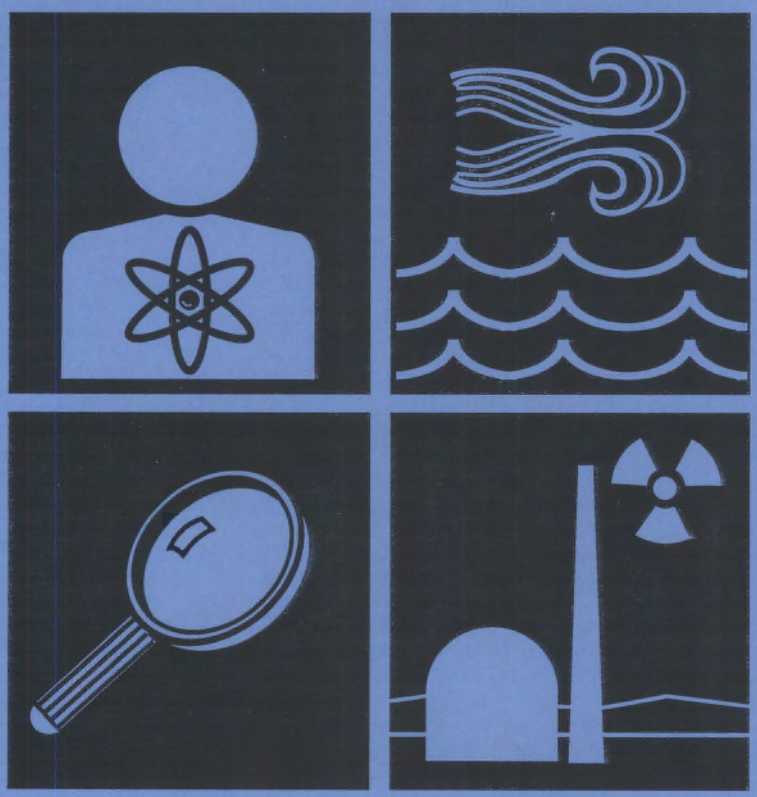
Hanford Environmental Dose Reconstruction Project

Monthly Report

May 1990



Prepared for the Technical Steering Panel

Battelle

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PNL-6450-31 HEDR
UC-707

HANFORD ENVIRONMENTAL DOSE RECONSTRUCTION PROJECT

Compiled by: S M Finch
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Hanford Environmental Dose Reconstruction Project

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W. L. Templeton, Acting Project Manager
Hanford Environmental Dose Reconstruction Project

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W. L. Templeton, Manager
Office of Hanford Environment

HANFORD ENVIRONMENTAL DOSE RECONSTRUCTION PROJECT

Monthly Report

May 1990

Prepared for the Technical Steering Panel

Pacific Northwest Laboratory
Richland, Washington 99352

PREFACE

This monthly report summarizes the technical progress and project status for the Hanford Environmental Dose Reconstruction (HEDR) Project 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 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.

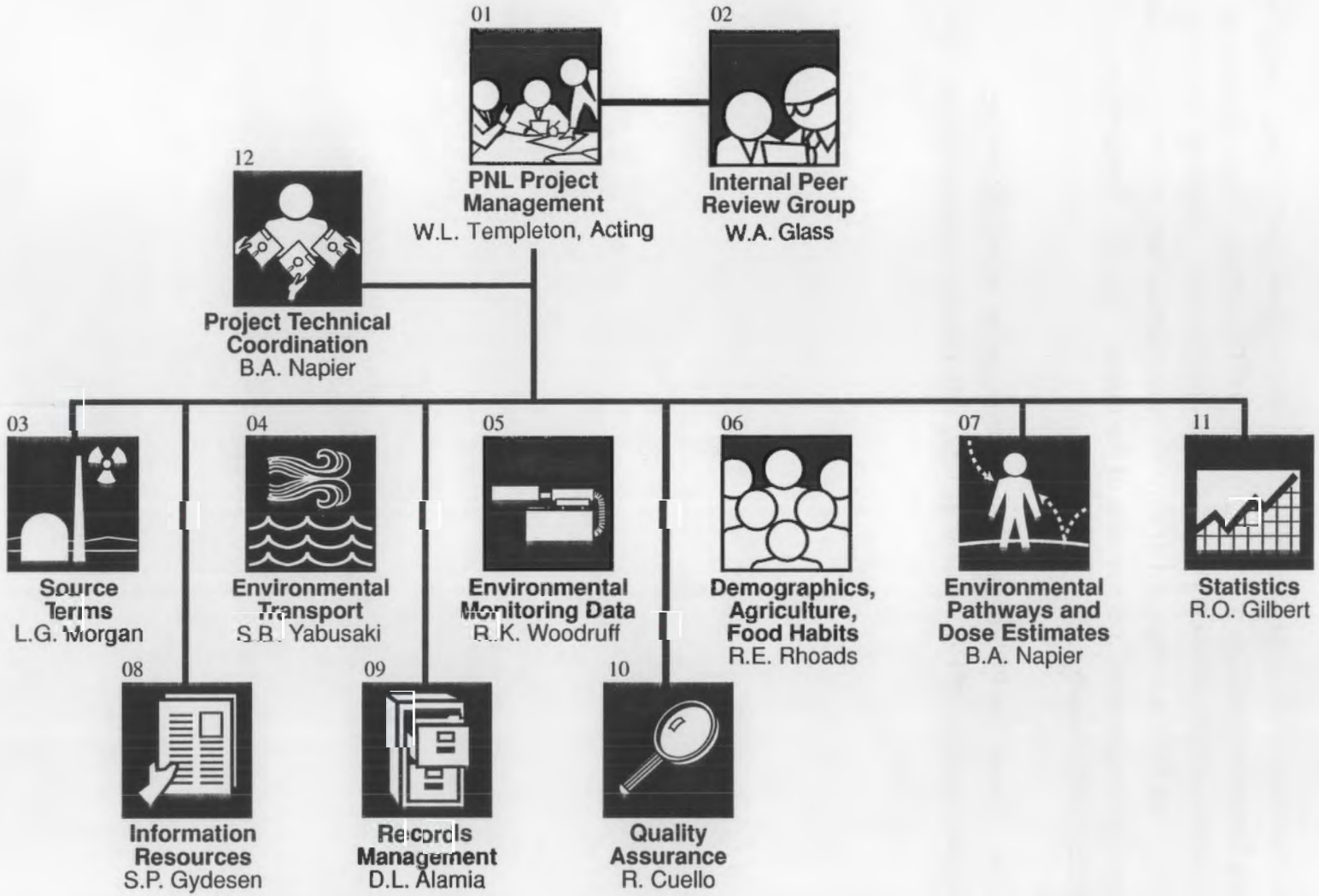
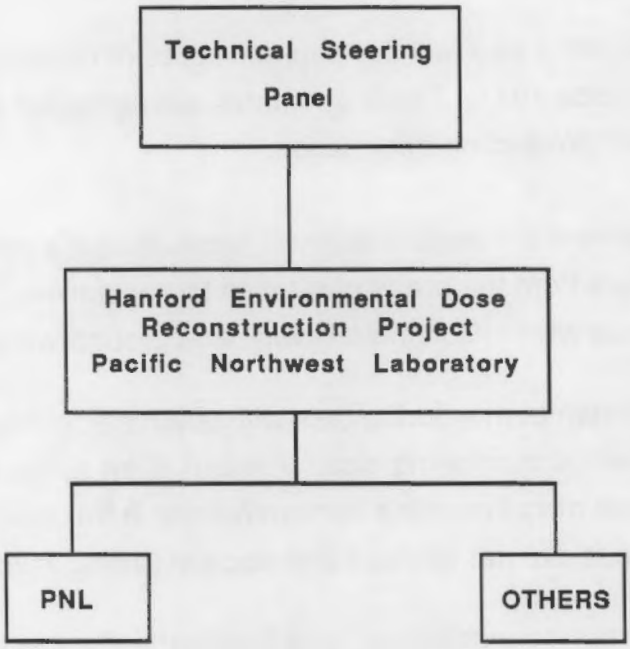


FIGURE 1. Organizational Structure of the Hanford Environmental Dose Reconstruction Project

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.

