21

Hanford Environmental Dose Reconstruction Project

Monthly Technical Report

May 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**

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor Battelle Memorial Institute, nor any of their employees, makes any warranty, expressed or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof, or Battelle Memorial Institute. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof, or Battelle Memorial Institute.

PACIFIC NORTHWEST LABORATORY
operated by
BATTELLE MEMORIAL INSTITUTE
for the
UNITED STATES DEPARTMENT OF ENERGY
under Contract DE-AC06-76RLO 1830

Printed in the United States of America
Available from
National Technical Information Service
United States Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22161

NTIS Price Codes
Microfiche A01

Printed Copy

Pages	Price Codes
001-025	A02
026-050	A03
051-075	A04
076-100	A05
101-125	A06
126-150	A07
151-175	A08
176-200	A09
201-225	A010
226-250	A011
251-275	A012
276-300	A013

**HANFORD ENVIRONMENTAL DOSE
RECONSTRUCTION PROJECT**

Monthly Technical Report

May 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
Richland, Washington 99352**

HANFORD ENVIRONMENTAL DOSE RECONSTRUCTION PROJECT

Approved By:
H. A. Haerer, Project Manager
Hanford Environmental Dose Reconstruction Project

Approved By:
W. L. Templeton, Manager
Office of Hanford Environment

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 and represents the interests of the federal government and the public. The organization for the project is outlined below.

HANFORD ENVIRONMENTAL DOSE RECONSTRUCTION PROJECT ORGANIZATIONAL STRUCTURE

MANAGEMENT SUMMARY

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 May 1988, including the following:

- presented a project overview to the Technical Steering Panel (TSP) for review during the first meeting with the TSP on May 16 and 17 in Richland
- estimated the iodine-131 emissions from T Plant for the end of 1944 using the best available power level and cooling-time data
- attended a workshop with the Offsite Radiation Exposure Review Project and National Cancer Institute staff to discuss uncertainty and the handling of environmental data
- reviewed preliminary information describing the effects of nuclear testing fallout on monitoring measurements at Hanford
- continued developing crop production data for 1940 to 1974.

MAJOR ISSUES AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- prepare for the July meeting with the TSP
- receive and incorporate TSP comments on the draft work plan
- determine the uncertainties of estimating the fission product inventories in Hanford production reactors using the ORIGEN2 code

- perform a limited analysis of historical over-bank flooding, flow behavior, and sediment dispersion for the Hanford reach of the Columbia River
- continue compiling milk production and distribution data.

CONTENTS

PREFACE.....	iii
MANAGEMENT SUMMARY.....	v
TASK 03 SOURCE TERMS	3.1
TASK 04 ENVIRONMENTAL TRANSPORT	4.1
TASK 05 ENVIRONMENTAL MONITORING	5.1
TASK 06 DEMOGRAPHICS, AGRICULTURE, FOOD HABITS	6.1
TASK 07 DOSE ESTIMATES	7.1
TASK 08 INFORMATION RESOURCES	8.1
TASK 09 RECORDS MANAGEMENT	9.1
TASK 10 QUALITY ASSURANCE	10.1

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

Estimates of the iodine-131 emissions from T Plant for the end of 1944 based on the best available data of power level and cooling times indicate no significant difference from those given by Anderson (1974) using the same assumptions (80% of iodine-131 emitted during dissolution).

An inquiry into the Savannah River Plant SHIELD Fission Product Inventory Code indicates that it is not an improvement over the ORIGEN2 code for use by the project.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- assemble a chronology of unplanned releases from Hanford facilities
- assemble a chronology of effluent measurements for major facilities
- continue to survey documents and information on facility operations and emissions
- determine the uncertainties of estimating the fission product inventories in Hanford production reactors using the ORIGEN2 code.

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 workshop was attended in Las Vegas, Nevada with the staff of the Offsite Radiation Exposure Review Project and National Cancer Institute assessment teams working on the Nevada dose reconstruction to discuss uncertainty and the handling of environmental data.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- continue project sensitivity analyses
- continue identifying key parameters for the atmospheric transport model
- complete White Paper on the preliminary atmospheric transport model selection
- assemble hydrologic/hydraulic database
- perform a limited analysis of historical over-bank flooding, flow behavior, and sediment dispersion for the Hanford reach of the Columbia River
- investigate the availability of surface-water models
- continue gathering documents for the TSP.

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

A review of preliminary information describing the effects of nuclear testing fallout on monitoring measurements at Hanford was initiated.

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

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Plans will be made to incorporate the experience of former Hanford employees into this task and Task 03.

Options will be investigated for creating a database for historic environmental monitoring data.

TASK 06 DEMOGRAPHICS, AGRICULTURE, FOOD HABITS

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

A University of Washington anthropology professor met with task members to discuss Indian fishing along the Columbia River.

A written critique and suggestions about proposed population estimation techniques were received from a demographic consultant.

Initial findings on milk production and consumption from 1945 to 1950 for counties adjacent to the Hanford Site are being analyzed and summarized.

Crop production spreadsheets for 1940 to 1974 continued to be developed.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- submit proposed demographic methods to the TSP for review
- submit to internal review the methods for estimating the food production and consumption for Benton and Franklin counties
- continue compiling food and milk production/distribution data.

