Hanford Environmental Dose Reconstruction Project

Monthly Technical Report

June 1988

Prepared for the Technical Steering Panel

Work Supported by
the U.S. Department of Energy
under Contract DE-AC06-76RLO 1830

Pacific Northwest Laboratory
Operated for the U.S. Department of Energy
by Battelle Memorial Institute

Battelle
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Pacific Northwest Laboratory
Richland, Washington 99352
HANFORD ENVIRONMENTAL DOSE RECONSTRUCTION PROJECT

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PREFACE

This monthly report summarizes the technical progress and project status for the Hanford Environmental Dose Reconstruction (HEDR) Project being conducted at 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 Department of Energy (DOE) funds the project. The organization for the project is outlined below.

**Diagram:**
- Department of Energy
- Technical Steering Panel
- PNL Office of Hanford Environment
- Hanford Environmental Dose Reconstruction Project
- Pacific Northwest Laboratory
- PNL
- OTHERS

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**HANFORD ENVIRONMENTAL DOSE RECONSTRUCTION PROJECT
ORGANIZATIONAL STRUCTURE**
OBJECTIVE

The objective of the Hanford Environmental Dose Reconstruction (HEDR) Project is to develop estimates of potential radiation doses that the public could have received from radioactive materials released from Hanford operations beginning in 1944.

PROGRESS

This summary report covers progress for the month of June 1988, which includes the following:

- added a new Statistics Task
- reorganized Task 04 (Environmental Transport) and Task 07 (Environmental Pathways and Dosimetry) so that Task 04 deals with the physical transport mechanisms of wind and water, and Task 07 deals with the pathways to humans (e.g., grass-cow-milk pathway) and with dosimetry
- briefed the new task leader for Task 03 (Source Terms)
- prepared for the second meeting of the TSP
- continued literature review of surface-water data
- summarized sampling, counting, and analysis methods used for determining iodine-131 concentrations on vegetation
- obtained a complete list of the data at the Coordination and Information Center of the Offsite Radiation Exposure Review Project (Las Vegas, Nevada), and copied and reviewed selected documents
- collected data on the domestic and agricultural use of Columbia River water
- met with a survey design specialist to discuss survey options for gathering agricultural and consumption data
- completed a preliminary calculation of the iodine-131 content of the first fuel batches dissolved in the Hanford separations plants.
MAJOR ISSUES AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

• continue preparations for the second meeting of the TSP, which is scheduled for July 25, 26, and 27

• revise the work plan based on the TSP's review and comments

• continue to survey documents and information on facility operations and emission data

• continue modifying the project influence diagram

• document the milk production and distribution information for the seven-county area surrounding Hanford.
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**TASK 03  SOURCE TERMS**

**OBJECTIVE**

The objective of this task is to develop quantitative estimates of all significant emissions of radionuclides from Hanford operations during the period 1944 to the present.

**PROGRESS**

A new task leader was appointed during this reporting period.

A preliminary calculation of the iodine-131 content of the first fuel batches dissolved in the Hanford separations plants has been completed, and documentation of the calculations is in progress.

Records and documents continue to be added to the database.

Scheduling work was initiated to determine critical interfaces with other tasks and establish preliminary starting and ending dates for various task efforts.

**MAJOR PROBLEM AREAS AND ACTION TAKEN**

None.

**PLANNED WORK FOR SUBSEQUENT MONTHS**

Work planned for subsequent months includes the following:

- complete preliminary assessment of the calculations to more precisely define the fission product inventory of iodine-131 from the separations plants for 1945

- continue to survey documents and information on facility operations and emission data

- complete initial survey of computer codes to estimate the fission product inventory in irradiated fuel elements; initiate effort to define the uncertainty in the estimated inventory as a function of the fuel's location in production reactors

- initiate work to define problems in estimating the airborne releases from production reactors.
TASK 04 ENVIRONMENTAL TRANSPORT

OBJECTIVE

The objective of this task is to reconstruct the movements of radioactive materials from operating areas to potentially exposed populations via the atmosphere, surface water, and ground water.

PROGRESS

A mesoscale atmospheric transport model was applied to tracer experiments that were previously performed at the Hanford Site. The influence of large-scale atmospheric conditions on surface observations is being investigated. A mixed-layer model is being finalized for routine use in wind field prediction.

Work continued on the surface-water subtask literature review and accumulation of hydraulic, sediment, and radiological river data. A review of modeling options for the Columbia River continued.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

• continue preliminary data collection and evaluation for the atmospheric transport and surface-water transport subtasks

• provide input to the sensitivity/uncertainty analyses for the ground-water and surface-water pathways.