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* 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

The following major activities were conducted by HEDR staff in May 1990:

- met with a member of the public, per his request, to discuss source terms. The principal topics of discussion were 1) information on neutronics of various fuel element geometries, 2) iodine behavior during cladding dissolution, and 3) records management
- prepared materials for presentation at the atmospheric transport workshop to be held in Richland on June 12 and 13
- prepared presentations on the dose reconstruction process and Phase I reports for the "Public Health Aspects of Hanford Health Studies" workshop on June 6
- conducted field tests with the Kalispel Tribe to determine methodology to use in gathering food consumption data
- sent a request for proposal to the Yakima Nation for developing a work plan
- prepared summaries of the 186,000 calculated distributions for presentation in the Phase I reports
- received information from Hanford records on whole-body counts made from late 1950s to present for Hanford workers
- delivered to the TSP copies of the remainder of the bibliographic database of currently classified Hanford Site-originated documents created during the years 1944-1960. The database currently holds nearly 11,000 records
- corresponded extensively with a TSP member on data and assumptions to allow independent verification of HEDR results with non-project computer models
- prepared to undergo an internal audit in June that focuses on data traceability.

MAJOR ISSUES AND ACTION TAKEN

The HEDR Project Manager resigned from Battelle to take a position with another corporation. He will continue as a consultant to HEDR through August 1990 until a new project manager is appointed.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- complete the following scheduled milestone in June:

  07-C *Radionuclide Transfer Factors*

- complete the implementation of the dose estimation code and provide preliminary dose estimates
- send draft "protocol" to TSP Demography Subcommittee members for review
- continue to work with the TSP Communications Subcommittee to plan for the release of Phase I preliminary dose estimates
- prepare a joint presentation with a TSP member to be given at the July TSP meeting on the computer study conducted to evaluate the modular structure of the Phase I Monte Carlo dose code
- conduct statistical analyses of whole-body counter data from the 1960s on schoolchildren and adults in the Tri-Cities area

BUDGET STATUS

Projected expenditures through May 1990	$ 1910K
Actual expenditures through May 1990	$ 2124K

VARIANCE EXPLANATION

The current cumulative variance between planned and actual costs is 11%. The current month spending is below that originally planned. We have received notification from DOE-Richland that an additional $285K will be funded to cover

additional Phase I activities directed by the TSP. The planned expenditures will be modified upon receipt of the funding.

CAPITAL STATUS

Capital equipment funding in the amount of $141,000 was approved and allocated for the purchase of a Geographic Information System. The computers and software were delivered and set up in April.

PROJECT SUMMARY REPORT

1. IDENTIFICATION NUMBER:	2. PROGRAM/PROJECT TITLE:	3. REPORTING PERIOD:
DE-AC06-76RLO 1830	HANFORD ENVIRONMENTAL DOSE RECONSTRUCTION	MAY 1990

4a. PARTICIPANT NAME AND ADDRESS:	4b. CLIENT NAME AND ADDRESS:	5. START DATE:
PACIFIC NORTHWEST LABORATORY P. O. BOX 999 RICHLAND, WA 99352	DOE/RL RICHLAND WA 99352	OCTOBER 1989
		6. COMPLETION DATE: SEPTEMBER 1990

7. FY 90 | 8. MONTHS: O N D J F M A M J J A S FY91

9. COST STATUS:

a. $ EXPRESSED IN THOUSANDS

b. BUDGET & REPORTING NO./SUB. ACCT NO.
12578
GF0525000

c. FIN. NO.

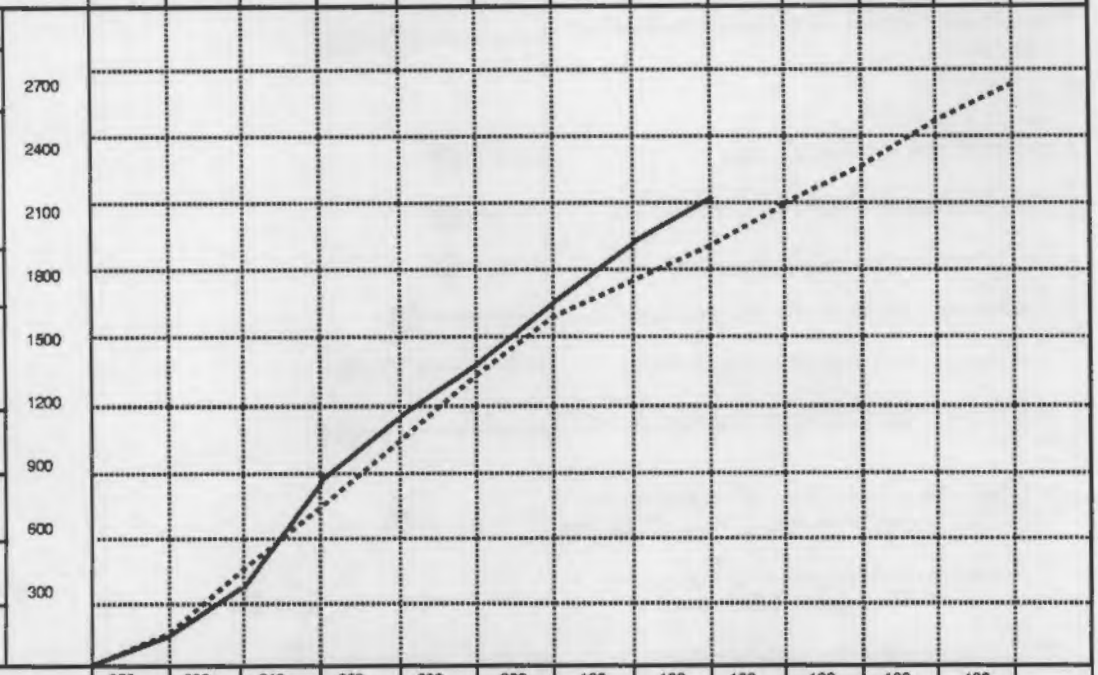
d. ACTUAL COSTS PRIOR YEARS
6332

e. FY BUDGET
2650 **

f. TOTAL BUDGET

g. FY FUNDS AUTH
3656 ***

h. TOTAL FUNDS AUTH
3656



COSTS	O	N	D	J	F	M	A	M	J	J	A	S	FY91
I. PLANNED	250	300	240	250	290	200	190	190	190	190	180	180	
J. ACTUAL	236	290	342	283	227	246	297	184					
K. VARIANCE	14	10	-102	-33	63	-46	-107	6					
L. CUM PLANNED	250	550	790	1040	1330	1530	1720	1910	2100	2290	2470	2650	
M. CUM ACTUAL	236	527	870	1152	1397	1643	1940	2124					
N. CUM VARIANCE	14	23	-80	-112	-67	-113	-220	-214					

10. LEGEND: PLANNED ------ ACTUAL ——— PROJECTED ..... 90% FUNDS SPENT ⚐
** projected FY budget does not include TSP budget ***FY funds authorized include TSP funding

