INTEGRATED TASK PLANS FOR THE HANFORD
ENVIRONMENTAL DOSE RECONSTRUCTION
PROJECT, FY 1992 THROUGH MAY 1994

D. B. Shipler, Project Manager

September 1992

Prepared for review and evaluation
by the Technical Steering Panel
and the Centers for Disease Control
under Contract 200-92-0503 (CDC)/18620 (BNW)

Battelle
Pacific Northwest Laboratories
Richland, Washington 99352

MASTER

LEGAL NOTICE

This report was prepared by Battelle as an account of sponsored research activities. Neither Sponsor nor Battelle nor any person acting on behalf of either:

MAKES ANY WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, with respect to the accuracy, completeness, or usefulness of the information contained in this report, or that the use of any information, apparatus, process, or composition disclosed in this report may not infringe privately owned rights; or

Assumes any liabilities with respect to the use of, or damages resulting from the use of, any information, apparatus, process, or composition disclosed in this report.

Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply endorsement, recommendation, or favoring by Sponsor or Battelle.

Printed in the United States of America

**Available to DOE and DOE contractors from the
Office of Scientific and Technical Information, P.O. Box 62, Oak Ridge, TN 37831;
prices available from (615) 576-8401. FTS 626-8401.**

**Available to the public from the National Technical Information Service,
U.S. Department of Commerce, 5285 Port Royal Rd., Springfield, VA 22161.**

INTEGRATED TASK PLANS FOR THE HANFORD
ENVIRONMENTAL DOSE RECONSTRUCTION
PROJECT, FY 1992 THROUGH MAY 1994

D. B. Shipler, Project Manager

This document has been reviewed and approved by the
Technical Steering Panel.

J. E. Till, Chair
Technical Steering Panel
Hanford Environmental
Dose Reconstruction Project

Date

INTEGRATED TASK PLANS FOR THE HANFORD
ENVIRONMENTAL DOSE RECONSTRUCTION
PROJECT, FY 1992 THROUGH MAY 1994

D. B. Shipler, Project Manager

D. B. Shipler, Project Manager
Hanford Environmental
Dose Reconstruction Project

Date

F. C. Hood, Director
Quality Programs

9-11-92

Date

for R. H. Gray, Manager
Office of Hanford Environment

9/9/92

Date

PREFACE

This document is an update of PNL-7757 HEDR, *FY 1992 Task Plans for the Hanford Environmental Dose Reconstruction Project*, published October 1991; PNL-7760 HEDR, *FY 1993 Task Plans for the Hanford Environmental Dose Reconstruction Project*, published October 1991; and FY 1994 work as reflected in the Technical Steering Panel (TSP) work plan approved at the August 19-20, 1991, TSP Budget/Fiscal Committee Meeting.

This updated document was prepared to 1) revise descriptions of work modified in Fiscal Year (FY) 1992 to date, 2) address FY 1993 and 1994 modifications designated by the Centers for Disease Control during contract negotiations with Battelle, and 3) address additional modifications indicated by a) progress of technical work to date, b) activities necessary to meet contract requirements and technical direction discussed with the TSP, and c) effects of delayed funding during FY 1992.

Because the FY 1993 and 1994 parts of these plans were written during early planning efforts, previous versions provided only brief summaries of work scopes, milestones, and associated budgeted costs. This updated document 1) adds more technical detail, such as technical approaches and data quality objectives, 2) revises descriptions of work based on status of the work to date, 3) revises descriptions of work and costs based on Battelle's contract with the Centers for Disease Control, and 4) provides a description of work, cost, and schedule for Battelle's entire period of performance.

PROJECT OVERVIEW

The purpose of the Hanford Environmental Dose Reconstruction (HEDR) Project is to estimate radiation doses from Hanford Site operations since 1944 to populations and individuals. The primary objective of work to be performed through May 1994 is to 1) determine the project's appropriate scope (space, time, radionuclides, pathways and individuals/population groups), 2) determine the project's appropriate level of accuracy (level of uncertainty in dose estimates) for the project, 3) complete model and data development, and 4) estimate doses for the Hanford Thyroid Disease Study (HTDS), representative individuals, and special populations as described herein.

The plan for FY 1992 through May 1994 has been prepared based on activities and budgets approved by the Technical Steering Panel (TSP) at its meetings on August 19-20, 1991, and April 23-25, 1992. The activities can be divided into four broad categories: 1) model and data evaluation activities, 2) additional dose estimates, 3) model and data development activities, and 4) technical and communication support.

The following activities will be conducted to accomplish objectives through May 1994.

MODEL AND DATA EVALUATION ACTIVITIES

- Complete development of source term codes for conducting analyses and estimating doses.
- Complete restructuring of the environmental accumulation and dose codes for conducting analyses and estimating doses.
- Complete restructuring of the atmospheric dispersion and deposition model for conducting analyses and estimating doses.
- Help assess the accuracy of the project computer codes by comparing output with model output generated by the International Atomic Energy Agency's "Validation of Model Predictions" program.
- Conduct sensitivity and uncertainty analyses on the dose and air dispersion models and upgrade them for application in the expanded area.

- review and evaluate environmental monitoring data for vegetation and surface water
- document radionuclide transfer and age-dependent dose factors.

ADDITIONAL DOSE ESTIMATES

- estimate doses for eight Native American tribes in the vicinity of the HEDR study area
- estimate doses for the HTDS
- estimate doses for the atmospheric and Columbia River pathways for comparison with Phase I dose estimates
- estimate doses from radionuclides other than iodine-131.

MODEL AND DATA DEVELOPMENT ACTIVITIES

- assist Native American tribes in acquiring and evaluating food consumption, demographic and agricultural data
- document the contribution of groundwater contamination to dose
- develop models for improving estimation of doses from the river pathway
- reevaluate and supplement milk production and processing data for the expanded area
- assess fresh fruit and vegetable pathways.

TECHNICAL AND COMMUNICATION SUPPORT

- continue document declassification and historical information retrieval
- continue technical integration support
- continue quality assurance support
- continue statistical support to all tasks
- continue TSP communications support
- continue records management
- continue project administration.

The Centers for Disease Control (CDC) manages and funds the HEDR Project. Battelle, Pacific Northwest Laboratories conducts the technical work of the project under the direction of the TSP. The FY 1992, 1993, and 1994 task plans form the basis of the work described in Battelle's contract with the CDC.

Figure 1 shows project organization; Table 1 shows the FY 1992, 1993, and 1994 (through May) Work Breakdown Structure (WBS) and budget for Battelle; Figure 2 shows FY 1992, 1993, and 1994 (through May) milestones. Table 1 reflects the budget approved by the TSP in August 1991 and April and August 1992. It also reflects modifications designated by CDC during negotiations for the Battelle contract.

R9205115.1

FIGURE 1. HEDR Project Organization

TABLE 1. HEDR Tasks, Work Breakdown Structure, and Budget for FY 1992, FY 1993, and FY 1994 through 5/94 (\$ in thousands)

WBS Element (a)	Task	Subtask	Task Manager	FY 1992 Budget	FY 1993 Budget	FY 1994 through May-94 Budget	Total Budget
01	1.1, 1.2 1.2 1.3, 1.4, 1.6, 1.7 1.5	Project Management	DB Shipler	1,129	1,030	358	2,517
		0101 Project Planning and Control		691	605	205	1,501
		0102 Final Phase I Reports (b)		16	0	0	16
		0103 Project Administration		381	386	142	909
		0104 Project Peer Review		41	39	11	91
02	2.8 2.1, 2.2, 2.6, 2.7 2.3, 2.4, 2.5	Technical Integration	BA Napier	294	409	197	900
		0201 Technical Planning, Control, and Reporting		57	70	18	145
		0204 Project Technical Coordination and Analysis		107	206	80	393
		0205 Pathways and Dose Model Requirements		130	133	99	362
03	3.6 3.1, 3.2 3.2 3.4 3.5 3.3 3.1	Source Terms	CM Heeb	332	446	86	864
		0301 Technical Planning, Control, and Reporting		47	30	9	86
		0302 Closure of Phase I Iodine-131 Releases (b)		4	0	0	4
		0303 Radioactive Releases to Air		0	171	0	171
		0304 Radioactive Releases to Water		99	204	0	303
		0305 Release Model Development, Verification, and Validation		16	41	0	57
		0306 Hanford Historical Releases		0	0	77	77
		0307 Radioactive Release Data Availability and Review		166	0	0	166
04	4.1.1, 4.1.2, 4.1.3, 4.1.5, 4.1.6 4.2 4.3 4.1.4 4.1.8	Environmental Transport	MD Freshley WH Walters JV Ramsdell JV Ramsdell	506	497	86	1,089
		0402 Atmospheric Model Development and Evaluation		214	178	31	423
		0403 Groundwater Transport		61	0	0	61
		0404 Surface-Water Transport		130	197	0	327
		0405 Atmospheric Model Database		87	26	26	139
		0406 Atmospheric Model Calculations		14	96	29	139
05	5.6 5.2 5.1 5.3 5.4	Environmental Monitoring Data	DH Denham	166	233	135	534
		0501 Technical Planning, Control, and Reporting		38	30	7	75
		0502 Terrestrial Monitoring Data		64	97	103	264
		0503 Environmental Monitoring Data Availability and Review		49	0	0	49
		0504 Surface-Water Monitoring Data		15	62	25	102
		0505 Air Monitoring Data		0	41	0	44

(a) See Appendix A for WBS element titles that correspond to these numbers.

(b) Funding and work for Subtasks 0102 and 0302 in FY 1992 was carried over from FY 1991.

TABLE 1. (contd)

WBS Element (a)	Task	Subtask	Task Manager	FY 1992 Budget	FY 1993 Budget	FY 1994 through May-94 Budget	Total Budget
06	6.5 6.4 6.2 6.1 6.4.2	Demography, Food Consumption, and Agriculture	GL Wilfert	554	316	185	1,055
		0601 Technical Planning, Control, and Reporting		36	35	11	82
		0602 Food Consumption		60	49	0	109
		0603 Milk Model Development		318	54	39	411
		0604 Demographics		0	0	0	0
		0605 Native American Data		140	178	135	453
07	7.4 7.1 7.3 7.1.5 7.2	Environmental Pathways and Dose Estimates	WT Farris	415	342	281	1,038
		0701 Technical Planning, Control, and Reporting		61	46	11	118
		0702 Pathways and Dose Code Development and Documentation		241	110	99	450
		0703 Pathways and Dose Model Parameter Development		73	73	0	146
		0704 Pathways and Dose Model/Code Verification and Validation		0	0	37	37
		0705 Dose Calculations		40	113	134	287
08	8.7 8.2, 8.3, 8.4, 8.5, 8.6 8.1	Statistics	RO Gilbert	380	310	117	807
		0801 Technical Planning, Control, and Reporting		38	45	11	94
		0802 Statistics Support for Project Technical Task Work		138	99	41	278
		0803 Analysis of Model Reliability		204	166	65	435
09	9.3 9.1, 9.2 9.4	Records Management	DL Martin	55	69	80	204
		0901 Technical Planning, Control, and Reporting		15	9	2	26
		0902 Project Records Management		40	60	21	121
		0903 Records Turnover Package		0	0	57	57
10	10.5 10.1, 10.2, 10.3 10.4	Quality Assurance	DL Stewart	60	66	33	159
		1001 Technical Planning Control, and Reporting		15	16	4	35
		1002 Quality Assurance Program Development		16	21	10	47
		1003 Quality Assurance Verification		29	29	19	77
11	11.3 11.1 11.2	Information Resources	GL Harvey	164	180	67	411
		1101 Technical Planning, Control, and Reporting		43	51	19	113
		1102 Hanford Document Declassification		52	101	38	191
		1103 Hanford Information Resources Identification and Search		69	28	10	107

(a) See Appendix A for WBS element titles that correspond to these numbers.

TABLE 1. (contd)

<u>WBS Element (a)</u>	<u>Task</u>	<u>Subtask</u>	<u>Task Manager</u>	<u>FY 1992 Budget (c)</u>	<u>FY 1993 Budget (d)</u>	<u>FY 1994 through May-94 Budget (e)</u>	<u>Total Budget</u>
12	TSP Communications Support		GL Harvey	68	39	17	124
12.7	1201	Technical Planning, Control, and Reporting		24	18	6	48
12.1	1202	TSP Public Outreach Support		4	0	0	4
12.2, 12.3	1203	Communications Assessment Research		12	6	4	22
12.4, 12.5, 12.6	1204	TSP Meetings and Materials Support		28	15	7	50
12.1	1206	Dose Estimating Turnover Package		0	0	0	0
Subtotal, HEDR Project Tasks				4,123	3,937	1,642	9,702
Technical Steering Panel (f)				864	0	0	864
Native American Research (g)				241	0	0	241
TOTAL				5,228	3,937	1,642	10,807

(a) See Appendix A for WBS element titles that correspond to these numbers.

(b) Funding and work for Subtasks 0102 and 0302 in FY 1992 was carried over from FY 1991.

(c) The FY 1992 Budget is funded from DOE at \$3,828K and CDC at \$1,400.

(d) The FY 1993 Budget includes \$13K for Subtask 0103 not funded by CDC in FY 1992 but included in the total contract and \$23K for Subtask 0603 not funded in FY 1992 as a result of the funding shortfall.

(e) The current contract with CDC ends May 31, 1994.

(f) CDC will contract with the State of Washington beginning October 1, 1992, for the TSP subcontracts.

(g) The Native American contracts will continue with Battelle through December 31, 1992, using FY 1992 carryover funds. New contracts with the Native American tribes for FY 1993 and FY 1994 work will be placed by CDC.

FIGURE 2. FY 1992 - FY 1994 Milestones

FIGURE 2. (contd)

FIGURE 2. (contd)

FIGURE 2. (contd)

FIGURE 2. (contd)

ACRONYMS AND ABBREVIATIONS

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CDC	The Centers for Disease Control
DOE	U.S. Department of Energy
DQO	data quality objective
EMDD	Environmental Monitoring Document Database
FY	fiscal year
GE	General Electric
GIS	Geographic Information System
HEDR	Hanford Environmental Dose Reconstruction Project
HIRTS	HEDR Information Resources Tracking System
HRP	Hanford single-pass reactor
HTDS	Hanford Thyroid Disease Study
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
NAWG	Native American Working Group
OSTI	Office of Scientific and Technical Information
PMS	Project Management System
PNL	Pacific Northwest Laboratory
QA	quality assurance
QC	quality control
RL	U.S. Department of Energy Richland Field Office
SCP	Software Control Procedures
STRM	Source Term Release Model
TSP	Technical Steering Panel
USGS	U.S. Geological Survey
VAMP	Validation of Model Predictions
WBS	work breakdown structure
WHC	Westinghouse Hanford Company
WSU	Washington State University

CONTENTS

PREFACE	iii
PROJECT OVERVIEW	v
MODEL AND DATA EVALUATION ACTIVITIES	v
ADDITIONAL DOSE ESTIMATES	vi
MODEL AND DATA DEVELOPMENT ACTIVITIES	vi
TECHNICAL AND COMMUNICATION SUPPORT	vi
ACRONYMS AND ABBREVIATIONS	xvii
INTRODUCTION	1.1
TASK 01: PROJECT MANAGEMENT	2.1
SCOPE	2.1
SUBTASK 0101: PROJECT PLANNING AND CONTROL	2.1
SUBTASK 0103: PROJECT ADMINISTRATION	2.5
SUBTASK 0104: PROJECT PEER REVIEW	2.11
QUALITY ASSURANCE	2.13
INTERACTIONS	2.13
ORGANIZATION	2.13
TASK 02: TECHNICAL INTEGRATION	3.1
SCOPE	3.1
SUBTASK 0201: TECHNICAL INTEGRATION PLANNING, CONTROL, AND REPORTING	3.1
SUBTASK 0204: PROJECT TECHNICAL COORDINATION AND ANALYSIS	3.4
SUBTASK 0205: PATHWAYS AND DOSE MODEL REQUIREMENTS	3.8
QUALITY ASSURANCE	3.11
INTERACTIONS	3.13

ORGANIZATION	3.14
TASK 03: SOURCE TERMS	4.1
SCOPE	4.1
SUBTASK 0301: SOURCE TERMS TECHNICAL PLANNING, CONTROL, AND REPORTING	4.2
SUBTASK 0303: RADIOACTIVE RELEASES TO AIR	4.5
SUBTASK 0304: RADIOACTIVE RELEASES TO WATER	4.9
SUBTASK 0305: RELEASE MODEL DEVELOPMENT, VERIFICATION, AND VALIDATION	4.14
SUBTASK 0306: HANFORD HISTORICAL RELEASES	4.18
SUBTASK 0307: RADIOACTIVE RELEASE DATA AVAILABILITY AND REVIEW	4.21
QUALITY ASSURANCE	4.24
INTERACTIONS	4.24
ORGANIZATION	4.24
TASK 04: ENVIRONMENTAL TRANSPORT	5.1
SCOPE	5.1
SUBTASK 0402: ATMOSPHERIC MODEL DEVELOPMENT AND EVALUATION	5.1
SUBTASK 0403: GROUNDWATER TRANSPORT	5.7
SUBTASK 0404: SURFACE-WATER TRANSPORT	5.11
SUBTASK 0405: ATMOSPHERIC MODEL DATABASE	5.18
SUBTASK 0406: ATMOSPHERIC MODEL CALCULATIONS	5.22
QUALITY ASSURANCE	5.26
INTERACTIONS	5.28
ORGANIZATION	5.29
TASK 05: ENVIRONMENTAL MONITORING DATA	6.1
SCOPE	6.1