TASK 07 DOSE ESTIMATES

OBJECTIVE

The objective of this task is to use information developed by Tasks 03 through 06 to estimate potential radiation doses to populations from past releases of radioactive materials from Hanford operations.

PROGRESS

Work involved the evaluation of the original notebooks of field experiments conducted at Hanford. The notebooks included data from the early 1960s on the deposition of iodine-131 on vegetation and data from the early 1950s on the effects of reactor effluents on cereal crop plants.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- continue developing information on the historical iodine-131 milk pathways
- make initial evaluation of PATHWAYS and the Hanford environmental dosimetry codes in relation to their applicability to this study
- start developing an "accounting" system to be used for the types of doses (i.e., unspecified/typical individual, population, and specified individual) that are proposed to be estimated in this study.

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.

Several documents, already in the public domain, were provided to TSP members.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Input to the Information Resources Tracking Database will continue.

Preparations will be made in anticipation of the many questions the TSP will have that relate to Hanford Site records.

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 continued 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

Revision 1 of QA Plan OHE-3 was approved and issued in May. Changes to the QA Plan include the following:

- The Project Impact Level (IL) was changed from IL I to IL II.
- The independent technical review of deliverables such as letter, topical, and final reports is now performed at the direction of the Project Manager.
- The QA Plan is now updated to the latest MA-70 QA Plan format.

An Interim Change Notice (ICN) to procedure RMP-1, HEDR Records Control, was drafted in order to clarify protocols for records correction. This ICN was approved and distributed in May.

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 to the Software Control to the Environmental Transport Codes and records control.

3 3679 00057 2570

DISTRIBUTION(36) Pacific Northwest Laboratory

W. F. Bair K4-14
 W. W. Ballard K1-78
 W. E. Brooks K3-70
 D. S. Broussard K1-67
 D. B. Cearlock K1-42
 T. D. Chikalla K1-74
 T. T. Claudson K1-45
 R. Cuello P7-50
 G. H. Cunningham K1-59
 J. M. Davidson K1-66
 J. W. Falco K6-78
 M. D. Freshley K6-96
 R. O. Gilbert K6-45
 M. J. Graham K6-80
 S. P. Gydesen P8-55
 H. A. Haerer K5-17
 M. S. Hanson K1-51
 M. Hefty K5-06
 J. Johnson K3-53
 W. E. Kennedy K3-54
 R. C. Liikala K1-57
 L. G. Morgan K2-35
 B. A. Napier K3-54
 T. L. Page K5-16
 R. E. Rhoads K6-64
 J. T. A. Roberts K1-40
 R. G. Stevens K6-45
 J. A. Stottlemire K6-94
 W. L. Templeton K1-30
 A. R. Thies K6-03
 W. R. Wiley K1-46
 R. K. Woodruff K5-09
 Project Office Files K5-17
 Records Center K3-70
 Technical Library (2)

(5) DOE - Headquarters

Forrestal Bldg
 1000 Independence Ave
 Washington, DC 20585

Attn: L. Dever, EH-232 Room G-144
 A. Fingeret, GC-22 Room 6H-087
 J. Holl, MA-295 Room 7E-054
 C. Morris, DP-3 Room 4A-045
 J. Tseng, EH-20 Room 4A-045

(16) Technical Steering Panel

D. S. Barth	V. Nguyen
M. L. Blazek	W. Price
G. G. Caldwell	M. A. Robkin
S. N. Davis	G. S. Roessler
P. C. Klingeman	L. Seth
K. J. Kopecky	B. Shleien
R. L. Morrill	J. E. Till
A. H. Murphy	D. E. Walker

(13) DOE Richland Operations Office

J. H. Anttonen, AMR A5-10
 R. A. Holten, OPD A5-10
 J. R. Hunter, OPD A6-50
 J. J. Keating, AMS A6-90
 M. J. Lawrence, MGR A7-50
 J. R. Patterson, SED A6-90
 E. E. Pride, OCC A7-45
 A. J. Rizzo, AMO A6-53
 R. M. Rosselli, AMA A7-70
 R. R. Tibbatts, FRD A7-88
 M. W. Tiernan, SED A6-90
 K. J. Wheelless, COM A7-75
 M. J. Zamorski, OPD A6-55

(1) Hanford Environmental Health Foundation

S. E. Dietert H1-03

(2) Westinghouse Hanford Company

G. D. Carpenter R2-85
 D. E. Wood R2-85

(3) DOE Office of Scientific
 and Technical Information
 Technical Information Center
 P. O. Box 62
 Oak Ridge, TN 37830

(1) Brookhaven National Laboratory

A. P. Hull

(6) DOE - Headquarters

Germantown, MD 20545

Attn: B. Goldsmith, ER-73 Room E-222
 B. Lange, NE-472 Room F-416
 D. Nelson, EH-33 Room G-144
 G. Sherwood, NE-12 Room E-478
 V. Trice, DP-122 Room A-222
 L. Waldo, DP-122 Room A-222

(1) Department of Ecology

J. S. Stohr

(1) Wash State DSHS

R. R. Mooney