11. MILESTONES

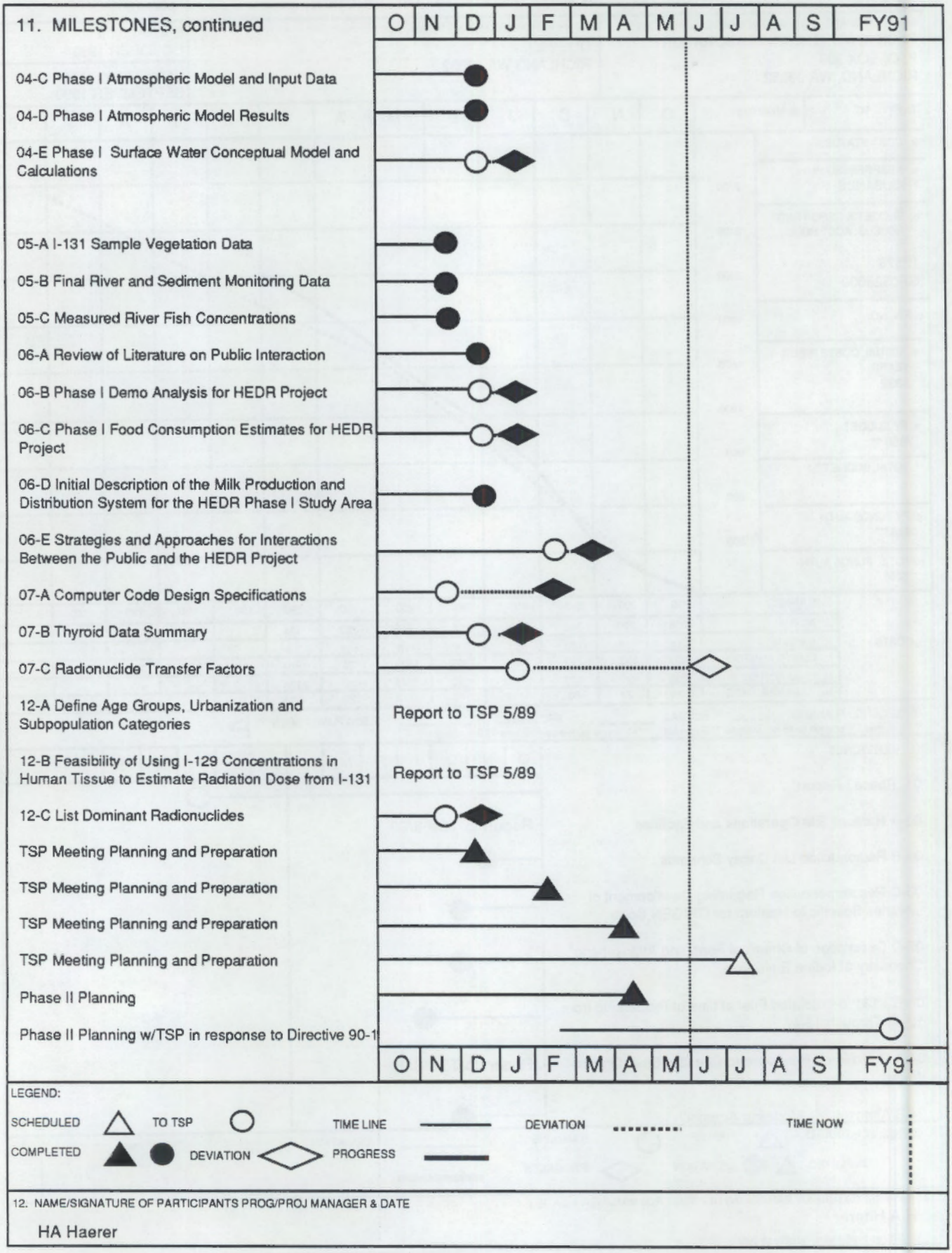
	O	N	D	J	F	M	A	M	J	J	A	S	FY91
01 Phase I Report*													○
03-A Hanford Site Operations and Facilities	Report to TSP 6/89												
03-B Radionuclide List Decay Schemes													●
03-C Recommendation Regarding Development of Libraries Specific to Hanford for ORIGEN Code													●
03-D Description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

LEGEND: SCHEDULED △ TO TSP ○ TIME LINE ——— DEVIATION ------ TIME NOW:
COMPLETED ▲ ● DEVIATION ◇ PROGRESS ▬▬

12. NAME/SIGNATURE OF PARTICIPANTS PROG/PROJ MANAGER & DATE
H A Haerer

* TSP rescheduled milestone to July

PROJECT SUMMARY REPORT



PROJECT SUMMARY REPORT - TECHNICAL STEERING PANEL

1. IDENTIFICATION NUMBER:	2. PROGRAM/PROJECT TITLE:	3. REPORTING PERIOD:
DE-AC06-76RLO 1830	HANFORD ENVIRONMENTAL DOSE RECONSTRUCTION - TSP	MAY 1990

4a. PARTICIPANT NAME AND ADDRESS:	4b. CLIENT NAME AND ADDRESS:	5. START DATE:
PACIFIC NORTHWEST LABORATORY P. O. BOX 999 RICHLAND, WA 99352	DOE/RL RICHLAND WA 99352	OCTOBER 1989
		6. COMPLETION DATE: SEPTEMBER 1990

7. FY 90 | 8. MONTHS

9. COST STATUS:

a. $ EXPRESSED IN THOUSANDS

b. BUDGET & REPORTING NO./SUB. ACCT NO.
12578
GF0525000

c. FIN. NO.

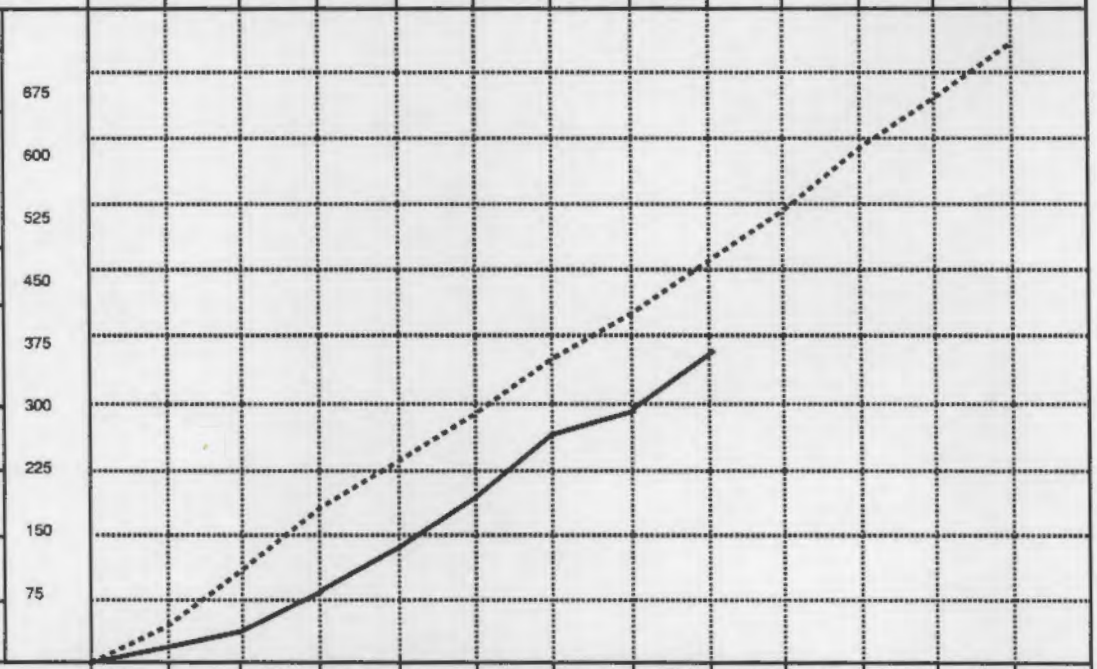
d. ACTUAL COSTS PRIOR YEARS

e. FY BUDGET
688

f. TOTAL BUDGET

g. FY FUNDS AUTH
688

h. TOTAL FUNDS AUTH
688 (unburdened)