SUBTASK 0501: ENVIRONMENTAL MONITORING DATA TECHNICAL PLANNING, CONTROL, AND REPORTING	6.2
SUBTASK 0502: TERRESTRIAL MONITORING DATA	6.5
SUBTASK 0503: ENVIRONMENTAL MONITORING DATA AVAILABILITY AND REVIEW	6.13
SUBTASK 0504: SURFACE-WATER MONITORING DATA	6.17
SUBTASK 0505: AIR MONITORING DATA	6.22
QUALITY ASSURANCE	6.25
INTERACTIONS	6.25
ORGANIZATION	6.27
TASK 06: DEMOGRAPHY, FOOD CONSUMPTION, AND AGRICULTURE	7.1
SCOPE	7.1
SUBTASK 0601: DEMOGRAPHY, FOOD CONSUMPTION, AND AGRICUL- TURE TECHNICAL PLANNING, CONTROL, AND REPORTING	7.2
SUBTASK 0602: FOOD CONSUMPTION	7.4
SUBTASK 0603: MILK AND OTHER FOOD MODEL DEVELOPMENT	7.6
SUBTASK 0604: DEMOGRAPHICS	7.13
SUBTASK 0605: NATIVE AMERICAN DATA	7.15
QUALITY ASSURANCE	7.20
INTERACTIONS	7.20
ORGANIZATION	7.21
TASK 07: ENVIRONMENTAL PATHWAYS AND DOSE ESTIMATES	8.1
SCOPE	8.1
SUBTASK 0701: ENVIRONMENTAL PATHWAYS AND DOSE ESTIMATES TECHNICAL PLANNING, CONTROL, AND REPORTING	8.1
SUBTASK 0702: PATHWAYS AND DOSE CODE DEVELOPMENT AND DOCUMENTATION	8.4
SUBTASK 0703: PATHWAYS AND DOSE MODEL PARAMETER DEVELOPMENT	8.9

SUBTASK 0705: DOSE CALCULATIONS	8.15
QUALITY ASSURANCE	8.19
INTERACTIONS	8.20
ORGANIZATION	8.20
TASK 08: STATISTICS	9.1
SCOPE	9.1
SUBTASK 0801: STATISTICS TECHNICAL PLANNING, CONTROL, AND REPORTING	9.2
SUBTASK 0802: STATISTICS SUPPORT FOR PROJECT TECHNICAL TASK WORK	9.4
SUBTASK 0803: ANALYSIS OF MODEL RELIABILITY	9.7
QUALITY ASSURANCE	9.11
INTERACTIONS	9.11
ORGANIZATION	9.12
TASK 09: RECORDS MANAGEMENT	10.1
SCOPE	10.1
SUBTASK 0901: RECORDS MANAGEMENT TECHNICAL PLANNING, CONTROL, AND REPORTING	10.1
SUBTASK 0902: PROJECT RECORDS MANAGEMENT	10.4
SUBTASK 0903: PROJECT RECORDS TURNOVER	10.6
QUALITY ASSURANCE	10.8
INTERACTIONS	10.8
ORGANIZATION	10.8
TASK 10: QUALITY ASSURANCE	11.1
SCOPE	11.1
SUBTASK 1001: QUALITY ASSURANCE TECHNICAL PLANNING, CONTROL, AND REPORTING	11.1
SUBTASK 1002: QUALITY ASSURANCE PROGRAM DEVELOPMENT	11.4

SUBTASK 1003: QUALITY ASSURANCE VERIFICATION	11.6
QUALITY ASSURANCE	11.8
INTERACTIONS	11.8
ORGANIZATION	11.8
TASK 11: INFORMATION RESOURCES	12.1
SCOPE	12.1
SUBTASK 1101: INFORMATION RESOURCES PLANNING, CONTROL, AND REPORTING	12.2
SUBTASK 1102: HANFORD DOCUMENT DECLASSIFICATION	12.5
SUBTASK 1103: HANFORD INFORMATION RESOURCES IDENTIFICATION AND SEARCH	12.7
QUALITY ASSURANCE	12.13
INTERACTIONS	12.13
ORGANIZATION	12.13
TASK 12: TSP COMMUNICATIONS SUPPORT	13.1
SCOPE	13.1
SUBTASK 1201: TSP COMMUNICATIONS SUPPORT TECHNICAL PLANNING, CONTROL, AND REPORTING	13.1
SUBTASK 1202: TSP PUBLIC OUTREACH SUPPORT	13.4
SUBTASK 1203: COMMUNICATIONS ASSESSMENT RESEARCH	13.6
SUBTASK 1204: TSP MEETINGS AND MATERIALS SUPPORT	13.8
SUBTASK 1206: DOSE ESTIMATING TURNOVER PACKAGE	13.11
QUALITY ASSURANCE	13.13
INTERACTIONS	13.13
ORGANIZATION	13.13
REFERENCES	14.1
APPENDIX A - PROJECT WORK BREAKDOWN STRUCTURE	A.1

FIGURES

(Plate is in pocket in back of report)

Plate: HEDR Project Summary Schedule for FY 1992 through May 1994

1	HEDR Project Organization	viii
2	FY 1992 - FY 1994 Milestones	xii
12.1	Typical Search Tree	12.8

TABLES

1	HEDR Tasks, Work Breakdown Structure, and Budget for FY 1992, FY 1993, and FY 1994 through 5/94	ix
---	--	----

INTRODUCTION

The purpose of the Hanford Environmental Dose Reconstruction (HEDR) Project is to estimate radiation doses, and their uncertainties, from Hanford Site operations since 1944 to individuals and populations. The primary objective of work to be performed through May 1994 is to complete the source term estimates and dose estimates for key radionuclides for the air and river pathways. At the end of FY 1993, the capability will be in place to estimate doses for individuals in the extended (32-county) study area, 1944-1991. Native American research will continue to provide input for tribal dose estimates. In FY 1993, the Technical Steering Panel (TSP) will decide whether demographic and river pathways data collection should be extended beyond FY 1993 levels.

The work scopes and milestones in this document are based on the work plan discussed at the TSP Budget/Fiscal Subcommittee meeting on August 19-20, 1991. Figure 1 shows the FY 1992, 1993, and 1994 (through May) milestones; Table 1 shows estimated costs for the same period. The subsequent work scope descriptions are based on the milestones.

Phase I ended in FY 1990. In February 1991, the TSP decided to shift the project planning approach away from phases--which were centered around completion of major portions of technical activities--to individual fiscal years (FYs), which span October of one year through September of the next. Therefore, activities that were previously designated to occur in phases are now designated in an integrated schedule to occur in one or more of the next fiscal years into FY 1995. In August 1992, the TSP decided to integrate the individual fiscal year task plans spanning the Battelle contract period (1992, 1993, and 1994 through May) into a single plan. This document is that plan. The plan will be reviewed and updated every 6 months.

This document began with a project overview, which included the purpose, scope, milestones, and costs for FY 1992, 1993, and 1994 (through May) dose reconstruction activities. The remainder of the document consists of the 12 task plans that discuss scope, approach, milestones, and deliverable items.

Milestones consist of major reports and letter reports. Major reports are documentation to the TSP and the Centers for Disease Control (CDC) of completed major HEDR activities. The TSP and CDC review and approve these reports. Letter reports document interim work, such as screening calculations, and show progress or provide input to TSP decisions. TSP approval of letter reports is not required although comments are accepted and considered in ongoing work.

Project deliverables are data or other information provided from one HEDR task to another, input to monthly reports or other HEDR documents, or presentations to the TSP or its subcommittees.

Subtask and milestone numbers are assigned to individual project work elements and follow that work through completion. New work elements and milestones are assigned new numbers. Therefore, subtask and milestone numbers may not be consecutive or the same in different years.

Some milestones that were scheduled to be completed in FY 1991 but were delayed and completed in FY 1992 are shown in the subtask timelines (at the end of each subtask section) and the master milestone chart. However, many of these "slipped" milestones are not described here because these integrated task plans cover work scheduled from FY 1992 through May 1994.

TASK 01: PROJECT MANAGEMENT

SCOPE

Project management will provide planning, coordination, communication, information control, technical control, technical review, and administration of project work in accordance with the CDC contract and approved task plans and directives from the TSP. The task is also responsible for producing progress reports of project technical work and for formal communications with the TSP and CDC. Work to be performed by the project is listed in the project Work Breakdown Structure (WBS) (shown in the appendix) and allocated to subtasks for scheduling and tracking. Subtasks are as follows:

- Project Planning and Control (0101)
- Project Administration (0103)
- Project Peer Review (0104).

SUBTASK 0101: PROJECT PLANNING AND CONTROL (WBS 1.1, 1.2)

Scope

Project planning and control includes those activities necessary to develop and implement task plans and control the work described in the task plans. It includes defining work, developing and controlling budgets and schedules, implementing processes and procedures, reviewing products, implementing and tracking corrective actions, and reporting. It also includes management activities to ensure and enhance leadership and technical performance by HEDR task leaders and performance of technical work by project staff.

Approach

Project management, through this document, will implement, track, and control the work to be performed. Key to administrative and control requirements are

- the HEDR Project Management Plan
- the HEDR Quality Assurance (QA) Plan and implementing procedures

- records of meetings involving technical direction that may affect approved scope, cost, or schedule
- records of telephone communications involving technical direction that may affect approved scope, cost, or schedule
- monthly task reports, including status of task activities and interfaces; progress toward milestones; problems, potential problems, and solution alternatives; approved changes in scope, budget, or schedule; actual costs this period, cumulative costs this fiscal year, budget to date, and variances; other task information of interest
- task file keys and codes, including designation of quality records
- predesignated reviews and reviewers for specific deliverables, including clearance requirements
- maintenance of correspondence logs
- use of communication cover sheets on project documents
- identification, conduct, and recordkeeping of training for technical and administrative activities
- documentation of key decisions affecting technical performance, scope, cost, or schedule
- review, approval, and control of research notes, information, calculations, analyses, evaluations, and models.

Proven project management techniques, as identified in the Battelle Project Management System (PMS) manual, PNL-MA-95, will be implemented. The Project Management Plan, which provides information on how the project is conducted, is being revised. Planning will be accomplished by the development of task plans and costs estimated by fiscal year. Key information will be maintained in an integrated database that will generate logic networks of activities so that potential or approved changes in planned activities (scope, cost, or schedule) can be evaluated relative to task and/or project objectives and goals. Task plans will address the outline given in TSP Directive 90-1. Control of work approved in these task plans will be accomplished by applying procedures outlined in the Battelle PMS and reports provided through a project management software system. The project manager and task leaders will

regularly evaluate performance, analyze cost and schedule variances, report on work, and apply corrective actions as necessary.

The Project Management Plan and task plans include the contributions of project office staff, task leaders, and subtask leaders.

Milestones to the TSP

- 0101D - FY 1992 revised task plans (April 1992)
- 0101E - FY 1992-1994 integrated task plans (September 1992). This milestone was formerly the revised FY 1993 task plans. But at TSP direction, the FY 1993 task plans are now combined into these integrated task plans.
- 0101F - Project Management Plan revision (September 1992)
- 0101G - FY 1993 Integrated task plans, revisions (April 1993)
- 0101H - Project Management Plan revision (August 1993)
- 0101I - Project final report (March 1993)
- Monthly reports.

Project Deliverables

- Task plan input
- Monthly report input
- Presentations to the TSP and its subcommittees
- Audiovisual support to the TSP at its four public meetings in FY 1992.

Subtask: 0101, Project Planning and Control

SUBTASK 0103: PROJECT ADMINISTRATION (WBS 1.3, 1.4, 1.6, 1.7)

This subtask includes the following elements:

- Project Administration
- Records Control
- Subcontract Administration
- Project Communication Support.

Project Administration (WBS 1.3)

Scope

Project administration includes those activities necessary to interface with, respond to, and support the TSP, CDC, and Battelle management in their understanding and oversight of HEDR work. It also includes internal project support activities such as task management coordination, staff management and development (for HEDR-required skills), and project computer system/network maintenance and administration.

Approach

These activities are performed under policies, procedures, and guidelines established by the TSP, CDC, and Battelle for liaison and coordination of oversight functions. Staff administration and development are governed by Battelle management guidelines. Maintenance and administration of computer systems and networks are controlled by Battelle guidelines and procedures. Reviews and audits of these practices are performed by Battelle management, the project QA function, and independent Battelle audit functions.

Milestones to the TSP

None. Response to specific requests are documented by letter.

Project Deliverables

None.

Records Control (WBS 1.4)

Scope

Records control includes activities necessary to maintain accurate project records and control project documents. These activities include verification of completeness and legibility of documents, maintenance and application of sequential numbering, maintenance of a database system and project files, and transfer of records to the Battelle Records Center at regular intervals in accordance with approved procedures.

Approach

Battelle records management procedures and specific TSP and project requirements will be applied. The availability, accessibility, retrievability, and verifiability of project information will be maintained. In addition, the records will meet legal, regulatory, and quality requirements as established by Battelle and the project.

Records of Hanford documents reviewed by HEDR staff will be maintained as an annotated bibliography. This bibliography will become part of project records and made available in the U.S. Department of Energy (DOE) Richland Field Office (RL) Public Reading Room.

Milestones to the TSP

None.

Project Deliverables

- Transfer of project records to the Battelle Records Center at regular intervals
- Designation of project records to be transferred to the RL Public Reading Room.

Subcontract Administration (WBS 1.6)

Scope

Subcontract administration includes activities necessary to identify, acquire, control, provide status of, and report progress of consultants and other contract support for the project. These activities include definition

of scope; preparation of budgets and schedules; technical proposal review and selection; technical direction; scope, cost and schedule control and reporting; and milestones for evaluation.

Approach

Processes consistent with Battelle subcontracting procedures and TSP directives will be implemented to procure consultants and maintain subcontracts to meet CDC, TSP, project management, and technical needs. The status of contracts will be reported regularly using a project management software system. Modifications will be processed through the Battelle Contracts Department in accordance with written requests from authorized contract representatives.

Milestones to the TSP

None.

Projective Deliverables

None.

Project Communication Support (WBS 1.7)

Scope

Project communication support includes three aspects:

- providing accurate and timely information to the TSP and CDC on a regular basis about the plans, progress, and results of the project
- responding to direct requests for information from the media, the technical community, Battelle management, and other interested organizations and individuals
- planning and implementing internal project communication.

Approach

Project milestones, TSP directives, and requests for information will be evaluated to identify appropriate communication activities necessary to support dose reconstruction goals. Communication support will be provided for preparing monthly and other project reports, preparing other print and visual materials, presenting information at TSP meetings as requested, providing

speakers for other events as requested, and providing other materials or services as requested. Activities for internal project communication involve developing policy and guidelines for communicating project results; advising HEDR staff on, and reviewing, project communication products; and ensuring HEDR staff and management are kept apprised of current project issues.

The Project Office will edit and coordinate the production of project reports to the TSP and CDC. HEDR staff who generated the original reports will respond to subsequent comments of the TSP and those of the CDC, which will be routed through the TSP. Upon receiving written TSP approval and CDC concurrence, the Project Office will prepare copies of the final reports for the TSP and CDC. Activities include the following:

- develop/update internal communication policies/procedures for HEDR Project Management Plan
- recommend methods for effective Battelle communication/presentation of project products and activities such as the decision modeling, information search and declassification methods, collaboration with tribes, and use of the Geographic Information System (GIS) output
- develop and present training courses to improve project staff communication and task management skills
- edit, write and coordinate production of project reports and other documents, such as journal articles, from other tasks
- review Battelle presentations for public or scientific meetings, prepare visuals as necessary, and coordinate production of visuals and paper copies
- hold annual meeting with Battelle managers of HEDR staff to discuss HEDR status/issues
- write or contribute to articles for Battelle publications to inform staff and Battelle-targeted external audiences about key HEDR activities
- respond to direct requests for project-related information, such as from members of the public, university representatives, state officials, legal representatives (for plaintiffs or defendants), and the media.

Milestones to the TSP

None.

Project Deliverables

- Monthly report input
- Guidelines to project participants for preparation of documents and presentations.

Subtask: 0103, Project Administration

Note: This subtask has no milestones to the TSP/CDC.

	O	+
	N	+
	D	+
	J	+
	F	+
FY 1992	M	+
\$381 K	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
	O	+
	N	+
	D	+
	J	+
	F	+
FY 1993	M	+
\$386 K	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
	O	+
	N	+
	D	+
	J	+
	F	+
FY 1994	M	+
\$142 K	A	+
	M	+
	J	+
	J	+
	A	+
	S	+

SUBTASK 0104: PROJECT PEER REVIEW (WBS 1.5)

Scope

Peer review includes activities necessary to ensure that plans for technical work are complete, appropriate, and capable of meeting stated objectives and that the results of technical work are sound, are based on appropriate analyses, and meet stated objectives.

Approach

Standard peer review requirements will be applied to the review of task plans and task/project products. In addition, management review will be performed on presentation and information materials to ensure that project, TSP, CDC, and Battelle policies and sensitivities are appropriately addressed.

Milestones to the TSP

None.

Project Deliverables

- Comments on dry runs
- Comments from peer reviewers of documentation.

Subtask: 0104, Project Peer Review

Note: This subtask has no milestones to the TSP/CDC.

	O	+
	N	+
	D	+
	J	+
	F	+
FY 1992	M	+
\$41 K	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
	O	+
	N	+
	D	+
	J	+
	F	+
FY 1993	M	+
\$39 K	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
	O	+
	N	+
	D	+
	J	+
	F	+
FY 1994	M	+
\$11 K	A	+
	M	+
	J	+
	J	+
	A	+
	S	+

QUALITY ASSURANCE

The HEDR QA Plan will be applied to planning and achieving data quality objectives (DQOs) and closure on significant technical review comments by TSP, CDC, and internal Battelle project reviews. Planning and tracking of corrective actions will be addressed in a project procedure and included in QA audits. Regular QA audits will be performed and closed in accordance with the HEDR QA Plan and PNL-MA-70.

INTERACTIONS

Task plans will identify relationships between project activities so that interfaces, dependencies, and coordinations can be managed. Project management will track these interfaces and ensure that their functions are achieved. In addition, project management will network and track project activities and their dependencies to ensure that transfers of data and other information occur as planned.