• continue modifying the project influence diagram.
TASK 05 ENVIRONMENTAL MONITORING

OBJECTIVE

The objectives of this task are to assemble, evaluate, and report historical environmental monitoring data and to use the data to estimate the contributions of Hanford operations to radionuclide concentrations in environmental media.

PROGRESS

The Coordination and Information Center of the Offsite Radiation Exposure Review Project (Las Vegas, Nevada) was visited to review information that may be of use to the HEDR project. A complete microfiche listing of the Center's holdings was obtained as well as results of computer searches for specific categories of information. Selected documents were reviewed and copies obtained.

Several former Hanford employees with knowledge of past emissions and environmental monitoring data responded to a request for possible assistance. These responses were reviewed and evaluated.

The sampling, counting, and analysis methods used for determining the concentrations of iodine-131 on vegetation were summarized from documents reviewed to date. This is a preliminary step in the attempt to determine sources of bias and uncertainty in the data.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Plans will be made for searching the Seattle Federal Records Center for applicable records.
OBJECTIVE

The objective of this task is to develop the population and agricultural data needed to estimate the population doses that may have resulted from releases of radioactive materials from Hanford operations.

PROGRESS

Progress for this month included the following:

• met with survey design specialist to discuss possible survey options for gathering agricultural and consumption data
• collected data from secondary sources to be used for population estimates
• continued the literature search on historical food consumption and agricultural practices
• began collecting data on the agricultural and domestic use of Columbia River water
• Planned visits to Indian reservations to discuss potential tribal participation in collecting demographic and food habits information
• developed a bibliography of consumption, production, and dairy information
• continued collecting agricultural production data.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

• write reports on the milk production and distribution of the seven-county area surrounding Hanford
• document options for gathering primary agricultural practices and food consumption data
• estimate populations of the seven-county region surrounding the Hanford area with the ratio correlation procedure and component method
• meet with tribal officials and technical staff to explain the HEDR project and discuss potential tribal participation in collecting information

• continue collecting, analyzing, and summarizing production and consumption data

• continue developing a documents database.
TASK 07  ENVIRONMENTAL PATHWAYS AND DOSIMETRY

OBJECTIVE

The objectives of this task are to use information developed by Tasks 03 through 06 to determine the concentrations of radionuclides in environmental media, and to use these data to estimate the potential exposures and resultant radiation doses to individuals and groups from past releases of radioactive materials from Hanford operations.

PROGRESS

This task was reorganized to incorporate some of the work formerly performed by Task 04. This work deals with the environmental pathways of exposure to humans. Examples of environmental pathways are the grass-cow-milk pathway or the sediment-benthos-pelagic fish pathway. The physical transport of materials by the surface water, atmosphere, and ground water will still be addressed by Task 04. Much of the project coordination work will continue to be associated with Task 07.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Presentations on model selection and preliminary uncertainty analyses will be made to the TSP at the second TSP meeting in July. If TSP approval is forthcoming, model selection tasks will begin. Coordination with the new Statistics Task will be arranged. A data coordination meeting with Task 06 is planned following the TSP presentations. Input to the Geographic Information System development group is being organized.
TASK 08 INFORMATION RESOURCES

OBJECTIVE

The objectives of this task are to meet HEDR project information needs and to develop and maintain a microcomputer-based tracking and retrieval system.

PROGRESS

Input to the Information Resources Tracking Database continued.

A software program has been written that provides for simple importing into AskSam from dBase III +. AskSam has retrieval capabilities that include truncation, boolean operators, and higher speed.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Input to the Information Resources Tracking Database will continue.

Work to locate documents containing information necessary to fill data gaps will continue.
TASK 09 RECORDS MANAGEMENT

OBJECTIVE

The objectives of this task are to 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 others.

PROGRESS

Project records continue to be processed.

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
- develop and issue procedures for duplication and transfer of completed project reports and supporting documents to the Public Reading Room at the Federal Office Building
- provide instruction to the Public Reading Room for filing records according to the Battelle Standard Filing System.
TASK 10 QUALITY ASSURANCE

OBJECTIVE

The objectives of this task are to ensure continuous quality assurance (QA) support and coordination with all project tasks. These objectives are 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

Work during June was limited. Upcoming task activities were reviewed so a surveillance plan could be drafted. This surveillance plan will help ensure control of activities.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Activities anticipated in upcoming months include:

• assist in implementation of QA program requirements

• perform surveillances of the Software Control to the Environmental Transport Codes and records control.