		O	N	D	J	F	M	A	M	J	J	A	S	FY91
COSTS	I. PLANNED	57	57	57	57	57	57	57	57	58	58	58	58	
	J. ACTUAL	17	21	30	60	46	39	81	84					
	K. VARIANCE	40	36	27	-3	11	18	-24	-27*					
	L. CUM PLANNED	57	114	171	228	285	342	399	456	514	572	630	688	
	M. CUM ACTUAL	17	38	68	128	174	213	277	361					
	N. CUM VARIANCE	40	76	103	100	111	129	122	95*					

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

11. MILESTONES

O	N	D	J	F	M	A	M	J	J	A	S	FY91

LEGEND: SCHEDULED △ TIME LINE ——— DEVIATION - - - - - - - - TIME NOW:
COMPLETED ▲ DEVIATION ◇ PROGRESS ———

12. NAME/SIGNATURE OF PARTICIPANTS PROG/PROJ MANAGER & DATE
H A Haerer

Table 1 Status of Directives

STATUS OF DIRECTIVES

		Complete	Ongoing	Phase I	Phase II
88-1	(a) Proposals (b) Source Terms		X	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			

Table 1 Status of Directives, contd.

STATUS OF DIRECTIVES					
		Complete	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		

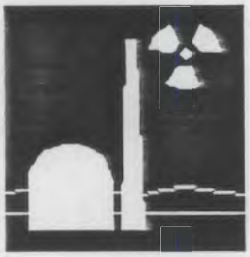
Table 1 Status of Directives, contd.

STATUS OF DIRECTIVES					
		Complete	Ongoing	Phase I	Phase II
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		

CONTENTS

TABLES

FIGURES



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:

- met with a member of the public, per his request, to discuss source terms. The principal topics of discussion were 1) information on neutronics of various fuel element geometries, 2) iodine behavior during cladding dissolution, and 3) records management
- submitted information on proposed Phase II activities for the Source Terms Task to the HEDR Project Manager.

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:

- determine the need to conduct sensitivity calculations using ORIGEN2[a].

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

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:

- prepared materials for presentation at the atmospheric transport workshop to be held in Richland on June 12 and 13.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

WORK PLANNED FOR SUBSEQUENT MONTHS

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

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

Environmental Monitoring Data

OBJECTIVE

Members of the Environmental Monitoring Data Task 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 this reporting period focused on continued Phase II planning.

- prepared for a presentation at the 1990 Health Physics Society Meeting in June entitled, "Reconstruction of Hanford Vegetation Monitoring Data for Dose Reconstruction 1945-1947."

MAJOR PROBLEM AREAS AND ACTION TAKEN

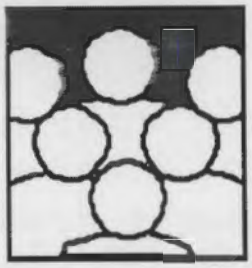
None.

PLANNED WORK FOR SUBSEQUENT MONTHS

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

- examine the magnitude of the effect of Phase I assumptions on 1945-1947 vegetation concentrations

- determine sensitivity of dose calculations to accuracy and precision in historical radionuclide measurements in fish and water
- determine necessary extent of terrestrial media data base
- determine the suitability of "green run" air data for use in later phases.



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:

- conducted field tests with the Kalispel Tribe to determine methodology to use in gathering food consumption data
- met with Yakima Nation council to finalize HEDR contract negotiations
- sent a request for proposal for Work Order No. 1 (developing a Work Plan) to Yakima Nation
- developed draft "protocol" to gather food consumption information.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None .

PLANNED WORK FOR SUBSEQUENT MONTHS

- circulate draft "protocol" to TSP Demography Subcommittee members for comments and approval
- contact all focus group members to determine whether they want a copy of the audience analysis report, part of which summarizes focus group comments
- continue to work with the TSP Communications Subcommittee to plan for the release of Phase I preliminary dose estimates
- continue planning Phase II activities with the TSP.

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:

- calculated the dose estimates for the atmospheric pathways. The estimates are now undergoing review and minor modifications. We are preparing summaries of the 186,000 calculated distributions for presentation in the Phase I report

- completed nearly all the implementation of the surface-water portion of the Phase I HEDR model. All necessary input data are in place. A selection of cases to be analyzed has been developed. Upon completion of final acceptance testing, the Phase I results will be prepared in early June

- completed installation of the project's Geographic Information System computers and software. Prepared a first digital map of the HEDR census subdivisions for testing. Postponed formal training for the initial group of users until next fiscal year. Acquired training video tapes for prior familiarization

- received information from Hanford records on whole-body counts made from the late 1950s to the present for Hanford workers. Data is available on body burdens of zinc-65, cesium-137, sodium-24, and phosphorus-32 for many residents of the areas. Over 40,000 individual records are available for this period. A trending analysis is being made of background exposures over a long period of interest for inclusion in the Phase I report on the river pathway.

- rescheduled Milestone 07-C, *Radionuclide Transfer Factors*, due originally January 1990, for completion in June 1990.

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:

  07-C *Radionuclide Transfer Factors*

- complete the preliminary code implementation

- provide preliminary dose estimates

- incorporate TSP comments in several draft HEDR reports.

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

- perform sensitivity analysis calculations

- evaluate sensitivity of dose estimates to changes in model structure

- evaluate the need for age-dependent dose factors

- evaluate the need for a generalized uncertainty expression.

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:

- delivered to the TSP copies of the remainder of the bibliographic database of currently classified Hanford Site-originated documents created during the years 1944-1960. The database currently holds nearly 11,000 records
- added new citations to the tracking system that now numbers nearly 3,500
- discussed with a representative of General Electric Co., San Jose, a feasible procedure for reviewing about 30 boxes of Hanford Site-originated documents that may be of potential interest/use to the HEDR Project
- received informal notification from the DOE-Headquarters Office of Classification and Technology Policy that the requirement for a two-person review for declassification will probably not be implemented in calendar year 1990
- provided the DOE-RL Public Reading Room with 107 documents of potential interest/use in the HEDR Project. A title listing of these reports is attached in Appendix A
- filled information requests from the TSP and HEDR task members.

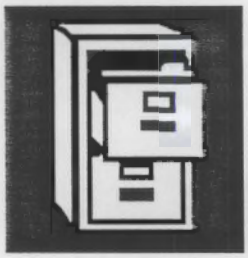
MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Planned work for subsequent months includes the following:

- make necessary arrangements to determine the existence or non-existence of Hanford Site-originated documents that were transferred to the corporate headquarters of du Pont and General Electric during the years 1944 through 1964
- continue to add input to the information resources tracking data base
- continue to provide documents to the DOE-RL Public Reading Room in an orderly, timely fashion
- develop a list of Hanford-originated raw data logs/notes of potential interest/use to the HEDR Project
- continue to identify and collect significant documents that address silver reactor capabilities, performance, and incidents
- watch for information that may explain in detail, and support data in, "green run" document HW-17381 DEL
- identify significant documents that address fuel element failures that occurred in now decommissioned Hanford Production Reactors
- continue to identify and collect documents and/or data of potential interest/use to the HEDR Project that address activities during the years from reactor startup through 1949.