ORGANIZATION

J. E. Till, TSP Chair	
B. Shleien, TSP Budget/Fiscal Subcommittee Chair	
M. L. Blazek, TSP Communications Subcommittee Chair	
01 Project Management	D. B. Shipler, Task Leader
0101 Project Planning and Control	D. B. Shipler, Subtask Leader M. D. Freshley A. C. Bampton
0103 Project Administration	S. M. Finch, Subtask Leader A. H. McMakin S. D. Cannon J. M. Daer G. L. Harvey K. M. Heaton
0104 Project Peer Review	W. A. Glass, Subtask Leader

TASK 02: TECHNICAL INTEGRATION

SCOPE

This task provides technical guidance, coordination, and communication among all other tasks. This task ensures that the output and formats of the results of each task fit the general needs of the project on an acceptable schedule, while still maintaining scientific integrity of each product.

The scope of work for Task 02 is addressed in three subtasks:

- Technical Integration Planning, Control, and Reporting (0201)
- Project Technical Coordination and Analysis (0204)
- Pathways and Dose Model Requirements (0205).

SUBTASK 0201: TECHNICAL INTEGRATION PLANNING, CONTROL, AND REPORTING (WBS 2.8)

Scope

This subtask includes preparation of advanced work plans, routine task reporting, travel requirements, preparation of technical papers on subjects of current interest, control of task schedules and costs, and the planning and reviewing of all task activities. This subtask also includes resolution of TSP, CDC, and public comments on reports.

Approach

This is a level-of-effort task requiring the task staff to be involved daily with various other task and subtask components of the project. Task management and control will be accomplished primarily through the system of project control initiated in Task 01 (Project Management) and other Battelle accounting systems already in place. Task staff will maintain personal contact with task leaders and other HEDR staff to ensure that project milestones are defined, integrated, and met.

Activities include the following:

- update task plans, budgets, and DQOs

- prepare monthly task reports
- attend TSP, project, and public meetings
- plan and prepare task/project technical papers and presentations.

Milestones to the TSP

None.

Project Deliverables

- Input to task plans
- Input to monthly reports
- Input to TSP and subcommittee meetings.

Subtask: 0201, Technical Integration Planning, Control, and Reporting

Note: This subtask has no milestones to the TSP/CDC.

	O
	N
	D
	J
	F
FY 1992	M
\$57 K	A
	M
	J
	J
	A
	S
	O
	N
	D
	J
	F
FY 1993	M
\$70 K	A
	M
	J
	J
	A
	S
	O
	N
	D
	J
	F
FY 1994	M
\$18 K	A
	M
	J
	J
	A
	S

SUBTASK 0204: PROJECT TECHNICAL COORDINATION AND ANALYSIS
(WBS 2.1, 2.2, 2.6, 2.7)

Scope

This subtask includes activities that provide overall technical guidance, coordination, communication, and integration among all other tasks. Activities ensure that the output and formats of the results of each task fit the general needs of the project on an acceptable schedule, while maintaining the scientific integrity of each product. The subtask provides technical coordination with agencies and projects associated with, but independent of, the HEDR Project, including the Hanford Thyroid Disease Study (HTDS).

Approach

Coordination is accomplished through day-to-day communication with project staff to ensure that project requirements and milestones are defined, integrated, and met. Interfaces and constraints are identified, defined, and controlled to meet project technical requirements and milestones. Analyses are defined, planned, and coordinated at this level, while much of the work is performed in other tasks. Project databases, originated and maintained by other subtasks, are defined and integrated under this subtask.

Activities including the following:

- A. HTDS Coordination
 - Level-of-effort communications
 - Establish data specifications
 - Coordinate HTDS pilot study calculations
 - Coordinate HTDS pilot study information requests.
- B. Data Management
 - Prepare data management plan
 - Define and integrate databases.
- C. Model Reliability Analyses (Sensitivity/Uncertainty)
 - Project testing and sensitivity/uncertainty analysis requirements and plans
 - source term model
 - atmospheric dispersion models

- terrestrial models
- surface-water models.

Data Quality Objectives

New Data/Information to Be Developed

Data management plan and project testing and sensitivity/uncertainty analysis requirements and plan.

Final Use of Data/Information

To define and direct the development, maintenance, and manipulation of data and the performance of the project testing and sensitivity/uncertainty analyses.

Data Quality Objectives

- Completeness - The testing and sensitivity analysis part should consider analysis of the sensitivity of pathways/parameters contributing more than 5% of the dose to any individual. The uncertainty analysis part should consider analysis of all parameters contributing more than 5% of the total uncertainty at any location to any individual. The data management plan should consider the control of 100% of the input data to any calculation.

Documentation

The results of DQO achievement and measurement will be provided in milestone reports to the TSP and CDC.

Milestones to the TSP

- 0204A - Letter Report: Data management plan (October 1992). The plan sets data management requirements for the project databases. Requirements will include those to maintain a central calculational database and keep it current while allowing the contributing tasks continuing access. Requirements will also specify controls to ensure that appropriate inputs for the project dose model are held reasonably static.
- 0204B - Letter Report: Recommendation on whether monitoring data for the Columbia River are sufficient to estimate doses, and if not, the extent of modeling needed for dose estimation (July 1992). Provides input to the FY 1992 TSP decisions on the same subject. Recommendation is based on monitoring data from Tasks 04 and 05 and on previous work on identification of dominant radionuclides for the river pathway.

Project Deliverables

- Data communications specifications
- Research requirements.

Subtask: 0204, Project Technical Coordination and Analysis

SUBTASK 0205: PATHWAYS AND DOSE MODEL REQUIREMENTS (WBS 2.3, 2.4, 2.5)

Scope

This subtask will develop requirements to enable the enhanced computer code to estimate specific individual and population group doses for defined pathways of exposure, incorporate enhanced atmospheric dispersion capabilities, and conduct testing and sensitivity/uncertainty investigations. This subtask will be the lead for that effort, with input from the technical tasks. Techniques for computation will be investigated, selected, and documented.

The HEDR Project is represented at the International Atomic Energy Agency (IAEA) coordinated research program on the "Validation of Models for Radionuclide Transfer in Terrestrial, Urban, and Aquatic Environments" (VAMP) by this task. A first test scenario, devised by the IAEA with Chernobyl data, has been investigated. A similar scenario, devised with Hanford data, will be prepared and submitted to the VAMP participants to enable independent calculations to be made. Validation of additional portions of the model with Hanford data will continue with a Project Model Validation Plan. The validation plan will establish methods for using existing monitoring data to validate portions of the overall project model. The plan will set criteria for the activities to be conducted in Tasks 04, 05, 07, and 08.

An output display document will be prepared. This document will outline the types of user-friendly interactive mechanisms required for the dose calculation modules to allow use of the codes by other agencies (e.g., CDC or other agencies). This document will set the requirements for development work in Task 07.

Approach

The approach is direct coordination and interaction with staff of Tasks 07 (Environmental Pathways and Dose Estimates) and 08 (Statistics). The model has a fully dynamic structure that maintains model correlations through all computations. This structure requires massive data storage availability as well as speedy data retrieval capabilities. Innovative approaches will be developed, tested, and evaluated using bench-scale computer applications.

Letter reports on ideas under consideration will be prepared for project files. Final selections will be documented.

Development of a Hanford VAMP validation scenario this fiscal year will ensure that it is available when the VAMP participants complete the second scenario. Analysis of the results of this scenario will depend on completion by the VAMP participants.

Activities include the following:

A. Project Model Design

- Select river pathways model
- Determine output requirements
- Investigate summary system (user-friendly interactions).

B. Project model support

- Key radionuclides report
- Define population dose calculation requirements
 - coordinate definition of groups (with Task 06)
 - coordinate collective (population) dose capability (with Task 07)
 - coordinate database for collective doses
- Prepare strategy for selection of model parameter distributions (with Tasks 07 and 08).

C. Project Code Validation

- VAMP scenario 2 participation
- VAMP scenario 3 (Hanford scenario)
 - Interaction with IAEA to define scope
 - Data search
 - Data synthesis/scenario preparation

- International scenario analysis
- Assistance to IAEA in publication.

Data Quality Objectives

New Data/Information to Be Developed

Updated design specifications, lists of important parameters, important exposure pathways, and important radionuclides.

Final Use of Data/Information

To direct and control the development of the project pathways and dose-estimating computer code and to direct the collection of input data.

Data Quality Objectives

- Accuracy - The objective is to incorporate physical phenomena as accurately as any other nationally known code for similar use. Peer reviews will be used to ensure and measure accuracy.
- Precision - The objective is to make uncertainties of code and input information integral parts of the code operation and ensure that they are expressed in the code output. Peer reviews will be used to ensure and measure precision.
- Completeness - The objective is for the code to calculate dose estimates for all currently identified pathways, lifestyles of population groups and individuals, dominant airborne and waterborne radionuclides released from Hanford for the area bounded by the Cascade Mountains on the west, the Canadian border on the north, the Bitterroot Mountains on the east, and the northern counties of Oregon on the south. Peer reviews will be used to ensure and measure completeness.
- Representativeness - The objective is that the code represents all known pathway phenomena, lifestyles, food habits, agricultural practices, and physical phenomena of radioactivity and dosimetry. Expert verification will be used to ensure and measure representativeness.
- Comparability - Models developed by the project should compare within factors of two to three of international models.

Documentation

The results of DQO achievement and measurement will be a section of each milestone to the TSP.

Milestones to the TSP

- 0205B - Letter Report: Key radionuclides, Rev. 1 (October 1992). The report will document the results of an expanded investigation of Hanford-originated radionuclides that potentially resulted in the largest doses, for the entire time period under consideration, for atmospheric and surface-water releases. This provides input to the TSP decision at the end of FY 1992 identifying the key radionuclides.
- 0205E - Letter Report: Project model validation plan (April 1993). The report will establish methods for using existing monitoring data to validate portions of the project model. The plan will establish criteria for selection of comprehensive data sets by Task 05 to complement calculations by Tasks 04 and 07, with evaluation criteria for Task 08.
- 0205F - Letter Report: Output display document (September 1993). The planned computer codes will produce voluminous numerical outputs of daily radionuclide concentrations in various media at many locations. To assist in review and presentation of these data, various display mechanisms will be investigated. This may include but is not limited to GIS and other computer graphic techniques.

Project Deliverables

- Techniques for computations
- Selection of temporal and spacial resolution for surface water model
- Selection of surface-water model
- Hanford VAMP validation scenario.

QUALITY ASSURANCE

Subtask 0201 requires QA/data verification activities in regard to the data management activity. The specific Software Control Procedures (SCPs) include SCP-70-318, "Control of Data Bases," and SCP-70-317, "Transfer of Software, Data, and/or Documentation."

Subtask: 0205, Pathways and Dose Model Requirements

Subtask 0204 requires QA/data verification activities in regard to the data management activity. The specific SCPs include SCP-70-318, "Control of Data Bases," and SCP-70-317, "Transfer of Software, Data, and/or Documentation."

Subtask 0205 reflects a requirement for design documentation, SCP-70-312 "Determination of Software Requirements"; for code review, SCP-70-313, "Final Internal Development Review of Software and Documentation"; and for verification/validation, SCP-70-315, "Conversion Testing, Verification, and/or Validation of Software." The applications performed for the VAMP intercomparison will be controlled by procedures on data transfer and database management, SCP-70-317 and -318, as well as SCP-70-316, "Software Application Control."

INTERACTIONS

This task requires interactions with all other technical tasks of the HEDR Project. The Project Technical Coordination and Analysis subtask (0204) specifically deals with each task in the data management and model reliability analysis activities. The Pathways and Dose Model Requirements subtask (0205) deals with Task 07 in model support and with Tasks 05, 07, and 08 in model validation activities.

ORGANIZATION

TSP Quality Assurance and Technical Integration Subcommittee D. S. Barth, Chair

02	Technical Integration	B. A. Napier, Task Manager
0201	Technical Integration Planning, Control, and Reporting	B. A. Napier, Subtask Manager
0204	Project Technical Coordination and Analysis	B. A. Napier, Subtask Manager
J. C. Simpson (Task 08)
L. Wilhelmi
0205	Pathways and Dose Model Requirements	B. A. Napier, Subtask Manager
J. C. Simpson (Task 08)
W. T. Farris (Task 07)
T. A. Ikenberry
S. V. Shoemaker (Task 07)

TASK 03: SOURCE TERMS

SCOPE

The purpose of the Source Terms Task is to provide reconstructed estimates of the amounts and timing of radionuclide releases from Hanford. These estimates will be used by other HEDR tasks to estimate doses received by the public from Hanford operations and also to provide the public with detailed single-source information concerning historical Hanford releases.

Two levels of detail are forecasted for source term work:

- Level 1 - airborne radionuclides defined on daily basis; waterborne radionuclides on a weekly basis. This provides sufficient detail for input to the transport models.
- Level 2 - monthly or annual definition.

Dosimetry-related radionuclides are provided at Level 1. Radionuclides that contribute small amounts to the dose, but for which the public has expressed interest, will be provided at Level 2.

No groundwater source terms are provided. Battelle has access to a Westinghouse Hanford Company (WHC) CERCLA database, which is sufficient. The CERCLA database is a ranking of inactive waste sites on the Hanford Site. Information on all such sites includes a site description, estimated hazardous material inventory, and a relative ranking upon which to establish a cleanup priority.

The CERCLA database is comprehensive enough to address any future source term issues concerning groundwater contamination.

Airborne carbon-14, tritium, and fission products were added to those listed in the Project Summary Schedule (letter report from D. B. Shipler to J. E. Till, April 3, 1991).

Waterborne scandium-46, manganese-54, and cobalt-60 were added because they were used by the U.S. Geological Survey (USGS) in its study of Columbia River system sediments. The river model development may require a more accurate reconstruction of the Hanford source, at least for their study period. Waterborne sources from reactor coolant purges and from failed fuel are

addressed in other specific task activities. It may be necessary to add some releases from these sources to the appropriate radionuclide source term.

Special irradiation programs, including lithium and thorium irradiations, will be addressed under historical releases. Significant contributions from these sources will be added to the appropriate release estimates, if required.

This task includes the following elements for FY 1992:

- Source Terms Technical Planning, Control, and Reporting (0301)
- Radioactive Releases to Air (0303)
- Radioactive Releases to Water (0304)
- Release Model Development, Verification, and Validation (0305)
- Hanford Historical Releases (0306)
- Radioactive Release Data Availability and Review (0307).

SUBTASK 0301: SOURCE TERMS TECHNICAL PLANNING, CONTROL, AND REPORTING (WBS 3.6)

Scope

This subtask provides management, control, reporting and administration of the source term subtasks. Planning, meeting attendance, documentation, reporting and publications are included. Efforts to meet QA planning, audits for accuracy, traceability and compliance are included, as well as technical integration with other HEDR tasks.

The work to achieve defined scopes of work is included in each subtask plan; those activities not directly related to the work in subtask plans are included here.

Approach

HEDR management and administrative procedures in place will be applied to manage this task. These include planning for compliance with project QA practices, DQOs, project management, finance, and reporting requirements.

Activities include the following:

- project planning/task planning
- meetings (TSP, public, and project)
- documenting, reporting and publications
- project integration/interactions.

Milestones to the TSP

None.

Project Deliverables

- Task plan input
- Monthly report input
- Presentations to the TSP and its subcommittees
- Project documentation.

Subtask: 0301, Source Terms Technical Planning, Control, and Reporting

Note: This subtask has no milestones to the TSP/CDC.

	O	+
	N	+
	D	+
	J	+
	F	+
FY 1992	M	+
\$47 K	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
	O	+
	N	+
	D	+
	J	+
	F	+
FY 1993	M	+
\$30 K	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
	O	+
	N	+
	D	+
	J	+
	F	+
FY 1994	M	+
\$9 K	A	+
	M	+
	J	+
	J	+
	A	+
	S	+

SUBTASK 0303: RADIOACTIVE RELEASES TO AIR (WBS 3.2, 3.3)

Scope

This subtask will provide source term input from 1944-1991 to the atmospheric transport model for iodine-131 (1947-1991 only; 1944-1947 was completed in FY 1991), ruthenium-103, ruthenium-106, cobalt-60, cerium-144, and tellurium-132. This means the nominal monthly values will be provided for the operating life of the reactors and separations plants. Actual output files to the atmospheric transport model will be produced by the release model code.

Monthly summary tables will be provided for the following sources and radionuclides:

<u>Separations Areas</u>	<u>Reactor Areas</u>
plutonium-239	argon-41
iodine-129	carbon-14
strontium-90	tritium
cesium-137	fission products
krypton-85 (1944-1960)	

Approach

Airborne releases from the 200 Area will be calculated starting from reactor operating conditions that determine the radionuclide composition of the spent fuel dissolved. The separations plant operating records determine the times of dissolution, and the dissolver off-gas treatment equipment in service at the time determines the fraction released.

Spent fuel composition will be determined using the ORIGEN2 computer code as needed. There is no cross-section library for the single-pass Hanford production reactors (HPRs). The neutron spectrum that most nearly resembles that of the Hanford single-pass HPRs is an N Reactor library developed at Hanford. Heeb (1991) addresses the maximum uncertainty that could result from using the N Reactor library for HPRs. Maximum uncertainties greater than 10% would be expected for cobalt-60, ruthenium-106, and plutonium-239. Correction factors will be developed for these radionuclides. All other airborne radionuclides can be computed with ORIGEN2 at less than 10% error.

Release estimates will cover the period from 1944 through 1972, when the last of the HPR fuel was reprocessed.

Release factors will be determined for each element. They will be time-dependent as release control equipment is installed and/or the mode of operation changed.

Data Quality Objectives

New Data/Information to Be Developed

Radionuclide source terms of releases to the atmosphere from Hanford facilities for the period 1944-1972.

Final Use of Data/Information

Input to air release models that provide realizations of possible magnitudes and times of releases of radionuclides to the air transport model.

Data Quality Objectives

- Accuracy - The objective is to provide accurate estimates of source terms that are based on historical records of plant operation. Accuracy will be verified by comparison with historical measurements.
- Completeness - The objective is that the information should cover the period from 1944 through 1972 and identify radionuclides contributing up to 99% of the potential radiation dose from the air pathways. This will be achieved through collaboration with Tasks 02 and 07, in preparation of a report similar to the Phase I "dominant radionuclides" report. Completeness will be evaluated through peer review and TSP approval.
- Representativeness - The objective is for the data to represent all known activities, operating variations, and accidental releases. To ensure representativeness, all recorded incidents will be included in the development of the release data, which will be verified by peer review.
- Comparability - Cross-comparisons will be made with multiple historical reference sources where possible. The reasons for any quantitative discrepancies will be

resolved. The objective is to completely resolve the reasons for discrepancies that are larger than 10%.

Milestones to the TSP

- 0303A - Airborne release report (November 1991)
- 0303B - Iodine-131 source terms, 1944-1991 (December 1992)
- 0303D - Report on key radionuclides released to air, 1944-1991 (June 1993).

Project Deliverable

- Source terms to Subtask 0305 for release modeling.

Subtask: 0303, Radioactive Releases to Air

SUBTASK 0304: RADIOACTIVE RELEASES TO WATER (WBS 3.4)

Scope

This subtask will provide source terms for radionuclides released to the Columbia River from the eight original single-pass HPRs and from N Reactor over the operating life of these facilities. Detailed releases will be provided for phosphorus-32, zinc-65, arsenic-76, neptunium-239, sodium-24, manganese-56, copper-64, chromium-51, iodine-131, and tellurium-132. Yearly estimates will be provided for strontium-90, tritium, and cesium-137. In addition, monthly releases will be provided during the USGS study period for scandium-46, manganese-54, and cobalt-60. One USGS study period covers the period for January 1964 to September 1966 (Haushild et al. 1973). Another covers the period from April 21 to May 12, 1966 (Glen 1973). The final USGS report is Haushild (1975). A discussion of the USGS results starts on page 9.20 of Walters et al. (1992).

Approach

Waterborne releases will be obtained primarily from measurements. However, only total beta activity was measured routinely in the early period (1944-1951), and gaps exist in the Health Instruments Operation's reports of effluent activity. Activation calculations may be performed to provide a continuous source term and to relate total beta activity to the radionuclide contributors of interest to HEDR.

Neutron activation occurs when the parent nuclide present in low concentrations in the reactor inlet water passes through the intense neutron flux of the pile—a process that takes about 1 second. The concentration of the activation product depends upon five parameters:

- concentration of the parent nuclide in the inlet water
- residence time in-pile (hold-up time)
- cross section of the parent nuclide
- cross section of the activated nuclide
- decay rate of the activated nuclide.

The first two items are not very well known. Data on low-level concentrations of parent nuclide elements in the Columbia River from 1944 to 1971 are sporadic or nonexistent. Effective hold-up times were estimated for many radionuclides in HW-69969. It was found that the effective hold-up time is essentially unrelated to the physical transit time of water through the reactor for all radionuclides of interest. Normalizations to measured effluent radionuclide activity can be made with activation calculations, which would use "measured values" of the hold-up time. It is expected that reactor operating history records with an application of activation calculations normalized via effective hold-up times will provide necessary surface-water release estimates.

Activities include the following:

- A. Develop a Standard Method of Performing Reactor Activation Calculations and Normalizing to Measured Data
 - Determine effective hold-up times
 - Develop calculational method to relate total beta and gamma monitoring results to contributing radionuclides.
- B. Estimate Columbia River Releases
 - 100 Area phosphorus-32 releases, 1944 to shutdown
 - 100 Area zinc-65 releases, 1944 to shutdown
 - 100 Area arsenic-76 releases, 1944 to shutdown
 - 100 Area neptunium-239 releases, 1944 to shutdown
 - 100 Area sodium-24 releases, 1944 to shutdown
 - 100 Area manganese-56 releases, 1944 to shutdown
 - 100 Area copper-64 releases, 1944 to shutdown
 - 100 Area chromium-51 releases, 1944 to shutdown
 - 100 Area iodine-131 releases, 1944 to shutdown
 - 100 Area tellurium-132 releases, 1944 to shutdown
 - 100 Area strontium-90 releases, 1944 to shutdown

- 100 Area tritium releases, yearly, 1944 to shutdown
- 100 Area cesium-137 releases, yearly, 1944 to shutdown
- 100 Area scandium-46 releases, USGS study period
- 100 Area manganese-54 releases, USGS study period
- 100 Area cobalt-60 releases, USGS study period
- Characterize radionuclide releases from reactor coolant system purges
- Characterize radionuclide releases from failed fuel.

Data Quality Objectives

New Data/Information to Be Developed

Radionuclide source terms of releases to the Columbia River from Hanford facilities for the period 1944-1972.

Final Use of Data/Information

Input to surface-water release models that provide realizations of possible magnitudes and times of releases of radionuclides to the river transport model.

Data Quality Objectives

- Accuracy - The objective is to provide accurate estimates of source terms that are based on historical records of plant operation and measured releases. Accuracy will be verified by comparison with other historical release measurements.
- Completeness - The objective is that the information should cover the period 1944 through 1972 and identify radionuclides contributing up to 99% of the potential radiation dose from river pathways. This will be achieved through collaboration with Tasks 02 and 07, in preparation of a report similar to the Phase I "dominant radionuclides" report. Completeness will be evaluated through peer review and TSP approval.
- Representativeness - The objective is for the data to represent all known activities, operating variations, and accidental releases. To ensure representativeness, all recorded incidents will be included in

the development of the release data, which will be verified by peer review.

- Comparability -

Cross-comparisons will be made with multiple historical reference sources. The reasons for any quantitative discrepancies will be resolved. The objective is to completely resolve the reasons for discrepancies that are larger than 10%.

Documentation

The results of the investigations described above will be documented in a section of the final report to the TSP.

Milestone to the TSP

- 0304B - Source term report for reactor releases to surface water, 1944-1991 (June 1993).

Project Deliverables

None.

Subtask: 0304, Radioactive Releases to Water

SUBTASK 0305: RELEASE MODEL DEVELOPMENT, VERIFICATION, AND VALIDATION
(WBS 3.5)

Scope

The Source Term Release Model (STRM) was developed and applied to the early iodine-131 releases in FY 1991. It currently provides a stochastic input mechanism for the atmospheric models that accounts for uncertainty in timing and magnitude of releases. It also provides a stand-alone assessment capability for quantifying the final source term uncertainty in terms of the uncertainties in each of the components used to estimate the source term. This subtask will expand the model to include water releases. It will document the model. It will verify that the code properly implements the conceptual model and that the model appropriately represents the uncertainties in the estimation of HEDR source terms.

Some inputs to STRM are probability distributions. This subtask will provide sufficient information to formulate the required probability distributions for airborne and waterborne releases. The distributions will be developed with the assistance of the HEDR Statistics Task. Nominal values ("best estimates") that form the base set for the release values will be supplied by the Source Terms Task.

Approach

The STRM provides sets of input files to the transport models. Each file in a set represents a possible configuration of source term input for the transport model. Each of these "realizations" results from an independent sampling of the various probability distributions that express the uncertainties in the parameters used to generate the source term. The uncertainties fall into two broad classes: those that deal with the magnitude of the release and those that deal with the timing of the release. Examples of the first of these would be

- nuclear constants such as cross sections, energy per fission, and decay constants
- irradiation conditions such as reactor power level, fuel burnup, average power of fuel in a given discharge, and time of discharge

- separations process parameters such as emission control measures employed and their effectiveness (release fraction), amounts of spent fuel processed, and cooling time.

Uncertainty in the timing of releases results primarily from records that do not provide sufficient detail. Periods of greatest detail will be selected to formulate distribution functions and these will apply to the periods lacking in detail. This technique is appropriate to the state of information that is often quite detailed, but lacks the continuity required for complete source term definition.

Activities include the following:

- Release model documentation, verification, and validation
- Release model applications to airborne releases
- Release model applications to waterborne releases
- Release model applications to Hanford historical radioactive releases (WBS 3.5).

Data Quality Objectives

New Data/Information to Be Developed

Models that will provide the time-phased radionuclide release input to environmental transport models.

Final Use of Data/Information

Models will be used to provide source term input for HEDR environmental transport models.

Data Quality Objectives

- Accuracy - The objective is to provide the best estimates within available information, including uncertainties and unavailability of recorded data. Results will be compared with direct evaluations and variances will be defined to measure accuracy.

- Comparability - The objective is that uncertainty calculated by the code shall fall within the range of available information. Direct evaluations will be used to determine comparability. Results of direct evaluations and variances will be defined to measure comparability with previous measurements and calculations.

Documentation

DQO achievement and measurement results will be provided in a section of the model documentation report.

Milestone to the TSP

- 0305A - Release model documentation report (September 1993).

Project Deliverables

- Input files to atmospheric transport model (as required by internal project schedules)
- Input files to river model (as required by internal project schedules).

Subtask: 0305, Release Model Development, Verification and Validation

SUBTASK 0306: HANFORD HISTORICAL RELEASES (WBS 3.3)

Scope

This subtask will provide input to a comprehensive description of releases of radioactive materials from Hanford operations since 1944. It will include annual releases by major facilities for most radionuclides.

Approach

The other source term subtasks deal with the primary sources of the release of radionuclides: the reactors and separations areas. These will be summarized in a single release history document that will be part of the project final report. Releases from other Hanford facilities will be documented based upon original Hanford sources. If there is some reason to believe the original estimates are not accurate, an attempt will be made to improve the estimate based on current technology.

Data Quality Objectives

New Data/Information to Be Developed

A bibliographic database will be developed of references pertaining to the release of radionuclides from Hanford facilities.

Final Use of Data/Information

Creation of Hanford radioactive release history from sources other than production separations facilities and production reactors.

Data Quality Objectives

- Completeness - The objective is that the information will cover Hanford sources other than production separations facilities and production reactors for the period from 1944 through 1991. To ensure completeness, a document search tree will be developed and followed to identify and retrieve Hanford-originated documents related to radionuclide releases.
- Representativeness - The objective is that the bibliography must represent all principal activities, operating variations, and accidental releases. To ensure representativeness, all searchable records will be included in the database. This will be verified by peer review.

Documentation

The results of achievement and measurement of the DQOs will be documented in the project final report.

Milestones to the TSP

None.

Project Deliverable

- Status of data development to Task 01 for input to project final report.

Subtask: 0306, Hanford Historical Releases

Note: This subtask has no milestones to the TSP/CDC.

	O
	N
	D
	J
	F
FY 1992	M
\$0 K	A
	M
	J
	J
	A
	S
	O
	N
	D
	J
	F
FY 1993	M
\$0 K	A
	M
	J
	J
	A
	S
	O
	N
	D
	J
	F
FY 1994	M
\$77 K	A
	M
	J
	J
	A
	S

SUBTASK 0307: RADIOACTIVE RELEASE DATA AVAILABILITY AND REVIEW (WBS 3.1)

Scope

Quantitative radionuclide releases covering the operating history of major Hanford facilities are required as the first step in calculating doses. An essential requirement in developing quantitative release history estimates is the reconstruction of the operating history of the production reactors and separations facilities over their lifetimes. This subtask will provide the necessary plant operating information base for the reconstruction of release histories. In addition to providing the basis for release estimates, this subtask will form the starting point for the comprehensive report on the history of Hanford radioactive releases.

Approach

Historical documents required in source term reconstruction will be identified and entered in the source term bibliographic database.

Activities include the following:

- update source term bibliographic database and integrate with HEDR Project database
- search for 100, 200, 300, and 400 Area operations data and create a quantitative facility operating history database as input for release calculations
- reconstruct reactor and separations plant operations quantitatively in terms of amounts and character of spent fuel discharged and reprocessed
- prepare operational history of emission control systems and procedures
- prepare continuous history of reactor water treatment methods that are crucial to activation product releases to the river.

Data Quality Objectives

New Data/Information to Be Developed

A bibliographic database will be developed of references pertaining to the release of radionuclides from Hanford facilities with information to develop magnitudes and times of releases.

A qualitative operating history will be reconstructed for the Hanford reactors and separations facilities, which will be used to calculate airborne and surface-water releases in FY 1993.

Final Use of Data/Information

- Input to Subtasks 0303 and 0304 (FY 1993) for generation of facility source terms to the atmosphere and to the Columbia River.
- Input to the Hanford radioactive release history.

Data Quality Objectives

- Completeness - The objective is that the information will cover the eight original Hanford reactors and the four separations facilities for the period from 1944 through 1991. To ensure completeness, a document search tree will be developed and followed to identify and retrieve Hanford-originated documents related to radionuclide releases.
- Representativeness - The objective is that the bibliography must represent all known activities, operating variations, and accidental releases. To ensure representativeness, all searchable records will be included in the database. This will be verified by peer review.

Documentation

The results of achievement and measurement of the DQO will be documented as a section in the milestone report to the TSP.

Milestone to the TSP

- 0307A - Letter Report: Hanford operations leading to radioactive releases, 1944-1991 (October 1992). Will provide the basis for airborne and waterborne release calculations. Will include amounts of material processed at separations area (for air releases) and reactor operating history (for water releases). Radionuclides studied are those listed under Subtasks 0303 and 0304 in the FY 1993 task plan.

Project Deliverables

- Bibliographic database of Hanford facility references concerning operations and releases to the project files
- Bibliographic database to Subtasks 0303 and 0304
- Basic reconstruction of Hanford facility operations to Subtasks 0303 and 0304.

Subtask: 0307, Radioactive Release Data Availability and Review

	O	
	N	
	D	
	J	
	F	
FY 1992	M	
\$166 K	A	
	M	
	J	
	J	
	A	
	S	
	O	► 0307A, Letter Report: Hanford operations, 1944-1991
	N	
	D	
	J	
	F	
FY 1993	M	
\$0 K	A	
	M	
	J	
	J	
	A	
	S	
	O	
	N	
	D	
	J	
	F	
FY 1994	M	
\$0 K	A	
	M	
	J	
	J	
	A	
	S	

QUALITY ASSURANCE

Traceability of all calculations from the initial source will be maintained. Hand calculations will be performed according to applicable Battelle procedures. Battelle software control procedures SCP-70-312 through -317 will be followed where applicable. An annotated log of all documents examined will be maintained.

INTERACTIONS

The Source Terms Task supplies input to Task 04, Environmental Transport. Requirements for the interaction are specified by Task 02, Technical Integration, and Task 08, Statistics.

ORGANIZATION

TSP Source Term Subcommittee
M. A. Robkin, Chair
B. Shleien

03	Source Terms	C. M. Heeb, Task Leader
0301	Source Terms Technical Planning, Control, and Reporting	C. M. Heeb, Subtask Leader
0303	Radioactive Releases to Air	C. M. Heeb, Subtask Leader
0304	Radioactive Releases to Water	C. M. Heeb, Subtask Leader
0305	Release Model Development, Verification and Validation	C. M. Heeb, Subtask Leader
0306	Hanford Historical Releases	C. M. Heeb, Subtask Leader
0307	Radioactive Release Data Availability and Review	C. M. Heeb, Subtask Leader

TASK 04: ENVIRONMENTAL TRANSPORT

SCOPE

In the Environmental Transport Task, information will be acquired and evaluated to support development of transport models that will be used in dose estimating for the feasibility study being conducted by the HTDS. This task consists of the following elements:

- Atmospheric Model Development and Evaluation (0402)
- Groundwater Transport (0403)
- Surface-Water Transport (0404)
- Atmospheric Model Database (0405)
- Atmospheric Model Calculations (0406).

Former Subtask 0401, Environmental Transport Technical Planning, Control, and Reporting, is now addressed as part of Subtask 04A (Atmospheric Transport), Subtask 04B (Surface-Water Transport), and Subtask 04C (Groundwater Transport) (see p. 5.29).

SUBTASK 0402: ATMOSPHERIC MODEL DEVELOPMENT AND EVALUATION (WBS 4.1.1, 4.1.2, 4.1.3, 4.1.5, 4.1.6)

Scope

The scope of atmospheric model development and evaluation will include the following activities:

- atmospheric model documentation
- model reliability studies
- participation in model sensitivity/uncertainty workshop organized by Task 08
- revision of the model as appropriate for transport and diffusion calculations in years of low emissions.

Approach

The atmospheric model will be documented in a HEDR report that will be subjected to peer and editorial review.

Model reliability studies will be conducted that cover model sensitivity, model uncertainty, and model validation. Initial model reliability studies will be conducted to prepare for a sensitivity/uncertainty workshop to be held in the second quarter of FY 1993 (see Task 08). The results of the workshop will be used to guide the reliability studies that follow. Ultimately, the reliability studies will examine the sensitivity of model output to uncertainty in model parameters and input data. They will also examine the sensitivity of model output to the forms selected for representing atmospheric processes. These studies will specifically address the effect of temporal integration on sensitivity.

The model validation studies will address the relationship between predicted and measured time-integrated air concentrations and surface contamination for specified time periods. These studies will be undertaken jointly with project statisticians. Criteria to be used in evaluation of validation data sets include number of tests, tracer characteristics, adequacy of source definition (time and amount), available meteorological data, range of atmospheric conditions, number and type of tracer samples, and range of distances. No data sets used in model development will be considered for use in validation. Prior to conducting model validation tests, a validation protocol will be prepared. The protocol will address the statistical measures to be used in validation and criteria for evaluating the results of the tests. No experiments will be conducted for model validation.

The approaches and procedures used in model reliability studies will be documented in HEDR reports.

The modeling domain for the period from December 1944 through December 1945 is an area approximately bounded by 44°N, 121.5°W, 49°N, and 116°W. As the release rates decrease, it may be appropriate to decrease the size of the model domain and reduce the complexity of the model used for atmospheric

calculations. Results of calculations for the 1944-1949 period will provide a basis for recommendations to the TSP related to changes in the model and model domain.

If the TSP determines that use of a less complex atmospheric transport model is acceptable for the period from 1950 through 1991, a model for that period will be prepared, tested, and documented.

Activities in this subtask will address the following:

- A. Wind Field Model Implementation
- B. Model Documentation
- C. Model Reliability Studies
 - prepare for and participate in uncertainty/sensitivity workshop
 - identify and evaluate model validation data sets
- D. Evaluation of Atmospheric Modeling Requirements for the Periods when Release Rates Decrease.