Records Management

OBJECTIVE

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

PROGRESS

Activities for this reporting period included the following:

- received and processed project records
- transferred three record packages to the DOE-RL Public Reading Room.

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.

Quality Assurance

OBJECTIVE

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

PROGRESS

Activities for this reporting period included the following:

- continued working on expanding existing QA plan to include project-specific data quality objectives that will be included as part of Phase II planning
- continued providing QA program implementation guidance to project staff in areas of computer software modeling, databases and internal/external reviews of Phase I results.

MAJOR PROBLEM AREAS AND ACTIONS TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- review Phase I report for adequate data traceability and to ensure that to the extent feasible, relevant QA/Quality Control data, assumptions, or value judgements are included
- issue remaining HEDR procedures: HEDR-TP-3, "HEDR Documentation of Critical Decisions" and "HEDR-TP-4, "HEDR Data Quality Objectives"

- develop guidelines that set forth the minimum contents of the Phase II QA plan.

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:

- maintained day-to-day contact with staff programming the computer code for estimating doses in Phase I to resolve statistical questions and problems as they arose

- worked closely with Task 12 (Project Technical Coordination) and Task 7 (Environmental Pathways and Dose Estimates) to develop statistical procedures for combining estimated doses in suitable ways for presentation in the Phase I reports. Methods were developed for 1) combining monthly dose distributions into annual dose distributions, 2) forming summary distributions of dose across various categories such as age groups and census divisions, and 3) graphically displaying the several thousand dose distributions that will appear in the Phase I report

- prepared computer files of the Columbia River fish concentrations that will be used in estimating doses from the river pathway in Phase I. Developed methods for developing parameterizations of the data suitable for use in the river pathway computer dose code

- developed computer files and data summaries of the Geiger counter in situ counts of the thyroids of Hanford workers in 1944-46 for use in the Phase I reports

- continued a computer study to quantify the effects of the modular construction of the Phase I Monte Carlo air-pathway dose model on the distributions of dose estimates. This study will provide information needed to interpret the results of the Phase I preliminary estimates of dose and dose uncertainties that will be obtained using the modular computer code. Preliminary results on this computer study were given in the April 1990 monthly report

- received and addressed review comments on a paper presented at the Workshop of Statistics of Human Exposure to Ionizing Radiation on April 2-4, 1990, Oxford, United Kingdom called "Statistical Aspects of Reconstructing the 131-Iodine Dose to the Thyroid of Individuals Living Near the Hanford Site in the Mid-1940s." The paper will be published in the journal Radiation Protection Dosimetry

- began to plan the invited paper "Statistical Aspects of the Hanford Environmental Dose Reconstruction Project," to be presented at the American Statistical Association Conference on Radiation and Health, Copper Mountain, Colorado, July 8-12, 1990. The paper will be published in an addendum to Radiation Research

- developed updated proposed work tasks for the remainder of Phase I and for Phase II.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- prepare dose distributions for proper display and summarization in the Phase I report

- prepare with a TSP member a joint presentation to be given at the July TSP meeting on the computer study conducted to evaluate the modular structure of the Phase I Monte Carlo dose code

- work with a TSP member to finalize work activities for Phase II

- conduct statistical analyses and summarizations of whole-body-counter data on schoolchildren and adults in the Richland-Pasco-Kennewick area that were obtained in the 1960s to help validate the HEDR dose model. Similar analyses and summarizations will be done for gross-beta thyroid counts of Hanford workers in the mid-1940s

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

- document multiplicative lognormal code development to date.

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:

- participated in a PNL-wide review of the Laboratory's computer program QA system
- prepared a presentation for the "Public Health Aspects of Hanford Health Studies" workshop scheduled for June 6
- corresponded extensively with a TSP member on data and assumptions to allow independent verification of HEDR results with non-project computer models (e.g. AIRDOS-EPA, GENII).

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for the subsequent months includes the following:

- continue defining the overall structure of the needed HEDR database and the type of data needed for smooth project integration
- 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 obtain independent estimates of certain doses.

APPENDIX A

List of Hanford-Originated Documents of Potential Interest/Use to the HEDR Project Placed in the DOE-RL Public Reading Room in May 1990

HANFORD SITE ORIGINATED DOCUMENTS OF
POTENTIAL INTEREST/USE TO THE HEDR PROJECT -
PLACED IN THE DOE/RL PUBLIC READING ROOM
DURING THE MONTH OF MAY, 1990

BNWL-CC-1386	Radiation Survey of Islands & Beaches on the Columbia River between Hanford & the 300 Area. 6 p.	3/15/66
BNWL-CC-1411	Impact of Proposed Washington State Water Quality Standards on Hanford. 12 p.	11/3/67
BNWL-CC-1436	Report to the Working Committee for Columbia River Studies on Progress since August, 1964 for Projects Carried out by Battelle-Northwest. 14 p.	11/29/67
BNWL-CC-1992	Columbia River Studies July-December 1968. 10 p.	1/13/69
BNWL-CC-2253	Operating Instructions for the Gross Gamma & Iodine Monitors at the Automatic Columbia River Monitoring Station. 21 p.	8/13/69
* DUH-160	Time Interval between Discharge of Metal from the Pile & Processing in Canyon. 5 p.	1/20/44
* HW-3-814	Monthly Reports of 200 Areas Technical Group for September 1944 thru February 1946. 134 p.	10/4/44
HW-3-1168	Neutron Flux Map. 4 p.	12/5/44
HW-3-1258	Initial Charging Pattern for 105-D Unit. 5 p.	12/6/44
* HW-3-1369	Plant Performance Data Report for Week Ending January 3, 1945. 8 p.	1/6/45
HW-3-1943	Fission Product & Product Contamination in Separations Process Cells & Ventilation System. 6 p.	3/14/45
HW-3-2257	Exposure History of Discharged Metal. 2 p.	4/12/45
HW-3-2400	Investigation of High Exit Water Activity - 100 F. 2 p.	5/14/45
HW-3-2643	100-D Unit Purge of June 4, 1945. 3 p.	6/4/45

* Declassified by new directive

HW-3-2719	100-D Unit Purge of June 20, 1945. 2 p.	6/20/45
HW-3-2985	Activity of Pile Discharge Water (Retention Basin Performance). 8 p.	6/25/45
* HW-3-3287	Slug Sorting, Efficiency of Segregation of October 25 Push at 100-D Area. 13 p.	12/5/45
* HW-7-1538	Processing History on Production Batches. 4 p.	4/12/45
* HW-7-1672	Processing History on Production Batches. 5 p.	5/24/45
HW-7-2226	100-D Unit Purge of August 5, 1945. 3 p.	8/5/45
* HW-7-2409	Exposure History of Discharged Metal. 10 p.	9/18/45
* HW-7-2412	Reuse of Depleted Metal in 1500 & 2400 Tube Piles. 10 p.	9/7/45
* HW-7-2441	Slug Sorting by Radiation Measurements. 9 p.	9/24/45
HW-10941	Further Comments on Report ARSC-8 Ref: PSP:AA. 2 p.	9/7/48
HW-11380	High Effluent Activity at 100-B. 5 p.	10/29/48
HW-12335	Effluent Water Activity at 400 MW. 2 p.	2/2/49
HW-12492	Process Water Specifications. 3 p.	12/1/48
HW-12632	Minutes of Meeting to Study Pile Effluent Water Activity, March 1, 1949. 3 p.	3/4/49
* HW-13422	100 Areas Technical Activities Report - Physics April, 1949. 10 p.	5/16/49
HW-14792	Iodine Removal Facilities for Dissolver Off-Gas (200 East & West Areas). 11 p.	3/9/50
HW-15200 (TID-274-5)	Decontamination of the Stack Gases at Hanford Works. 8 p.	11/23/49
HW-16047	Effect of Temperature on the Reactivity Absorbed by Xenon. 6 p.	2/16/50
* HW-17476	100 Areas Technical Activities Report - Physics March, 1950. 7 p.	4/10/50
* HW-19709	A Survey of Process Water Quality. 12 p.	12/18/50
HW-19745	Progress Report for October 1950, Process Section, Separation Technology Department. 28 p.	12/20/50