Data Quality Objectives

New Data/Information to be Developed

Results of sensitivity/uncertainty analysis on the atmospheric transport and dispersion model.

Final Use of Data/Information

Decisions relative to scope of additional model development or modification work and need for additional or refinement of input or parametric information. Establishment of model and databases for verification and validation studies.

Data Quality Objectives

- Accuracy - Bias is a measure of model accuracy. It is the difference between model predictions and observed values. The objective for accuracy is that bias in monthly average air concentrations be less than a factor of three. Statistical evaluation of the stochastic realizations will be performed and compared to monitoring data for selected locations.

A method of evaluating model bias will be determined with the assistance of project statisticians.

- Precision - The objective is that precision will be determined stochastically from the variability built into the source term model.
- Completeness - The objective is that the model be capable of estimating dispersion and deposition within an area approximately bounded by 49°N, 116°W, 44°N, and 121.5°W. Time-integrated air concentrations and surface contamination will be computed at intervals of no more than 10 miles. The code should handle deposition, plume depletion, and variable atmospheric processes. Completeness will be ensured by using outside experts to identify and evaluate alternative methods and models. Peer review will be performed of the modeling techniques.
- Representativeness - The objective is for the model to account for physical phenomena that affect dispersion of material in the environment. These phenomena include transport, diffusion, wet and dry deposition, and radioactive decay. Outside experts will assist in identification and evaluation of methods for treating atmospheric processes in the model. The model will undergo peer review.
- Comparability - The objective is that the model treat phenomena that are treated in similar, nationally accepted atmospheric dispersion models.

Documentation

A section of the model documentation report will discuss the DQO processes, evaluations, and results described above.

Milestones to the TSP

- 0402B - Report documenting the atmospheric model (February 1992). The report will include
 - a description of the problem being addressed
 - the technical basis for the model, including the basic equations
 - a user's guide to the model
 - a programmer's guide with flow charts and glossary of variables

- a code listing
- sample data sets and model output.
- 0402D - Meteorological data report (October 1992); folded into Milestone 0405A. This completes work continued from FY 1991.

Project Deliverables

- Input to Task 07 for model verification/validation in FY 1994
- Results of atmospheric model reliability studies for inclusion in the Task 08 model reliability report in FY 1993
- Status information to Task 01 for Project Final Report in FY 1994.

Subtask: 0402, Atmospheric Model Development and Evaluation

SUBTASK 0403: GROUNDWATER TRANSPORT (WBS 4.2)

Scope

Dose calculations will be completed for groundwater pathways and added to the groundwater pathways report during FY 1992. The report consists of four sections: 1) Hanford Site well data analysis, 2) riparian wells, 3) watershed deposition, and 4) offsite groundwater migration. The information contained in the document is needed for a TSP decision on whether the groundwater pathway has been adequately addressed.

Approach

The approach during the first quarter of FY 1992 will be to work with staff members from Task 07 (Environmental Pathways and Dose Estimates) to finalize dose calculations for the groundwater pathways. Qualified technical staff will be identified for peer review of the groundwater report and editorial and HEDR Project Office comments will be incorporated. Comments will be obtained from members of the TSP Environmental Transport subcommittee and incorporated into the document. Review comments from the TSP will be obtained and the document will be published as a Battelle report. Presentation of information at TSP meetings will accompany submittal of the document to the TSP.

Data Quality Objectives

New Data/Information to Be Developed

A single report presenting existing information on Hanford-originated radionuclides in wells, washoff, and offsite groundwater migration.

Final Use of Data/Information

The information contained in the groundwater report will be used by the TSP to make a decision on whether the groundwater pathway has been adequately addressed or if additional work is needed. The question being addressed is whether groundwater represents a potential pathway by which significant radiation doses resulting from past Hanford operations could have been received.

Data Quality Objectives

- Accuracy - The objective is that groundwater concentrations be from annual monitoring reports. Accuracy will be ensured by hand-checking the data in reports against the original sources.
- Precision - The objective is to quantify uncertainties in reported and reconstructed concentrations. This will be done by calculating the ranges (maxima, minima and best estimates) of concentrations or assessing the range of observed values. These ranges will be summarized and reported.
- Completeness - The objective is to develop a high level of confidence that discovery of additional groundwater concentration data later will not change reported values by more than an order of magnitude. If additional data change the reported values by more than an order of magnitude, the criteria for completeness will be that conclusions of the investigation do not change. To ensure completeness, a data search and inventory plan will be prepared. Completeness will be evaluated with peer review and TSP approval.
- Representativeness - The objective is that the output be representative of the conditions existing at and near the site over the last 45 years. Peer review of the comparisons will be made to ensure representativeness.
- Comparability - The objective is that reported results be comparable to existing environmental monitoring reports. To ensure comparability, existing documentation will be reviewed. Peer review of conclusions will be obtained to verify comparability.

Documentation

The results of the DQO processes and evaluations described above will be documented in a section of the final report to the TSP.

Milestone to the TSP

- 0403A - Groundwater report (January 1992). Topics to be discussed include a description of Hanford Site groundwater, Hanford Site wells used for drinking water, the offsite migration pathway, the riparian well pathway, the watershed pathway, and conclusions. Appendixes will

include summaries of drinking-water systems at the Hanford Site and drinking-water limits for radionuclides, as well as available information on water sources for communities along the Columbia River downstream from the Hanford Site.

Project Deliverables

None.

Subtask: 0403, Groundwater Transport

SUBTASK 0404: SURFACE-WATER TRANSPORT (WBS 4.3)

Scope

During FY 1992, radionuclide transport in the Columbia River will be reviewed from 1944-1971 from Priest Rapids Dam to the coastal areas and summarized in several reports.

This subtask consists of the following activities:

- document the literature and database review
- participate in cooperative development of the river database with Task 05
- develop a conceptual model for the Columbia River system and adjacent coastal areas
- document the conceptual model.

The final scope of work performed under this task will be determined by the TSP based on the results of the literature and database review and conceptual model work. The scope of work described herein is based on assumed needs of the project at this time. The proposed work includes developing the computational approach for water concentrations and performing those computations for specified locations and time periods. The work is limited to the length of the Columbia River from Priest Rapids Dam downstream to the vicinity of The Dalles and Bonneville dams for about 8-12 locations and about 13 radionuclides. The time period under study extends from 1944 through 1971.

Approach

The approach is divided into three pieces of work: 1) review and summarize existing literature, 2) develop computational approach, and 3) conduct hydraulic modeling of water concentrations.

Report of Literature and Database Review

From the literature and database review (conducted in FY 1991), a report will be prepared summarizing the results of previous studies containing information on radionuclide releases, activity levels, and distributions in the Columbia River system. These previous studies, which began in the late 1940s and continued intermittently through the early 1970s, were conducted by

Hanford contractors and by groups external to Hanford (e.g., universities and state and federal agencies). General topics included the uptake and release of radionuclides in stream sediments, uptake by biota, mixing processes, and behavior of specific radionuclides in river systems. Locations from Hanford downstream to the coastal areas are represented with some studies that are very site-specific and others that extend over many miles of river. An evaluation of data availability for the river locations and adjacent coastal areas will be provided. The report will provide descriptions of the governing transport processes, radionuclide accumulation areas, and key time periods of concern.

Conceptual Model

Using the river database and information obtained from reports, journal articles, and conference proceedings, a conceptual model of the river transport processes will be developed. The model will describe the behavior of radionuclides in the river system with respect to uptake and release by sediment and biota (sink and source areas within the river channel) and seasonal river discharge effects. During the review work, simple dilution-decay routing will be conducted for specific radionuclides and seasonal or yearly time periods to evaluate and identify modeling constraints (e.g., data needs). Weekly and monthly time steps will be compared for relative accuracy of downstream concentration prediction. Through the development of the model, significant time periods and river locations of concern will be identified.

Activities for this subtask are summarized below:

A. Literature and Database Review (continued from FY 1991)

- review Hanford reports and databases
- review state, federal, and university reports
- assemble Columbia River system hydraulic data
- complete identification of radionuclides.

B. Develop Surface-Water Database (with Task 05)

- develop radionuclide concentration categories (water, sediment, and biota)

- develop hydraulic data and information
 - river dispersion and flow times
 - river system hydrographs
 - river geometry.

C. Document Literature and Database Review

D. Develop Conceptual Model of Columbia River

- transport processes (river, estuary, and coastal)
- specific radionuclide behavior in water
 - determine transport modeling constraints
 - select radionuclides for study
- mixing processes (Hanford reach)
- radionuclide accumulation areas (sediment/biota)
- identify key time periods of concern
- identify transport modeling constraints
- conduct simple routing calculations
 - specific radionuclides
 - specific time periods
 - evaluate results based on conceptual model.

E. Document Conceptual Model Results

Develop Computational Approach

An approach for calculating water concentrations will be determined based on the final results of the initial dilution-decay routing of reactor effluent source-term data (began in FY 1992) and an evaluation of HEDR Project requirements. River hydraulic models under consideration will be evaluated with respect to their compatibility to project needs. The selected model will be initially tested using a small raw database consisting of source-term and monitoring data (for comparison) for one or two radionuclides. This would involve one or two years of releases and corresponding measurements in the river (various locations downstream). Included will be an initial test application of uncertainty analysis (Task 08) and QA procedures (Task 10) to the proposed modeling effort.

Conduct Hydraulic Modeling of Water Concentrations

During the second quarter of FY 1993, work will involve preparing the source term database (received from Task 03) as input to the selected computational model for calculating water concentrations for specific river locations and times. The model output database will be turned over to Task 07 by the end of the third quarter of FY 1993. The modeling will be limited to the reach of the Columbia River extending downstream from Priest Rapids Dam to the vicinity of Celilo Falls near The Dalles. The time period under consideration begins in 1944 and ends about 1971, although modeling calculations may be performed only for specific years. For the reach of river described, the calculation of water concentrations will be limited to about 8-12 locations.

Summary of Subtask Activities

A. Develop Modeling Approach

- conduct final testing of dilution-decay calculations
- review available river models
- select model based on project needs
- test model applicability
 - adapt to computer system
 - test with small database (source/sampled)
 - conduct initial testing of uncertainty analysis (with Task 08)
- finalize modeling approach.

B. Modeling of Water Concentrations

- prepare input database
- calculate time-varying water concentrations
- submit results to Task 07.

C. Prepare Final Report

- describe model
- discuss results.

Data Quality Objectives

New Data/Information to Be Developed

New information will include 1) concentrations of several radionuclides in Columbia River water, sediments, and biota (fish), at several locations for specified time periods, 2) estimates of doses received by representative individuals downstream of Hanford along the Columbia River (contributed by Task 07), 3) a conceptual river model, and 4) estimates of river water concentrations with a computational model.

Final Use of Data/Information

Input to dose calculation models, a preliminary description of river pathways and their potential impacts, and results from calculation of river water concentrations.

Data Quality Objectives

- Precision - The objective is to quantify uncertainties in reported and reconstructed concentrations. This will be done through uncertainty analyses. Distributions will be developed and reported.
- Representativeness - The objective is that the output be representative of the conditions existing in the Columbia River over the last 45 years. To ensure representativeness, peer review of the comparisons will be made.
- Comparability - The objective is for the results to be comparable to existing environmental monitoring reports, publicly available dose estimates, and current understanding by cognizant agencies of river hydraulics. Review of existing documentation will be performed. Peer review of conclusions will be obtained to verify comparability.

Documentation

The results of the DQO evaluations described above will be documented in a section of the report on the Columbia River modeling approach (0404C, June 1993) to be provided to the TSP.

Milestones to the TSP

- 0404A - Report summarizing the Columbia River pathway findings from key documents reviewed during FY 1991 (April 1992). The results of earlier studies conducted on the river pertaining to radionuclide concentrations and transport from 1944-1991 will be summarized. Examples of data will be presented as ranges of values instead of reproducing the entire set. Typical data sets will be illustrated with graphics. The report includes dose estimates from the river pathway for representative individuals downstream from Hanford. A complete bibliography of the collected documents will be presented in the Task 05 report to avoid duplication of effort.
- 0404B - Letter Report: Description of the conceptual model of Columbia River transport processes (December 1992). The report will describe the behavior of the key radionuclides for critical time periods and locations. Included will be the results of initial routing calculations for specific radionuclides and time periods.
- 0404C - Report for the TSP that describes the modeling approach and the river locations and time periods considered (June 1993). A discussion of the simulation results will be presented for each location.

Project Deliverables

- Monthly report input
- Radionuclide concentrations described in this technical work plan to Task 07 for use in dose estimation (June 1993).

Subtask: 0404, Surface-Water Transport

SUBTASK 0405: ATMOSPHERIC MODEL DATABASE (WBS 4.1.4)

Scope

Entry of meteorological data required for atmospheric model calculations will be completed. Post-entry data checks will be completed, and data files will be prepared for use in model calculations. The topographical data used by the atmospheric transport model will be reviewed for appropriateness. The data will be revised if warranted.

The approximate boundaries of the model domain are 44°N, 121.5°W, 49°N, and 116°W. The domain may be reduced in size as the historical emissions from operations at the Hanford Site decrease.

Approach

Meteorological data from 1944 through 1947 are not generally available on magnetic media. As a result, the data must be read from microfiche or paper copies of the original observation records and manually entered into the database. As the data are entered, they are subjected to various tests to identify potential errors in the data or data entry. When the data screening is complete and errors have been corrected, the data are added to a station database. Prior to running the atmospheric model, the station databases are combined into the atmospheric model database. An additional data screening program will be developed to examine the consistency of data for all stations for each hour and the hour-to-hour consistency of the data for each station.

Topographical and land use data have been obtained from commercial sources for the entire northwestern United States. These data are on magnetic tapes and compact disks. Data for the model domain will be extracted from the original magnetic media and prepared for use by the atmospheric model. Computer programs for extracting the data from the original media were supplied with the media. Programs will be developed to prepare the data for use by the model.

The atmospheric model database will be documented in HEDR reports that will be subjected to peer and editorial reviews prior to publication.

Activities include the following:

- A. Atmospheric Transport Model Database Extension (time and space)
 - Meteorological database
 - Obtain data for central Oregon and northern Idaho for 1944-1947
 - Enter and verify new meteorological data for 1944-1947
 - Enter and verify meteorological data for 1948-1950
 - Document meteorological database.
- B. Topographical Database
 - Determine land use for model domain and characterization of surface roughness
 - Determine topographic variability for model domain
 - Document topographic database.

Data Quality Objectives

New Data/Information to Be Developed

Database of meteorological information from designated meteorological stations on the Hanford Site and within the Hanford region to support calculation of time-integrated air concentrations and surface contamination for use in dose calculation.

Final Use of Data/Information

Will be the basis for input to the HEDR atmospheric transport and dispersion model.

Data Quality Objectives

- Accuracy - The objective is that the database contain the same information as recorded by the stations. Data entry accuracy criteria will be established by evaluating model sensitivity to data entry errors. A representative subset of the data will be examined to determine data entry accuracy. Data entry errors identified during the examination will be corrected; more extensive data checks will be made if data entry accuracy falls below an acceptable level.

- Precision - The objective is that uncertainties in the data be estimated from historical records and analysis of instrumentation and recording practices insofar as possible.
- Completeness - The objective is to identify and obtain sufficient meteorological data from national meteorological data archives to reconstruct dispersion of radio-nuclides released from Hanford. Completeness will be measured by professional judgment.
- Representativeness - The objective is that the database represent the known available Hanford and regional meteorological information.

Documentation

The quality process, measurements, and results will be a section in the report to the TSP.

Milestones to the TSP

- 0405A - Letter report on status of interim atmospheric model database (October 1992); includes Milestone 0402D.
- 0405B - Letter report on status of atmospheric model database (September 1993).

The reports will

- describe the model database and, where appropriate, list the data
- describe the original data sources and data quality
- describe the instruments used to collect the data
- document computer codes used to process the data.

Project Deliverables

- Input to HEDR database
- Input to HEDR document file.

Subtask: 0405, Atmospheric Model Database

FY 1992 \$87 K	O	
	N	
	D	
	J	
	F	
	M	
	A	
	M	
	J	
	J	
	A	
	S	
FY 1993 \$26 K	O	► 0405A, Letter Report: Interim atmospheric model database and meteorological data (includes Milestone 0402D)
	N	
	D	
	J	
	F	
	M	
	A	
	M	
	J	
	J	
	A	
	S	► 0405B, Letter Report: Atmospheric model database status
FY 1994 \$26 K	O	
	N	
	D	
	J	
	F	
	M	
	A	
	M	
	J	
	J	
	A	
	S	

SUBTASK 0406: ATMOSPHERIC MODEL CALCULATIONS (WBS 4.1.7)

Scope

The atmospheric model will first be used to calculate daily time-integrated air concentrations and surface contamination for the Phase I model domain for iodine-131 releases from December 1944 through December 1949 (FY 1993). These results will be used in the calculation of doses for the HTDS pilot study and for Native Americans. Additional calculations will be performed to support dose calculations of doses from key radionuclides for the full study domain for all years.

Approach

The atmospheric model and model databases will be fully tested and documented prior to making fuel calculations. Source term files will be obtained from the Source Terms Task. Each file will contain a time series of hourly releases for the period to be modeled. The set of files will represent the uncertainties in the quantities of iodine-131 released each hour and the times of the releases. The atmospheric model will be run once with each source file, using the atmospheric model database, to generate sets of files containing the daily time-integrated air concentrations and surface contamination. Each set of files produced by the atmospheric model will describe a possible sequence of daily patterns of iodine in the environment that is consistent with the release sequence and the observed meteorological data. The aggregate of all sets of atmospheric model output will represent the effect of the uncertainty in both the source term and the atmospheric model. All sets of the atmospheric model output will be transferred electronically to the Environmental Pathways and Dose Estimates Task for use in dose calculations.

Samples of atmospheric model output will be checked prior to being transferred to the environmental pathways task. The checks will include examinations of model log files and visual examination of the time-integrated air concentration and surface contamination patterns.