* Declassified by new directive

	HW-20017	The Detection of Slug Failure by Monitoring the Activity of the Discharge Water. 8 p.	1/17/51
	HW-20019	Algae Filter Development. 5 p.	1/25/51
	HW-21709	Relation of Radioactivity in 100-D Retention Basin to Water Treatment Variables. 3 p.	7/13/51
	HW-22344	Compilation of Data on 51 Ruptured Slugs. 7 p.	10/4/51
	HW-22824	Investigation of 100 Areas Storage & Transportation of Irradiated Uranium. 5 p.	11/13/51
	HW-23163	The Use of Aluminum Sulfate for 100 Areas's Process Water Coagulation. 19 p.	1/4/52
	HW-23919	Technical Activities Report: Water Studies. 38 p.	4/1/52
	HW-24577	Limits - Cooling Water Contamination. 10 p.	5/27/52
*	HW-24791	Temperature Distribution in a Slug. 21 p.	6/24/52
*	HW-25076	Calculation of Xenon in a Hanford Pile. 17 p.	8/11/52
	HW-28509	The Activity of Xenon-131 & Xenon-133 at the Time of Dissolving at the Separation Plant. 6 p.	6/25/53
	HW-28729	Xenon Poisoning Calculations Based on Tube Power. 8 p.	7/15/53
	HW-29215	An Analytical Method for P-32 in Reactor Effluent. 11 p.	9/4/53
	HW-29698	Natural Atmospheric Particulate Background at the Hanford Works. 13 p.	12/19/50
	HW-30618	A New Constant Monitor for Ruthenium & Iodine in Stack Gases. 4 p.	1/22/54
	HW-30935	Facilities Required for Correction of Ammonium Nitrate Emission Problem at REDOX. 18 p.	3/17/54
*	HW-31848	Slug and Tube Factors. 19 p.	5/13/54
	HW-33723	Determination of Mn-56 in Reactor Effluent Water. 11 p.	11/9/54
	HW-34163	REDOX E-Cell Ozonization. 21 p.	12/20/54
*	HW-34338	Localized Fuel Element Failure Incident at the 100-H Reactor. 10 p.	1/11/55

* Declassified by new directive

* HW-35221	1954 Slug Rupture Experience at Hanford. 41 p.	3/30/55
* HW-38439	REDOX Iodine & Nitric Acid Absorbers. 25 p.	8/2/55
HW-38573	An Anion Exchange-Precipitation Procedure for the Determination of Na-24 in Reactor Effluent Water. 12 p.	8/10/55
* HW-42446	Useful Formulas and References for Process Technology Unit Engineers. 6 p.	4/9/56
* HW-44260	Slug Rupture Experience at Hanford - April through September 1955. 15 p.	7/11/56
HW-45070	Water Treatment History at Hanford Reactors thru August 20, 1956. 6 p.	8/21/56
HW-46120-RD	Gamma Monitor. 11 p.	10/18/56
HW-46447	Raising K Reactor Power Levels: Ruptured Slug Aspects. 6 p.	11/5/56
HW-50138	Radioactive Gases Originating in Reactor Process Tubes. 6 p.	4/23/57
HW-53501	Calculated Effect of M-388 Alloy Jacketed Slugs on Reactor Effluent Water Activity. 5 p.	11/6/57
HW-57004	Composited 107 Retention Basin Outlet Samples. 4 p.	6/4/57
HW-57208-RD	Design & Operating Considerations for Off-Gas Systems in Nuclear Processing Plants. 36 p.	8/29/58
HW-60057	Radioisotope Proportional Beta Counter Factors. 41 p.	4/30/59
HW-60154	The Chemical Form of Phosphorus-32 in Hanford Reactor Effluent Water. 18 p.	4/24/59
HW-60529	Direct Disposal of Reactor Effluent. 11 p.	5/27/59
HW-63910	Measurements of Eu-152 and Tb-160 in Reactor Effluent Water. 5 p.	2/15/60
HW-64961	Radioisotope Concentrations in the Effluent Water from a Zircaloy-2 Process Tube. 4 p.	5/2/60
HW-65414	Methods for Reducing Reactor Effluent Radioisotope Release. 12 p.	5/27/60
HW-66015	Rare Earth Analysis on a Composite Reactor Effluent Water Sample. 7 p.	6/17/60
HW-66736	Use of High Alum Feed for Water Treatment. 5 p.	9/8/60

* Declassified by new directive

HW-67245-REV	Hanford Whole Body Counter Results for 1960. 28 p.	4/30/61
HW-68521	Reactor Effluent Activity Reduction: Process Water Treatment Tests, Part 1 - Radiological Effects. 21 p.	2/15/61
HW-74075-RD	C-14 in Reactor Effluents. 14 p.	6/20/62
HW-80216	Hanford Mobile Whole Body Counter. 14 p.	12/31/63
HW-80557	Reduction of Radionuclides in Reactor Effluent Water: Final Report on the Effect of Chemical Additives & Coating Materials on the Adsorption of Radionuclide Parent Elements in Process Water on Aluminum Surfaces. 16 p.	12/23/63
HW-84182	The Effect of Coolant pH on Phosphorus-32 Concentration in Small Reactor Effluent. 8 p.	9/22/64
HW-89072	Stack Gas Disposal Extracts: March 1947 - January 1952. 60 p.	10/31/89
HW-SA-2197	Quantitative Measurements of Some Gamma-Ray Emitting Radionuclides in Nuclear Industrial Workers by Whole Body Counting Techniques. 11 p.	6/1/61
HW-SA-2475	Factors Establishing Limits for Release of Effluents from the Plutonium Recycle Test Reactor. 31 p.	3/6/62
HW-SA-3559	The Hanford Mobile Whole Body Counter. 9 p.	6/1/64
* OUT-1642	Shipment Histories. 4 p.	4/23/45
* OUT-1651	Shipment Histories. 2 p.	4/24/45
PNL-5649	A Comparison of Uncertainty Analysis Methods Using a Groundwater Flow Model. 72 p.	6/30/88
PNL-6584 Vol. 3	GENII (Generation II): The Hanford Environmental Radiation Dosimetry Software System: Volume 3: Code Maintenance Manual. 1223 p.	9/30/88
PNL-SA-17384	Statistical Aspects of Reconstructioning the I-131 Dose to the Thyroid of Individuals Living Near the Hanford Site in the Mid-1940's. 10 p.	4/30/90

* Declassified by new directive

DUN-772	Contamination Control - Columbia River - February, 1966. 16 p.	2/28/66
DUN-914	Contamination Control - Columbia River - March, 1966. 15 p.	4/1/66
DUN-1381	Contamination Control - Columbia River - July, 1966. 14 p.	8/8/66
DUN-1585	Contamination Control - Columbia River - August, 1966. 12 p.	9/30/66
DUN-1631	Contamination Control - Columbia River - September, 1966. 13 p.	10/20/66
DUN-1729	Contamination Control - Columbia River - October, 1966. 13 p.	11/21/66
DUN-1854	Contamination Control - Columbia River - November, 1966. 14 p.	12/15/66
DUN-1906	Contamination Control - Columbia River - December, 1966. 14 p.	1/11/67
DUN-2029	Contamination Control - Columbia River - January, 1967. 14 p.	2/1/67
DUN-2231	Alternate Methods of Reactor Effluent Treatment and Disposal. 36 p.	3/22/67
DUN-2243	Contamination Control - Columbia River - February, 1967. 14 p.	3/24/67
DUN-2361	Contamination Control - Columbia River - March, 1967. 16 p.	4/19/67
DUN-2498	Contamination Control - Columbia River - April, 1967. 15 p.	5/22/67
DUN-2942	Contamination Control - Columbia River - April-June 1967. 18 p.	8/7/67
DUN-3366	Contamination Control - Columbia River - July-September 1967. 18 p.	11/15/67
DUN-3935	Contamination Control - Columbia River - October-December 1967. 16 p.	3/11/68
DUN-4477	Contamination Control - Columbia River - January-March 1968. 15 p.	7/22/68

APPENDIX B

HEDR Publications - to Date

HEDR PUBLICATIONS - TO DATE

Title	Author	Date Cleared	Clearance No.	Additional Information	Status
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
Work Plan for the Hanford Environmental Dose Reconstruction Project	Haerer, HA	12/89	PNL-6696 HEDR REV 1		TSP approved; published 12/89
Proposed Approach for Developing Information on Population Food Consumption and Lifestyles of Native Americans in the HEDR Study Area	Rhoads, RE, and Bruneau, CL	1/89	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	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
Demographic, Agricultural, Food Consumption, and Lifestyle Research for the Hanford Environmental Dose Reconstruction Project	Beck, DM, et al.	2/89	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
A History of Major Hanford Operations Involving Radioactive Material	Ballinger, MY, and Hall, RA	6/89	PNL-6964 HEDR		TSP reviewed; PNL addressing comments
Summary of Workshop on Milk Production and Distribution, November 30, 1988 - HEDR Project	Beck, OM, et al.	7/89	PNL-6975 HEDR		To TSP 8/89
Feasibility of Using ^{129}I Concentrations in Human Tissue to Estimate Radiation Dose From ^{131}I	McCormack, WD	4/89	PNL-6889 HEDR		TSP approved 9/89; published 1989
Hanford Environmental Dose Reconstruction	Bruneau, CL	1/89	PNWD-1323 HEDR	Informational brochure used in PNL's work with Tribes	TSP approval not required

HEDR PUBLICATIONS - TO DATE

Title	Author	Date Cleared	Clearance No.	Additional Information	Status
Radionuclide Sources and Radioactive Decay Figures Pertinent to the HEDR Project	Heeb, CM	10/89	PNL-7177 HEDR		PNL addressing TSP comments
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
Preliminary Summaries for Vegetation, River and Drinking Water and Fish Radionuclide Concentration Oata (DRAFT)	Woodruff, RK	11/89	PNL-SA-17641 HEDR		To TSP for review 12/89
Atmospheric Transport Modeling and Input Data for Phase I of the Hanford Environmental Dose Reconstruction Project	Ramsdell, JV, and 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

HEDR PUBLICATIONS - TO DATE

Title	Author	Date Cleared	Clearance No.	Additional Information	Status
Estimates of Columbia River Radionuclide Concentrations: Data for Phase I Dose Calculations	Richmond, Walters	1/90	PNL-7248 HEDR		PNL addressing TSP comments
Evaluation of Thyroid Radioactivity Measurement Data From Hanford Workers, 1944-1946	Ikenberry, T	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
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
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
Estimations of Traditional Native American Diets in the Columbia Plateau	Hunn, E. S. and Bruneau, C. L.	8/89	PNL-SA-17296		
A Preliminary Examination of Audience-Related Communications Issues: Hanford Environmental Dose Reconstruction Project	Holmes, C. W.	4/90	PNL-7321 HEDR		PNL addressing TSP comments
MESOILT2, A Lagrangian Trajectory Climatological Dispersion Model	Ramsdell, J. V.	4/90	PNL-7340 HEDR		PNL addressing TSP comments

APPENDIX C

HEDR Presentation Handouts to the TSP - To Date

HEDR PRESENTATION HANDOUTS TO THE TSP - TO DATE

Title	Author	Date Cleared	Clearance No.	Additional Information
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, J. V.	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
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	PNL-SA-16794 HEDR	Presented at the TSP meeting, March 17, 1989, Spokane, WA
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
Methods for Presenting the Results to the Public	Rhoads, RE	8/89	PNL-SA-17368 HEDR	Presented at the TSP meeting, September 6, 1989, Portland, OR
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 and Poston, TM	10/89	PNL-SA-17502 S HEDR	Presented at the TSP meeting, October 12-14, 1989, Portland, OR
Hanford Environmental Dose Reconstruction Project	Haerer, HA	12/89	PNL-SA- 17661S HEDR	Presented at the TSP mtg, December 11-13, 1989, Richland, 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 PRESENTATION HANDOUTS TO THE TSP - TO DATE

Title	Author	Date Cleared	Clearance No.	Additional Information
Estimated Quantity of 131I Contained in Irradiated Fuel at Time of Fuel Processing, CY 1944-1945	Jackson, P. O. and Morgan, L. O.	11/88	PNL-SA-16398 HEDR	Presented at the TSP mtg, November 11-12, 1988, Olympia, WA
Communications Directive	Rhoads, RE	12/89	PNL-SA-17653 S HEDR	Presented at the TSP mtg, December 11-13, 1989, Richland, WA
Preliminary Evaluation of Thyroid Bioassay Data From Hanford Workers, 1944-1946	Ikenberry, T. and Napier, BA	12/89	PNL-SA-17670 S HEDR	Presented at the TSP mtg, December 11-13, 1989, Richland, WA
Overview of Project Model - Air Pathway	Napier, BA	12/89	PNL-SA-17673 HEDR	Presented at the TSP mtg, December 11-13, 1989, Richland, WA
Source Terms - Air Pathway Source Terms - Surface-Water Pathway	Morgan, LG	12/89	PNL-SA-17657 HEDR	Presented at the TSP mtg, December 11-13, 1989, Richland, WA
Atmospheric Transport Model	Freshley, MD	12/89	PNL-SA-17662 S HEDR	Presented at the TSP mtg, December 11-13, 1989, Richland, WA
Environmental Monitoring Data: Vegetation, 1945-1947	Woodruff, RK	12/89	PNL-SA-17671 HEDR	Presented at the TSP mtg, December 11-13, 1989, Richland, WA
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-17659 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
HEDR Demography, Agriculture, and Lifestyle Research	Beck, D. M.	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	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 Cleared	Clearance No.	Additional Information
Environmental Measurements - Columbia River	Poston, TM, and 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
Detailed Example Calculations for HEDR, Phase I	Napier, BA	2/90	PNL-SA-17913 HEDR	Presented at the TSP mtg, Feb 15-17, 1990, Richland, WA
Communications Directive	Rhoads, RE	2/90	PNL-SA-17903 S HEDR	Presented at the TSP mtg, Feb 15-17, 1990, Richland, WA
HEDR Project Report to the TSP	Haerer, HA	2/90	PNL-SA-17904S HEDR	Presented at the TSP mtg, Feb 15-17, 1990, Richland, WA
Source Terms	Morgan, L. G.	1/89	PNL-SA-16566 HEDR	Presented at the HEDR Workshop on Sensitivity and Uncertainty Analysis, January 16-18, 1989, Pasco, WA
Experience with Gress and Swats	Piepho, M. G.	1/89	PNL-SA-16567 HEDR	Presented at the HEDR Workshop on Sensitivity and Uncertainty Analysis, Janaury 16-18, 1989, Pasco, WA
HEDR Project Report to the TSP	Haerer, H. A.	10/89	PNL-SA-17501 HEDR	Presented at the TSP mtg, Oct 12-14, 1989, Portland, OR
HEDR Project - Report to the TSP July 21, 1989	Haerer, H. A.	7/89	PNL-SA-17218 HEDR	Presented at the TSP mtg, July 21, 1989, Richland, WA
HEDR Project Report to the TSP for May 1989 Public Mtg	Haerer, H. A.	5/89	PNL-SA-17032 HEDR	Presented at the TSP mtg, May 18-20, 1989, Toppenish, 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
Radionuclides Transported by the Columbia River	Freshley, M. D.	7/89	PNL-SA-17235 HEDR	Presented at the TSP mtg, July 21, 1989, Richland, WA
Example of Sensitivity/Uncertainty Analysis	Strenge, D. L.	1/89	PNL-SA-16570 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	PNL Clear. Date	Clearance No.	Additional Information
Hanford Environmental Dose Reconstruction Project - Phase I Report	Haerer, HA	5/90	PNL-18304 S HEDR	Presented at the workshop, "Public Health Aspects of Hanford Health Studies, A Workshop for State, Local, and Tribal Health Officials," June 6, 1990.