The atmospheric model input used for each model run will be completely documented in a model log file. These files will be archived as project records. In addition, a report will be prepared that summarizes the model

input and output. This report will include examples of daily model output and monthly integrated patterns. It will also include a characterization of the variability in the output resulting from uncertainty in the atmospheric model input.

Activities related to atmospheric transport calculations include the following:

- Establish data transfer protocol
- Run model
- Transfer output to dose calculation (Task 07)
- Analyze model output
- Document model input and results.

Data Quality Objectives

New Data/Information to Be Developed

Daily time-integrated air concentrations and surface contamination as scheduled and requested.

Final Use of Data/Information

The results of the atmospheric model calculations will provide the basis for calculating air pathway doses to individuals and special population groups and analyzing the model.

Data Quality Objectives

- Accuracy - The objective is that bias in monthly time-integrated air concentrations and ground contaminations be within a factor of three. Model accuracy will be evaluated in Subtask 0402 by direct comparisons of model output with available monitoring data.
- Precision - The objective is to characterize the uncertainty in time-integrated air concentrations and surface contamination resulting from uncertainty in the source term, meteorological data, and atmospheric model. The ability of the model to characterize uncertainty will be evaluated in Subtask 0402.

- Completeness - The objective is that concentrations and contamination will be calculated for designated time intervals for all nodes in the model domain.
- Representativeness - The objective is that the atmospheric transport model output represent the distribution of radionuclides in the environment as well as can be done by similar models and represent the uncertainty in the time-integrated air concentrations and surface contamination better than is done with similar models.

Documentation

A summary of the quality process, measurements, and results will be included in the model reliability report to the TSP prepared in Task 08.

Milestones to the TSP

None.

Project Deliverables

- Data files containing time-integrated air concentrations and surface contamination to Task 07 for dose calculations.

Subtask: 0406, Atmospheric Model Calculations

Note: This subtask has no milestones to the TSP/CDC.

FY 1992
\$14 K

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

FY 1993
\$96 K

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

FY 1994
\$29 K

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

QUALITY ASSURANCE

Within the HEDR Project, the Environmental Transport Task relies on databases managed by two other HEDR tasks: Environmental Monitoring Data (Task 05) and Source Terms (Task 03). These databases relate primarily to radionuclide source terms and distributions. The Environmental Monitoring Data and Source Term tasks are responsible for ensuring the quality of these databases.

The Environmental Transport Task also uses information from references external to the project for transport parameters (meteorologic and hydrologic) and independent radionuclide measurements. It is the responsibility of the environmental Transport Task to reference the source of internal and external data and to identify how these data are used. This includes documenting information about how data were verified or validated, and why selected data were used and any other data were not used. Data traceability and verification are reviewed periodically by the project QA officer and TSP observers.

Meteorological data used in the HEDR Project have been collected by various organizations for purposes other than the HEDR Project. In general, the data predate formal QA programs. There is no way to certify the quality of the data. However, the hourly meteorological data selected for use in the HEDR Project came from observations made pursuant to the normal function of the organizations and were used on a routine basis when they were collected. In addition, they were collected by individuals trained in making meteorological observations using standard meteorological instruments for the period. These factors provide some assurance that the instruments were operating properly at the time of the observations and that the data are reasonable.

Meteorological data collected at Hanford have been subjected to numerous checks during and following data entry. These checks include double checks of the raw data entries, range checks, and a recent screening of all data for anomalies in distributions. Data obtained from the National Climatic Data Center are subjected to range checks before being added to the project database. Additional checks will be made prior to using the data in any model calculations that lead to dose estimates.

The atmospheric models used in the HEDR Project are from the atmospheric sciences literature. The models represent the processes of transport, diffusion, deposition, depletion, and decay in a manner that is consistent with the available data and the objectives of the project. Modeling options are discussed with the TSP as they are evaluated. Prior to use of a model in calculations leading to dose estimates, the model will be described in the technical basis section of the documentation of the computer code.

Computer codes used in calculations leading to dose estimates will be developed and modified under formal QA procedures. These procedures require the following elements:

- Preparation of a software requirements specification. This document describes the purpose of the code and establishes the procedures to be followed in design, development, documentation, review, control, testing, and use of the code.
- Development of a software testing plan. The software testing plan establishes the testing documentation requirements, the testing methods, and the acceptance criteria for the code.
- Preparation of software documentation. The software documentation describes the technical basis and provides a user's guide for the code. It may also contain a listing of the code.
- Software review. Prior to formal software testing, codes undergo an independent review to ensure that they satisfy the requirements specifications.
- Software configuration management. Following the software review, codes are placed in configuration management. Once a code is in configuration management, all changes to the code are strictly controlled and must be made following written procedures.
- Software tests (code verification). The formal software tests to ensure that the code is performing as intended are made when the code enters configuration management. These tests are performed in accordance with the software testing plan.

Model calculations will be compared to measured data where suitable data are available. The magnitude of differences will be used in the quantification of the uncertainty of the model outputs and to provide, if possible, direction for changing the model to reduce uncertainties.

Input data for each computer run leading to dose estimates and the output from the run are permanent project records. Output of the atmospheric transport computer codes for use in dose estimates will be formally transferred to other project tasks.

For Subtask 0404 (Surface-Water Transport), a working bibliography will be maintained, which will periodically be transmitted to the project office and be made publicly available. Notations on observations, evaluations, and any other written information developed during the review will be kept in a separate file category. These will be used to prepare the report on this phase of the work.

Because the computational model work for Subtask 0404 will be performed offsite at Washington State University (WSU), a QA Plan and supporting procedures will be implemented at WSU based on subcontract specifications. Battelle QA staff will conduct a site visit to verify QA Plan implementation. Prior to submittal to Battelle of computed databases and other subcontractor records, Battelle QA staff will conduct a review to determine compliance with the applicable technical and QA requirements. All records turnovers will be forwarded to the Battelle task leader, who will submit databases and project records to other tasks and the Project Office.

INTERACTIONS

The Atmospheric Transport Subtask depends on information provided from the Source Terms Task (03) that characterizes the release locations, amounts, and times. This information is needed in making the air concentration and deposition projections and in assessing uncertainties in these projections. The Technical Integration Task (02) defines the products required from the atmospheric dispersion model. The Statistics Task (08) will assist in definition of the required products and in the uncertainty and sensitivity work elements.

Subtask 0404 (Surface-Water Transport) interactions are as follows:

- Task 03 - A reactor effluent source term database will be received from this task to be used as input to the Columbia River modeling work.

- Task 05 - Monitoring data will be obtained from this task for comparison with computed concentration values.
- Task 07 - Model output, consisting of computed water concentrations, as described in these task plans, will be submitted to this task for use in dose calculations.
- Task 08 - This task will provide support in the application of uncertainty analysis to the computed database.

ORGANIZATION

TSP Environmental Transport Subcommittee P. C. Klingeman, Chair

04	Environmental Transport Task	
04A	Atmospheric Transport	J. V. Ramsdell, Task Leader
0402	Atmospheric Model Development and Evaluation	J. V. Ramsdell, Subtask Leader J. C. Simpson (Task 08)
0405	Atmospheric Model Database	J. V. Ramsdell, Subtask Leader
0406	Atmospheric Model Calculations	J. V. Ramsdell, Subtask Leader
04B	Surface-Water Transport	W. H. Walters, Task Leader
0404	Surface-Water Transport	W. H. Walters, Subtask Leader M. C. Richmond (WSU)
04C	Groundwater Transport	M. D. Freshley, Task Leader
0403	Groundwater Transport	M. D. Freshley, Subtask Leader P. D. Thorne

TASK 05: ENVIRONMENTAL MONITORING DATA

SCOPE

There is a relatively large body of historical documents and files containing environmental contamination data. Radionuclide concentrations have been measured at various times and locations in air, Columbia River water and sediment, drinking water, fish, foods, soil, waterfowl, and other environmental media. Members of the Environmental Monitoring Data Task assemble, evaluate, and summarize key historical measurements of radionuclide concentrations in the environment around the Hanford Site. Publication of the data summaries provides documentation of the task activities and is important for the technical and public credibility of the project. These activities also provide information used by the Environmental Transport Task (04) in determining environmental transport modeling needs and by the Environmental Pathways and Dose Estimates Task (07) for model validation and/or direct estimation of radiation doses potentially received by the public.

The radionuclides for which monitoring data will be compiled (based on availability) are the following:

<u>Air</u>	<u>Water</u>
iodine-131	phosphorus-32
ruthenium-103	zinc-65
ruthenium-106	arsenic-76
cobalt-60	neptunium-239
cerium-144	sodium-24
tellurium-132	manganese-56
plutonium-239	copper-64
iodine-129	chromium-51
strontium-90	iodine-131
cesium-137	tellurium-132
argon-41	strontium-90
krypton-85	tritium
carbon-14	cesium-137
tritium	scandium-46
	manganese-54
	cobalt-60

Time periods to be addressed for media radionuclide concentrations of concern are the following:

- Detailed - 1944 to 1957
- Monitoring data corroboration - 1957 through 1972 (confirmation of consistencies with HEDR models - extrapolation and summarization of monitoring data)
- Monitoring and dose estimate integration - 1972 through 1991 (integration and summation of annual monitoring data and dose estimates with earlier time period HEDR results).

This task contains the following subtasks:

- Technical Planning, Control, and Reporting (0501)
- Terrestrial Monitoring Data (0502)
- Environmental Monitoring Data Availability and Review (0503)
- Surface-Water Monitoring Data (0504)
- Air Monitoring Data (0505).

SUBTASK 0501: ENVIRONMENTAL MONITORING DATA TECHNICAL PLANNING, CONTROL, AND REPORTING (WBS 5.6)

Scope

This subtask includes activities not included in other subtasks necessary for overseeing completion of Task 05 work activities and integration of Task 05 activities into the project as a whole. Activities include the following:

- project and task planning
- monthly reports
- meetings (TSP and project)
- meeting presentations
- documentation, reporting, and publications (including issuance of 0501A, Phase I Final Report)
- responding to TSP requests

- developing DQOs and QA verification
- project integration/interaction.

Approach

Management and administrative procedures in place for the project will be applied to manage this task. Comment resolution will be completed and the environmental monitoring data Phase I final report will be issued.

Milestones to the TSP

- 0501A - Environmental monitoring data Phase I final report (October 1992).

Project Deliverables

- Task plan input
- Monthly report input
- Presentations to the TSP and its subcommittees
- Project documentation.

Subtask: 0501, Environmental Monitoring Data Technical Planning,
Control, and Reporting

SUBTASK 0502: TERRESTRIAL MONITORING DATA (WBS 5.2)

Scope

In FY 1993, this subtask consists of summarizing soil, foodstuffs, and vegetation monitoring data. This subtask provides input to update the Environmental Monitoring Document Database (EMDD).

Soil and Foodstuffs Monitoring Data Availability

An inventory summarizing the soil and foodstuffs monitoring data available during the years from 1944 through 1991 will be created. Documents containing the data will be collected, inventoried, and filed in the same manner as previously used in Task 05 activities. This effort will include data from Hanford sources as well as data from other agencies such as the states of Oregon and Washington and nearby universities. The summary will include all of the soil and foodstuffs monitoring information related to Hanford operations during this time period. Because of the large amount of data available and limited resources, the data to be retrieved will be limited to reported ranges of values and reported average concentrations instead of reproducing the entire data sets. This summary is intended to provide a historical account of the soil and foodstuffs monitoring activities.

Vegetation Monitoring Data and Correction Factors, 1945-1951

This activity will quantify the appropriate correction factors that are necessary to reconstruct true vegetation contamination for the 1945-1951 time period. The 1945-1951 data were collected and entered into a database as part of FY 1991 activities. The correction factors that must be considered and applied to the respective data periods will be described and quantified. Items that may impact the correction factors include radioactive decay for the time lag between sample collection and counting, measurement efficiency due to the geometry of the measurement system, sample weight and configuration, radiation absorption and scattering, and, in some cases, the assumption that all beta activity on the vegetation was due to iodine-131. This effort will assist in determining whether additional accuracy can be obtained with further refinements in the data conversion method and will identify those efforts needed in order to quantify these improvements.

Vegetation Monitoring Data Availability, 1952-1991

An inventory summarizing vegetation monitoring data available during the years from 1952 through 1991 will be created. Documents containing the data will be collected, inventoried, and filed in the same manner as previously used in Task 05 activities. This effort will include data from Hanford and external sources, such as states and universities. Data to be retrieved will be limited to reported ranges of values and reported average concentrations. A letter report documenting this activity will provide input to the report summarizing monitoring data from all media found through FY 1993.

Approach

Soil and Foodstuffs Monitoring Data Availability

Soil and foodstuffs monitoring data will be inventoried using methods developed in Task 05 data review protocols effort during FY 1993. Archived historical Hanford documents and files are expected to be the primary sources of data. Literature/library searches of the Hanford Technical Library, the DOE Records Center in Richland, the Federal Records Center in Seattle, and queries of the HEDR Information Resources Tracking System (HIRTS) database will identify relevant material which will be obtained for review and reference. Where available, soil and foodstuffs monitoring data collected by outside agencies such as the states of Washington and Oregon and universities will augment the data obtained from the Hanford records. Titles and pertinent information contained in the material reviewed will be documented in the EMDD. The data entries for those documents that have already been entered in the EMDD will be revised accordingly to reflect this review. The material that is reviewed but that does not contain information specifically addressing the soil and vegetation monitoring data, as well as those that do, will be included in the review documentation. Listings of documents entered into the EMDD will be provided to the Information Resources Task (11) to ensure uniformity and completeness within the HEDR reference tracking system.

A soil and foodstuffs monitoring data database will be established for the years from 1944 through 1991. Data retrieval will be limited to reported ranges of radionuclide concentrations and reported average concentrations

rather than the entire set of individual measurement results. Data entries will be verified through a one-on-one comparison of the hard copy entries with the corresponding data tables in the referenced reports. Calculations used in the computer-generated summaries, if used, will be verified as well. A computer disk and a hard copy of each verified database, signed and dated by the people entering and verifying the data, will be maintained as part of the QA record in the Task 05 files.

Summaries of the soil and foodstuffs monitoring activities and results will be prepared to convey the information necessary for decision making relative to planning subsequent HEDR activities. Material to be included in the summaries include the media sampled, sample locations, constituents measured and/or reported, sampling and/or reporting frequency, sample methods, sample results, and the references.

Factors to be considered in evaluating the data's usefulness in future HEDR activities include who collected the data, what was the intended use or purpose for the data, collection method, inherent uncertainties associated with the data collection methods, validity of data manipulation techniques, assumptions used in deriving the data, availability of data for the same location/time period collected by others for comparison, consistency of the data, and value judgments of the experts in the field.

Vegetation Monitoring Data and Correction Factors, 1945-1951

This activity will involve combining and issuing the vegetation monitoring data and bias (0502A) and correction factor (0502B) reports drafted in FY 1991 and further evaluated in FY 1992. Because two different methods of analysis were used during this period, the combined report will provide the data and appropriate correction factor discussions for 1945-1948, during which vegetation samples were analyzed by gross counting of pellets, and for 1948-1951, during which an iodine extraction method was used to separate radioiodine from the vegetation matrix. Correction factors that were used or were not used throughout the period of interest will be determined by examining related records and follow-up discussions with veteran Hanford employees familiar with the respective vegetation sampling and analytical techniques. In addition, estimates of each of the applicable correction factors will be

made based on current technology. Such estimates provide a mechanism for the assessment of the adequacy of historical data manipulation and allow for the application of an improved adjustment factor as appropriate. Data in the vegetation database will be adjusted using the resultant correction factors, providing a more accurate set of vegetation contamination concentrations for subsequent use.

Vegetation Monitoring Data Availability, 1952-1991

Vegetation monitoring data will be collected using methods developed earlier in Task 05 data review protocols. Archived historical Hanford documents and files are expected to be the primary sources of data. Literature/library searches of the Hanford Technical Library, the DOE Records Center in Richland, the Federal Records Center in Seattle and queries of the HIRTS database will identify relevant material which will be obtained for review and reference. Where available, vegetation monitoring data collected by outside agencies such as the states of Washington and Oregon and universities will augment the data obtained from the Hanford records. Titles and pertinent information contained in the material reviewed will be documented in the EMDD. The data entries for those documents that have already been entered in the EMDD will be revised accordingly to reflect this review. Listings of documents entered into the EMDD will be provided to the Information Resources Task (11) to ensure uniformity and completeness within the HEDR reference tracking system.

A vegetation monitoring database will be established for the years from 1952 through 1991. Data retrieval will be limited to reported ranges of radionuclide concentrations and reported average concentrations rather than the entire set of individual measurement results. Data entries will be verified through a one-on-one comparison of the hard copy entries with the corresponding data tables in the referenced reports. Calculations used in the computer-generated summaries, if any, will be verified as well. A computer disk and a hard copy of each verified database, signed and dated by the people entering and verifying the data, will be maintained as part of the QA record in the Task 05 files.

Summaries of the vegetation monitoring activities and results will be prepared to convey the information necessary for decision making relative to planning subsequent HEDR activities. Material to be included in the summaries includes the media sampled, sample locations, constituents measured and/or reported, sampling and/or reporting frequency, sample methods, sample results, and the references.

Factors to be considered in evaluating the data's usefulness include who collected the data, what was the intended use or purpose for the data, collection method, inherent uncertainties associated with the data collection methods, validity of data manipulation techniques, assumptions used in deriving the data, availability of data from the same location/time period collected by others for comparison, consistency of the data, and value judgments of the experts in the field.

Data Quality Objectives

New Data/Information to Be Developed

Concentrations of radionuclides in vegetation for the from period 1951 through 1991.

Final Use of Data/Information

1) Provide basis for air transport/dose model verification of trends and directions of deposition patterns for early years (1944 to 1957), 2) provide confirmation of consistencies between HEDR model calculations and summarized terrestrial monitoring data for the time period from 1957 through 1972, and 3) provide input for integrating terrestrial monitoring data and dose estimates for the time period from 1972 through 1991 with earlier HEDR results.