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.

HEDR-RELATED PUBLICATIONS

Title	Author	PNL Clear. Date	Clearance No.	Audience	Status
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
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
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
Temporal Variations in Atmospheric Dispersion at Hanford	Ramsdell, JV	9/89	PNL-SA-17375 HEDR	Hanford Symposium on Health & the Environment, Oct 16-19,1989 Richland, WA	Presented 10/89
The Hanford Environmental Dose Reconstruction Project: Overview	Haerer, H A et al.	9/89	PNL-SA-16859 HEDR	Hanford Symposium on Health & 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 & the Environment, Oct 16-19,1989 Richland, WA	Presented 10/89
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
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

HEDR-RELATED PUBLICATIONS

Title	Author	Date Cleared	Clearance No.	Audience	Status
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
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	PNL-SA-17384	Workshop: Statistics of Human Radiation Exposure to Ionizing Radiation, April 2-4, 1990, Oxford, UK	Presented 4/90
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,Anahiem, 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, and Bruneau, CL			Journal of Rural Sociology	Planning for 1990
Fish Concentration Ratios	Poston, TM			Journal (not yet determined)	Planning for 1990
Uncertainty Analysis of the Conversion Factor for Historic Iodine-131 Gross Beta Vegetation Measurements	Strenge, DL, et al.	12/89	PNL-SA-17713 HEDR	To be presented at the Health Physics Soc. Mtg, June 24-28, 1990, Anahein, CA	To be presented 6/90

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

HEDR-RELATED PUBLICATIONS

Title	Author	Date Cleared	Clearance No.	Audience	Status
Biases in Measurements of I-131 in Vegetation Sampled from 1945 through 1947 and Reconstructed Conversion Factors	Mart, El and Woodruff, RK	1/90	PNL-SA-17761 A HEDR	Abstract for Health Physics Society Meeting , 1990	Abstract submitted to Society
Reconstruction of Hanford Vegetation Monitoring Data for Dose Reconstruction for 1945-1947	Woodruff, Mart and Hanf	1/90	PNL-SA-17760 A HEDR	Abstract for Health Physics Society Meeting, 1990	Abstract submitted to Society
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
Statistical Aspects of the Hanford Environmental Dose Reconstruction Project	Gilbert, RO et al.			American Statistical Association Conference on Radiation and Health, July 8-12, 1990, Copper Mountain, CO	To be presented 7/90

APPENDIX E

Communications Log

COMMUNICATIONS LOG - April 1990

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
TSP/J. Stohr	Sue Finch	PNL	Telephone	Ongoing discussions re: meeting planning
TSP/M. L. Blazek	Sue Finch	PNL	Telephone	Briefing Papers 1 & 2, Glossary
TSP/B. Shleien	Sue Finch	PNL	Telephone	HEDR costs
TSP/N. Germond	Shirley Gydesen	PNL	Telephone	Documents requiring declassification
PNL/S. Gydesen	Harry Burgess	General Electric Co.	Telephone	Hanford Site originated documents
TSP/B. Shleien	Donna Schneider	PNL	Telephone	Request to talk to Larry Morgan
TSP/B. Shleien	Larry Morgan	PNL	Telephone	I-131 & I-129 monthly source terms for 1944-47
PNL/L. Morgan	Bernard Shleien	TSP, Executive Secretary	Telephone	I-131 & I-129 monthly source terms for 1944-47
TSP/M. Robkin	Larry Morgan	PNL	Telephone	Scheduled visits to Richland in June
Public/Bob Cook	Bruce Napier	PNL	Telephone	Ratios of I-127/I-129 in the environment
TSP/M. Robkin	Bruce Napier	PNL	Telephone	Contact with an "alfalfa shipper"
TSP/B. Shleien	Bruce Napier	PNL	Telephone	Continuing discussions regarding dose verification
PNL/D. Beck & C. Bruneau	Michael Cardwell	Kalispel Tribe	Telephone	HEDR interviewing guide
PNL/J. Briggs & C. Bruneau	Jack Fiander & Elmer Ward	Yakima Nation	Meeting	HEDR contract
PNL/C. Bruneau	Michael Cardwell	Kalispel Tribe	Telephone	HEDR diet interview

INITIATED BY	CONTACT	AFFILIATION	TYPE	SUBJECT
Spokane Tribe/ David Ernst	Carol Bruneau	PNL	Telephone	Update on HEDR status
PNL/C. Bruneau	Madeline Queahpama	Warm Springs Tribe	Telephone	HEDR contract
PNL/C. Bruneau	Dick Morrill	TSP	Telephone	Comments from tribes
PNL/C. Bruneau	Allen Slickpoo	TSP	Telephone	Communication with Nez Perce Tribe
Yakima Nation/ Delano Saluskin	Carol Bruneau	PNL	Telephone	HEDR contract
Umatilla Tribe/ Donna Powaukee	Carol Bruneau	PNL	Telephone	HEDR work plan
Colville Tribe/ Cara Carroll	Carol Bruneau	PNL	Telephone	Change in scope of work
Colville Tribe/ Cara Carroll	Carol Bruneau	PNL	Telephone	HEDR work plan
Kalispel Tribe/ Michael Cardwell	Carol Bruneau	PNL	Telephone	Report to PNL
PNL/S. Grover	Jack Clark	City of Kennewick, Water Dept.	Telephone	Water supply of Kennewick, 1964-66
TSP/K. Niles	Andrea McMakin	PNL	FAX	TSP staff comments on HEDR materials
PNL/A. McMakin	Mary Lou Blazek	TSP	Telephone	Communication planning
PNL/A. McMakin	Joe Stohr	TSP Staff	Telephone	Printing schedules

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