Data Quality Objectives

- Accuracy - The objective is to verify or reconstruct actual concentrations reported. This will be done by checking the processes and procedures for validity (see approach above). Accuracy will be verified by direct comparisons, extrapolations, and other methods (see approach above).
- Precision - The objective is to quantify uncertainties in reported and reconstructed concentrations. This will

be done through uncertainty analyses and verified by developing ranges or distribution functions.

- **Completeness -** The objective is that reported values be averages and ranges of concentrations for each medium and location. The goal is to achieve a high level of confidence that finding new information later will not change developed values by more than 5%. All known and discoverable sources of vegetation monitoring data will be investigated (see approach above). The approach to ensure completeness is to use an approved search and inventory plan (see approach above). Completeness will be evaluated through peer review and TSP approval.
- **Representativeness -** The objective is that concentrations developed represent the ranges of actual concentrations that could have occurred in the environmental media. Representativeness will be ensured by comparison of concentrations generated using different methods and other source analyses.
- **Comparability -** The objective is that new information be comparable (within a factor of two) to previous results or that differences be technically explainable. To achieve this, direct comparisons will be made with previous results. Evaluation of direct comparisons will be used to verify comparability.

Documentation

The quality process, measurements, and results will be summarized in sections of milestones to the TSP.

Milestones to the TSP

- 0502A - Summary Report (November 1992): Vegetation monitoring data and conversion factors (1945-1951). This report documents the vegetation monitoring data and conversion/correction factors for the periods 1945-1948 and 1948-1951 (combined reports from Phase I).
- 0502B - Letter Report: Vegetation monitoring data (1949-1951), bias and data correction (December 1992).
- 0502C - Summary Report: Environmental monitoring data located to date (September 1993).

Subtask: 0502, Terrestrial Monitoring Data

Project Deliverables

- Vegetation monitoring list of locations to Tasks 04 and 07 (March 1992 and September 1992, respectively).
- Final status of monitoring data to Task 01 for Project Final Report (FY 1994).

SUBTASK 0503: ENVIRONMENTAL MONITORING DATA AVAILABILITY AND REVIEW (WBS 5.1)

Scope

Historical documents and files will be searched and reviewed for information relative to environmental monitoring data at Hanford. This activity will be continued for the years 1944 through 1991. The data are for radio-nuclide concentrations in air, Columbia River water and sediment, drinking water, fish, foods, soil, waterfowl, and other environmental media. Documents and files will be reviewed, obtained when relevant, and entered into the EMDD as appropriate to facilitate future data retrieval. In addition, the EMDD will be maintained and updated under this subtask as new documents are located and as document reviews provide additional information.

Approach

The search for and review of historical documents and files containing environmental monitoring data or information relative to environmental monitoring activities at Hanford from 1944 through 1991 will continue using methods developed in Phase I. Specifically, the environmental monitoring data search and review process includes

- searching the author and subject card files of the Hanford Technical Library
- searching the Hanford Technical Library's listings of historical laboratory log books and notebooks
- reviewing the Hanford Technical Library's file of serial and periodic historical documents
- searching the card catalogs of the Records Holding Center in Richland for information on archived records stored in Richland and at the Federal Records Center in Seattle
- collecting, reviewing, and filing potentially useful documents in Task 05 files
- obtaining and inventorying boxes of archived records from the Records Holding Center in Richland and the Federal Records Center in Seattle
- searching historical environmental surveillance project files

- discussing documents, reports, and records with key former Hanford employees
- requesting, reviewing, and filing documents referenced in other documents or records
- creating a computer database of potentially important documents and establishing a computer network to facilitate reviewing and tracking
- maintaining a hard copy file of all potentially useful documents and records
- performing periodic queries of the Task 11 HIRTS database to identify new documents obtained by project staff which may contain information relative to environmental monitoring task needs.

The EMDD identifies what type of information is present in the document or file being inventoried. Information included in the EMDD entries include report year, author, title, organization, publisher, report period, key words, sample location by area, environmental media, radionuclides, type of river data, an assessment of the usefulness of the document by the reviewer, reviewer's initials, and an annotated bibliography. Actual environmental data are kept in separate database files and provided to other HEDR tasks for use in dose model validation (vegetation and air data) and dose estimation (water and fish data).

Data Quality Objectives

New Data/Information to Be Developed

Inventory of environmental monitoring documentation of Hanford release of potential interest to HEDR work for the period from 1944 through 1991.

Final Use of Data/Information

Basis for identification of radionuclide concentrations in environmental media and information on monitoring, analytical, and calculational processes.

Data Quality Objectives

- Completeness - The objective is to search all normal, identified Hanford records and Washington, Oregon, DOE, Corps of Engineers, USGS, and Northwest university libraries and potential document archives for titles and context related to Hanford environmental

monitoring. To ensure completeness, a list will be developed of all archival sources and review catalogues of all sources (see approach above). Peer review and comparison with results of interviewees will be used to verify completeness.

- Representativeness - The objective is that the inventory represent all titles of Hanford-related environmental monitoring documents currently available and that are currently known to exist. To ensure this, peer reviews and interviews with ex-Hanford and Northwest agency employees will be conducted. For verification, expert opinion and comparison of environmental monitoring plans with inventoried monitoring results will be used.

Documentation

Report to the TSP summarizing the quality process, measurements and results.

Milestones to the TSP

None.

Project Deliverables

- Periodic updates of EMDD to Tasks 02, 04, 07 and 11
- Periodic updates of EMDD to HEDR Project Office.

Subtask: 0503, Environmental Monitoring Data Availability and Review

Note: This subtask has no milestones to the TSP/CDC.

	O	+
	N	+
	D	+
	J	+
	F	+
FY 1992	M	+
\$49 K	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
	O	+
	N	+
	D	+
	J	+
	F	+
FY 1993	M	+
\$0 K	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
	O	+
	N	+
	D	+
	J	+
	F	+
FY 1994	M	+
\$0 K	A	+
	M	+
	J	+
	J	+
	A	+
	S	+

SUBTASK 0504: SURFACE-WATER MONITORING DATA (WBS 5.3)

Scope

This activity provides for the completion of the summary of the available Columbia River monitoring data initiated during FY 1991 as part of Subtask 0404, Surface-Water Transport. The primary activity completed during FY 1992 was input to the Task 04 summary report, which included the following information:

- inventory of Columbia River water and biota contamination data for 1944 through 1991
- data from Hanford sources and other agencies such as the states of Oregon and Washington, Corps of Engineers, USGS, and nearby universities
- a summary of the measurements to convey the information necessary for decision making relative to the river pathway in planning subsequent HEDR activities.

Media-specific databases for water, fish, sediment, shellfish, and waterfowl will be established for the years from 1944 through 1991 and site locations of concern in support of and as determined by the Environmental Transport (04) and Environmental Pathways and Dose Estimates (07) Tasks. The extent of the river included is from Priest Rapids Dam downstream to the estuaries and near-coastal areas. The specific media (4 to 6), radionuclides (10 to 12), and locations of concern (10 to 15) will be determined through an evaluation of the surface-water monitoring data summary documentation. Once the specific needs of the users are defined, this activity will provide the surface-water monitoring data to the respective tasks in a format consistent with the appropriate model codes. This subtask provides input to update the EMDD.

Approach

The approach is divided into two areas: 1) model verification and validation assistance and 2) "special event" monitoring data.

Model Verification and Validation Assistance

Surface-water monitoring data will be provided to the Environmental Transport (04) and Environmental Pathways and Dose Estimation (07) Tasks as specified by them. Communications with appropriate task personnel will provide the definition of the time periods, locations, and required data formats. Data currently entered in the surface-water database will be transmitted to the appropriate task consistent with the existing transport and dose estimation model parameters. Per Task 05 database management protocol, data entries will be verified through a one-on-one comparison of the hard copy entries with the corresponding raw data tables in the referenced reports. Calculations used in the computer-generated summaries will be verified as well. A computer disk and hard copy of each verified database, signed and dated by the people entering and verifying the data, will be maintained as part of QA records in the Task 05 files. Data obtained through this subtask will be summarized and presented as determined by the Environmental Pathways and Dose Estimates Task (07), consistent with appropriate modeling input parameters.

Special Event Monitoring Data

Surface-water monitoring data specific to releases from unusual events such as fuel failures and slug ruptures will be extracted from the relevant documents, assembled, evaluated, and summarized. Surface-water monitoring activities related to or done in conjunction with these events will be summarized as well. Comparisons of environmental levels of contaminants during the events will be made with the concentrations of radionuclides observed during times not influenced by the elevated releases. A single topical report covering the notable events will document the associated environmental monitoring activities and help put the events in perspective. Surface-water monitoring data specific to these events will also be provided to the Environmental Pathways and Dose Estimates Task (07) for use in model validation as appropriate.

Data Quality Objectives

New Data/Information to Be Developed

Surface-water monitoring data in a format consistent with existing model input parameters to be used in model verification and validation.

Final Use of Data/Information

1) Provide basis for surface-water transport/dose model verification for early years (1944 to 1957), 2) provide confirmation of consistencies between HEDR model calculations and summarized surface-water monitoring data for the time period from 1957 through 1972, and 3) provide input for integrating surface-water monitoring data and dose estimates for the time period from 1972 through 1991 with earlier HEDR results.

Data Quality Objectives

- Accuracy - The objective is to verify or reconstruct actual concentrations reported. This will be done by checking the processes and procedures for validity (see approach above). Accuracy will be verified by direct comparisons, extrapolations, and other methods (see approach above).
- Precision - The objective is to quantify uncertainties in reported and reconstructed concentrations. This will be done through uncertainty analyses and verified by developing ranges or distribution functions.
- Completeness - The objective is that reported values be averages and ranges of concentrations for each media and location. The goal is to achieve a high level of confidence that finding new information later will not change developed values by more than 5%. All known and discoverable sources of environmental monitoring data related to the river will be investigated (see approach above). The approach to ensure completeness is to use an approved search and inventory plan (see approach above). Completeness will be verified through peer review and TSP approval.
- Representativeness - The objective is that concentrations developed represent the ranges of actual concentrations that could have occurred in the environmental media. Representativeness will be ensured by generating

concentrations using different methods and verified by uncertainty analyses and other source analyses.

- **Comparability -** The objective is that new information be comparable (within a factor of two) to previous results or that differences be technically explainable. To achieve this, direct comparisons will be made with previous results. Evaluation of direct comparisons will be used to verify comparability.

Documentation

Report to the TSP summarizing the quality process, measurements, and results.

Milestones to the TSP

None.

Project Deliverables

- Input to the Task 04 report summarizing available surface-water monitoring data (April 1992) - This report will summarize existing Columbia River monitoring data from 1944 through 1991 that were reviewed in FY 1991. The report will summarize monitoring locations, constituents, time periods, and radionuclide concentrations for monitoring done by Hanford Site and independent agencies. Averages and ranges of concentrations will be included.
- River monitoring data to Milestone 0502C, the report summarizing all monitoring data found through FY 1993.
- Monitoring data to Tasks 04 and 07 for calculations.

Subtask: 0504, Surface-Water Monitoring Data

Note: This subtask has no milestones to the TSP/CDC.

FY 1992
\$15 K

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

FY 1993
\$62 K

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

FY 1994
\$25 K

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

SUBTASK 0505: AIR MONITORING DATA (WBS 5.4)

Scope

An inventory summarizing the air monitoring data available during the years from 1944 through 1991 will be created. Documents containing the data will be collected, inventoried, and filed in the same manner as previously used in Task 05 activities. This effort will include data from Hanford and external sources. The data will be limited to reported ranges of values and reported average concentrations. This subtask provides input to update the EMDD.

Approach

Air monitoring data that may be useful in model validation will be identified and provided to the Environmental Transport (04) and Environmental Pathways and Dose Estimates (07) Tasks as specified by them. Communications with appropriate task personnel will provide the definition of the time periods, locations, and required data formats. An air monitoring database will be developed to handle the specified data. Per Task 05 database management protocol, data entries will be verified through a one-on-one comparison of the hard copy entries with the corresponding raw data tables in the referenced reports. Calculations used in the computer-generated summaries will be verified as well. A computer disk and a hard copy of each verified database, signed and dated by the people entering and verifying the data, will be maintained as part of QA records in the Task 05 files. Data obtained through this subtask will be summarized and presented as determined by the Environmental Pathways and Dose Estimates Task (07), consistent with appropriate modeling input parameters.

Data Quality Objectives

New Data/Information to be Developed

Air monitoring data potentially useful in model validation.

Final Use of Data/Information

1) Provide basis for air transport/data model verification for early years (1944 to 1957), 2) provide confirmation of consistencies between HEDR

1957 through 1972, and 3) provide input for integrating air monitoring data and dose estimates for the time period from 1972 through 1991 with earlier HEDR results.

Data Quality Objectives

- Accuracy - The objective is to verify or reconstruct actual concentrations reported. This will be done by checking the processes and procedures for validity (see approach above). Accuracy will be verified by direct comparisons, extrapolations, and other methods (see approach above).
- Precision - The objective is to quantify uncertainties in reported and reconstructed concentrations. This will be done through uncertainty analyses and verified by developing ranges or distribution functions.
- Completeness - The objective is that reported values be averaged and ranges of concentrations for each media and location. The goal is to achieve a high level of confidence that finding new information later will not change developed values by more than 5%. All known and discoverable sources of environmental monitoring data related to the river will be investigated (see approach above). The approach to ensure completeness is to use an approved search and inventory plan (see approach above). Completeness will be verified through peer review and TSP approval.
- Representativeness - The objective is that concentrations developed represent the ranges of actual concentrations that could have occurred in the environmental media. Representativeness will be ensured by generating concentrations using different methods and verified by uncertainty analyses and other source analyses.
- Comparability - The objective is that new information be comparable (within a factor of two) to previous results or that differences be technically explainable. To achieve this, direct comparisons will be made with previous results. Evaluation of direct comparisons will be used to verify comparability.

Documentation

Report to the TSP summarizing the quality process, measurements and results.

Milestones to the TSP

None.

Project Deliverables

Data compiled during this effort will be transmitted to the Environmental Transport (04) and the Environmental Pathways and Dose Estimates (07) Tasks as appropriate.

QUALITY ASSURANCE

The project QA plan will control task activities. Data extracted from reports will be identified as to the original source; data entry into databases will be verified and verification recorded. Calculation methods will be verified as correct, and results of calculations will be spot-checked.

INTERACTIONS

The work of the task will require support by the Information Resources Task (11) through the identification of historical documents and records. Statistics Task (08) support will be required to complete the analysis of monitoring data uncertainty, to prepare data summaries, to determine the proper handling of less-than-detectable concentrations in calculating mean contaminant concentrations.

This task will provide data and information that is essential in identifying future needs and planning future activities within the Environmental Transport Task (04). The Environmental Pathways and Dose Estimates Task (07) will also use the data generated by this task in model verification and validation activities and to estimate potential doses to the public based on actual environmental measurements.

Subtask: 0505, Air Monitoring Data

Note: This subtask has no milestones to the TSP/CDC.

FY 1992 \$0 K	O	+
	N	+
	D	+
	J	+
	F	+
	M	+
	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
FY 1993 \$44 K	O	+
	N	+
	D	+
	J	+
	F	+
	M	+
	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
FY 1994 \$0 K	O	+
	N	+
	D	+
	J	+
	F	+
	M	+
	A	+
	M	+
	J	+
	J	+
	A	+
	S	+

ORGANIZATION

TSP Environmental Transport Subcommittee
P. C. Klingeman, Chair

TSP Quality Assurance and Technical Integration Subcommittee
D. S. Barth, Chair

05	Environmental Monitoring Data	D. H. Denham, Task Leader
0501	Environmental Monitoring Data Technical Planning, Control, and Reporting	D. H. Denham, Subtask Leader
0502	Terrestrial Monitoring Data	M. E. Thiede, Subtask Leader E. I. Mart
0503	Environmental Monitoring Data Availability and Review	M. E. Thiede, Subtask Leader
0504	Surface-Water Monitoring Data	D. H. Denham, Subtask Leader
0505	Air Monitoring Data	M. E. Thiede, Subtask Leader

TASK 06: DEMOGRAPHY, FOOD CONSUMPTION, AND AGRICULTURE

SCOPE

Task 06 provides the demographic, food consumption, and food production and distribution information needed to estimate doses. Demographic information for populations that may have been exposed to radionuclides during the time period of interest is developed for the general population and for several special population groups that are not adequately represented by the U.S. Census. Sources and quantities of food and water consumed by these populations are estimated. In particular, milk production from cows represents a significant food pathway for iodine-131 if the cows ate vegetation contaminated with radionuclides. Dairy farming practices and milk distribution systems are studied to identify the populations that may have consumed potentially contaminated milk.

Technical support for Phase I Native American data collection will continue, and data collection to support future dose estimates for Native Americans will be initiated. These data will be provided by the Native Americans. During FY 1993, responsibility for placing and managing contracts with the Native Americans to perform this work will transition from Battelle to CDC or their agent. Technical direction of work performed by the Native Americans will continue to be provided by the TSP's Native American Working Group. Battelle's work is limited to providing technical coordination, identifying information needed to calculate dose estimates for Native Americans, reviewing approaches and data, and estimating doses. Battelle will also work with CDC and the Native American Working Group to develop DQOs.

Work required as part of Task 06 will be carried out in the following subtasks:

- Demography, Food Consumption, and Agriculture Technical Planning, Control, and Reporting (0601)
- Food Consumption (0602)
- Milk and Other Food Model Development (0603)

- Demographics (0604)
- Native American Data (0605).

SUBTASK 0601: DEMOGRAPHY, FOOD CONSUMPTION, AND AGRICULTURE TECHNICAL PLANNING, CONTROL, AND REPORTING (WBS 6.5)

Scope

This subtask includes activities not included in other subtasks necessary for overseeing completion of Task 06 work activities and integration of Task 06 activities into the project as a whole. Activities include the following:

- project and task planning
- monthly reports
- meetings (TSP and project)
- meeting presentations
- documentation, reporting, and publications
- responding to TSP requests
- developing DQOs and QA verification
- project integration/interaction.

Approach

Management and administrative procedures already in place for the project will be applied to manage this task.

Milestones to the TSP

None.

Project Deliverables

- Task plan input
- Monthly report input
- Presentations to the TSP and its subcommittees
- Project documentation.

Subtask: 0601, Demography, Food Consumption, and Agriculture
Technical Planning, Control, and Reporting

Note: This subtask has no milestones to be TSP/CDC.

FY 1992
\$36 K

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

FY 1993
\$35 K

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

FY 1994
\$11 K

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

SUBTASK 0602: FOOD CONSUMPTION (WBS 6.4)

Scope

This subtask will develop estimates of food consumption for the general population that are improved in precision from those of Phase I. Compared to Phase I, estimation procedures will be refined and detail will be added. Analysis will continue on developing food consumption estimates, associated distribution statistics, and databases for the years 1945, 1951, and 1957.

Approach

Substantial refinement of the Phase I methodology will lead to development of food consumption estimates to be used for calculating final dose estimates. Consumption distributions will be characterized for major food types used in dose calculations. The exact shape of the distribution will be provided for food types such as milk, rather than just the mean and standard deviation information provided in Phase I. Information on daily diets over time will be provided in databases.

A new approach for estimating food consumption for individuals in the general population has been developed. The improved approach will rely on existing food consumption data sources such as national surveys and local studies conducted during the study period. The new approach will also develop a database of individual diets to be used by the Environmental Pathways and Dose Estimates Task (07) to simulate diets over time in dose calculation. The Statistics Task (08) will assist in characterizing uncertainty inherent in the consumption estimates and the between-day correlations of daily diets.

Data Quality Objectives

New Data to Be Developed

Refined estimates of food consumption by type of food population group.

Final Use of Data/Information

Input to the dose calculations.

Data Quality Objectives

- Accuracy - The estimation of likely daily diets over time will be evaluated by nutritionists to assess accuracy of combining foods into four food categories. Accuracy should be improved from Phase I by not having to rely on between-food correlation matrices as input to dose calculations.
- Precision - Frequency distributions of consumption data will be calculated by food type and population group. Associated means, medians, percentiles, standard deviations, and standard errors will be reported for each group. Precision also will be assessed by comparing food consumption estimates to consumption estimates derived from secondary data sources.
- Completeness - Food consumption estimates and daily diets will be developed for all dose-relevant food types and population groups. As in Phase I, detailed results will be presented for fresh dairy categories and leafy dark green vegetable categories. Analytical results for other food types, not found to be relevant to dose, will be presented in summary detail.
- Representativeness - The selected food types will represent those likely to be produced and consumed in the HEDR Project region during the time period being considered and believed to be significant contributors to radiation dose.
- Comparability - The presentation of results will be improved in level of detail from those presented in Phase I. Resolution will be enhanced by further dissecting population groups and food types.

Documentation

A section of the food consumption report will discuss DQO attainment.

Milestones to the TSP

- 0602B - Letter Report: Status of food consumption methodology (May 1992).
- 0602C - Food consumption report, 1945, 1951, and 1957 (March 1993).

Project Deliverables

- Database of individual diets and food consumption estimates with distributions for 1945, 1951, and 1957 to Task 07 (March 1993).

Subtask: 0602, Food Consumption

SUBTASK 0603: MILK AND OTHER FOOD MODEL DEVELOPMENT (WBS 6.2)

Scope

Data collection/evaluation and model development/testing on the production and distribution of milk and fresh fruits and vegetables will be compiled. This work involves the 19-county HEDR study area for the years from 1945 through 1951. This work will build on the model developed during Phase I and refined during FY 1991. By September 1993, the TSP will have decided whether to extend milk work beyond the 19-county area. If it is decided to do so, a milk production/distribution model will be completed for the extended area (32 counties in the air model domain) in FY 1994.

Approach

Milk Production and Distribution

The milk model for the 19-county area for 1945 and 1951 will be developed using basically the same approach applied to develop the model for Phase I. The Phase I model and the extensions being developed during FY 1992 will be used as the starting point for this work. The work will develop detailed models for the years 1945 and 1951. Simple models based on secondary data will be developed for the remaining time periods.

Initial information will be collected and analyzed from secondary information sources such as the Census of Agriculture. Next, interviews with farmers and agricultural experts for each major geographic area will be conducted. This information will be summarized and then presented to expert judges, who will provide the necessary estimates for the HEDR study. At least three experts will be used to provide the expert judgment. Standard techniques will be used to solicit the judgments from the experts and reach a consensus when there is initial disagreement among them.

A major activity in FY 1993 will be collection of information on dairy cow feeding practices from dairy farmers in the geographic areas and time periods of interest to the study. It is expected that a combination of telephone and in-person surveys will be used to obtain this information. "Proportional" techniques will be used where possible to identify and locate participants in the survey. The survey will concentrate on the 19-county HEDR

study area. The survey will be designed and initiated in FY 1992 and completed and documented in FY 1993. It is expected that the survey work will be subcontracted to WSU.

This activity relies extensively on information obtained from interviews with people knowledgeable about the dairy industry in the times and geographic areas of interest. Several procedures are followed to ensure the quality of the data obtained from these kinds of sources:

- Interview guides are prepared and reviewed internally before the interview is conducted. Only trained interviewers are used, which will help minimize bias introduced by the interview process.
- Accurate records are kept of interviews. A combination of tape recordings and interviewer notes are used to prepare an interview summary that presents the key results obtained. The tape recordings and notes also provide a record for future reference.
- Key results from the interview are provided to the interviewee for review. This enables the correction of any errors that may have been made in recording or interpreting the information provided. It also gives the interviewees the opportunity to clarify or change any information they provided and also may trigger memories of additional information.
- Results of the interviews are compared with other sources. These comparisons can include data obtained from written records or the results of other interviews. Any discrepancies are reconciled with the interviewee.
- Individual interviews are often used to collect basic information followed by group sessions with several knowledgeable people. Group processes can be used to trigger additional recollections and to arrive at a consensus.

An expert elicitation process will be used to estimate parameters that are not available from other sources. Mechanisms used to ensure the quality of information obtained from this kind of process include the following:

- Review of the results for internal consistency. After the session with the expert is concluded, the technical staff compare judgments made in different areas. Any inconsistencies, such as different judgments given similar available information, are noted and brought back to the expert for reconciliation.
- Review of the results by other experts. The result of this work is a model of the milk agricultural production and distribution systems.

This model is reviewed with people who provided descriptive information for the model to ensure that the result is reasonable. Similar reviews may also be performed with people having general knowledge about the dairy industry during the time period under study.

- Expert judgments are obtained from more than one expert and the results are compared. Differences are reconciled among the experts through a consensus-building process.

Fresh Fruit and Vegetable Production and Distribution

The Phase I results indicated that for certain populations, areas, and time periods, exposed fresh fruits and vegetables could be a potentially important exposure pathway. No information on fruit and vegetable production and distribution systems was collected during Phase I, so it is not known if this pathway is actually important or only appears to be potentially important because of the simplistic assumption made for Phase I. During FY 1992, preliminary information on fresh fruit and vegetable production and distribution systems will be collected and used to determine if more detailed models are needed. This preliminary assessment will focus on 1945 and 1951.

Production information on exposed fresh fruits and vegetables will be collected from the Census of Agriculture and similar records for the 19-county extended study area. In addition to production information, preliminary information will be collected on the fraction of the production going to fresh consumption, the storage processes used for fresh produce, and the general geographic locations to which fresh produce is distributed.

Harvest periods and storage practices will be characterized for the most important group of fresh fruits and vegetables. Approximate consumption estimates will be developed from the Phase I food consumption data. This information will be used to develop dose estimates from this pathway for representative individuals in the 19-county extended study area. The results of this assessment will be provided to the TSP in a letter report along with a recommendation on whether or not further work is needed to develop fresh fruit and vegetable production and distribution models.

Data Quality Objectives

New Data/Information to Be Developed

Agricultural production and distribution information for 1945-1951 for the extended HEDR study area.

Final Use of Data/Information

Input to dose estimates

Data Quality Objectives

- Accuracy - Secondary data will be used when available. When feasible, expert opinion will be used to provide information not available from other sources.
- Precision - The objective is that precision be reflected in the assigned distributions for market share and distribution patterns applied. These distributions will be developed based on expert opinion and available historical documentation. Peer review will be used to check the results.
- Representativeness - The objective is that data represent the state of the agricultural marketing system for the agriculture industry in the study area for 1945 and 1951. Changes over time will be noted to the extent possible.
- Comparability - The objective is that the results be comparable in detail and resolution to those prepared for the milk model in Phase I.

Documentation

Descriptions of process, achievement, and measurement of objectives will be included in a section of each model report to the TSP.

Milestones to the TSP

- 0603C - Letter Report: Assessment of fruit and vegetable pathways (September 1992). Nineteen-county area, 1945, 1957.
- 0603D - Report on milk production/distribution, 1945 and 1951 (September 1993)
- 0603E - Milk production/distribution report, beyond 19 counties (TSP decision) (December 1993)

Project Deliverables

- Milk production/distribution data to Task 07 for HTDS calculations (December 1992)
- Final status of milk production/distribution data to Task 01 for project final report (FY 1994).

Subtask: 0603, Milk and Other Food Model Development

SUBTASK 0604: DEMOGRAPHICS (WBS 6.1)

NOTE: The activities described in this subtask are currently unfunded. Should the TSP decide to have additional demographic information developed, the activities described here will be conducted.

Scope

Assuming a positive decision of the TSP, additional general demographic information for the 32-county area will be developed for dose estimating purposes. Also, assuming a positive decision of the TSP, general demographic information will be developed for the special population groups of migrant workers and unbadged construction workers. Demographics of military personnel will be summarized from results of current studies being conducted under other projects being conducted by Portland State University.

Approach

To be developed upon a decision of the TSP to proceed.

Data Quality Objectives

To be developed upon a decision of the TSP to proceed.

Milestones to the TSP

None.

Project Deliverables

- Demographic information to Task 07
- Summary of demographic information to Task 01 for the Project Final Report.

Subtask: 0604, Demographics

Note: This subtask has no milestones to the TSP/CDC.

FY 1992 \$0 K	O	+
	N	+
	D	+
	J	+
	F	+
	M	+
	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
FY 1993 \$0 K	O	+
	N	+
	D	+
	J	+
	F	+
	M	+
	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
FY 1994 \$0 K	O	+
	N	+
	D	+
	J	+
	F	+
	M	+
	A	+
	M	+
	J	+
	J	+
	A	+
	S	+

SUBTASK 0605: NATIVE AMERICAN DATA (WBS 6.4.2)

Scope

Battelle staff will provide technical assistance to Native American tribes in designing and carrying out data collection and analysis activities needed to perform Native American dose estimates. Battelle staff will also participate in the activities of the Native American Working Group as it monitors and supports the progress of Native American data collection and analysis.

Approach

Battelle staff will offer guidance and assistance to the Native American tribes in the following areas:

- Communication
 - Development of materials explaining each tribe's project status for distribution among tribal community members.
- Review/Refinement of Tribes' Preliminary Data Input
 - Dietary and demographic data reduction to computer input
 - Evaluation of dose model output and revision for output enhancement
 - Participation in sensitivity analyses performed on the data input
 - Review of preliminary HTDS results
 - Selection of specific dietary, demographic, and lifestyle patterns requiring additional data collection, based on clearly defined dose-relevant and culturally relevant criteria.
- Primary Data Collection and Analysis
 - Sample survey design and refinement
 - Sampling frame development
 - Sampling strategy development
 - Instrument development and pilot testing
 - Editorial control and data entry procedures
 - Survey administration.

- Oral History/Life History interviews
 - Respondent selection criteria
 - Question path development
 - Data records and storage
 - Interview administration.
- Archival Documents Review and Data Retrieval
 - Identification of relevant source materials
 - Establishment of confidentiality procedures
 - Data entry and editorial review.
- Development of Validity and Reliability Measures
 - Review of published literature regarding food consumption and mobility patterns for historical periods in question
 - Review of unpublished data sources (e.g., community health representatives' records, nutrition program records, or agricultural commodities distribution program records).

Data Quality Objectives

New Data to Be Developed

- Refined estimates of food consumption by type of food for age- and sex-specific population groups among each tribe's membership
- Refined estimates of residential location and duration for each tribe's membership
- Estimates of daily time spent outdoors for each tribe's membership.

Final Use of Data/Information

Input to the dose calculations.

Data Quality Objectives

- Accuracy - Estimates provided by tribal study participants of daily and seasonal consumption of traditional foods

will be compared with published reports of typical portion sizes and consumption patterns to assess accuracy of primary data.

- Precision - Frequency distributions of consumption data will be calculated by food type and age and sex group for each tribe. Associated means, medians, percentiles, standard deviation, and standard errors will be reported for each tribe. Precision also will be assessed by comparing food consumption estimates to consumption estimates derived from secondary data sources.
- Completeness - Food consumption estimates and daily diets will be developed for all dose-relevant food types and population groups. Analytical results for other food types, not found to be relevant to dose, will be presented in summary detail.
- Representativeness - The selected food types will represent the likely foods collected, produced, and consumed in the HEDR Project region during the time period being considered and believed to be significant contributors to radiation dose. Primary data on food consumption will be gathered from individuals chosen by a sampling strategy that will help ensure that respondents' experiences are representative of the tribal membership for the historical period of interest.
- Comparability - The participating tribes are being encouraged to use a common data collection and analysis protocol, which will help ensure comparability of food consumption and dose estimates among members of all tribes. Comparability with nontribal members of the region's population will be at the gross food category for dose-relevant food types (e.g., milk and dairy products, exposed leafy vegetables) and for residential location and dose assessments.

Documentation

Results of DQO processes and evaluations will be documented as a section in milestone reports to the TSP.

Milestones to the TSP

None.

Project Deliverables

- Report defining dose-relevant and culturally relevant criteria for selection of additional data collection requirements
- Narrative report comparing accuracy and precision of primary data with published and unpublished contemporaneous accounts
- Native American data to Task 07.

Subtask: 0605, Native American Data

Note: This subtask has no milestones to the TSP/CDC.

FY 1992
\$140 K

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

FY 1993
\$178 K

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

FY 1994
\$135 K

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

QUALITY ASSURANCE

The demography, lifestyle, food production and distribution, and other agricultural data being developed in this task are historical reconstructions. They rely on a variety of sources ranging from "hard" data from the U.S. Census Bureau to "soft" data from personal recollections. The data will be accepted in whatever form they exist. For these reasons, it is not possible to specify numerical goals for the acceptable level of uncertainty in the data. It is possible, however, to understand the sources of uncertainty in the data and to estimate the magnitude of these uncertainties for use in the dose calculations.

Procedures can also be implemented to reduce the likelihood that HEDR staff might make errors in recording the data, analyzing it and preparing the data for use in the dose calculation models. These procedures also ensure that the data are accurately documented for outside review and use by others in future studies. The existing project QA Plan is focused on these types of procedures. Procedures that will be followed in each subtask to ensure the quality of data produced are summarized in the "Approach" sections of the subtasks.

INTERACTIONS

Task 06 will work closely with Task 07 to summarize the multiple food types used in developing daily individual diets and in identifying farm production information into four food categories used in the dose calculations.

ORGANIZATION

TSP Demography Subcommittee D. W. Price, Chair

06	Demography, Food Consumption, and Agriculture	G. L. Wilfert, Task Leader
0601	Demography, Food Consumption, and Agriculture Technical Planning, Control, and Reporting	G. L. Wilfert, Subtask Leader
0602	Food Consumption	D. M. Anderson, Subtask Leader T. L. Marsh
0603	Milk and Other Food Model Development	G. L. Wilfert, Subtask Leader T. L. Marsh
0604	Demographics	G. L. Wilfert, Subtask Leader
0605	Native American Data	E. B. Liebow, Subtask Leader

TASK 07: ENVIRONMENTAL PATHWAYS AND DOSE ESTIMATES

SCOPE

The work of this task is to estimate radiation doses to specified population groups and specific individuals. FY 1992, 1993, and 1994 (through May) work includes final development of the air and river pathway exposure models, representative individual estimation of doses for HTDS, Native American tribal groups, and documentation of model parameters.

This task consists of the following elements:

- Environmental Pathways and Dose Estimates Technical Planning, Control, and Reporting (0701)
- Pathways and Dose Code Development and Documentation (0702)
- Pathways and Dose Model Parameter Development (0703)
- Dose Calculations (0705).

SUBTASK 0701: ENVIRONMENTAL PATHWAYS AND DOSE ESTIMATES TECHNICAL PLANNING, CONTROL, AND REPORTING (WBS 7.4)

Scope

This subtask includes activities not included in other subtasks necessary for overseeing completion of Task 07 work activities and integration of Task 07 activities into the project as a whole. Included are project and task planning, preparation of monthly reports, attendance at project and TSP meetings, presentations at such meetings, support for preparation of documentation, reports and publications, addressing specific TSP and CDC requests for information within the scope of the project or task plans, developing quality objectives, supporting QA activities, and general project integration.

Approach

Planning, control, and reporting activities will be accomplished primarily through the system of project control initiated by Task 01 and other Battelle accounting systems already in place. The task manager will maintain

contact with subtask leaders and staff members from this and other tasks to ensure that task and project milestones are met.

Activities include the following:

- project and task planning
- monthly reports
- meetings (TSP and project)
- meeting presentations
- documentation, reporting, and publications
- responding to TSP and CDC requests
- QA verification
- project integration/interaction.

Milestones to the TSP

None.

Project Deliverables

- Task plan input
- Monthly report input
- Presentations to the TSP and its subcommittees
- Project documentation.

Subtask: 0701, Environmental Pathways and Dose Estimates
Technical Planning, Control, and Reporting

Note: This subtask has no milestones to the TSP/CDC.

	O
	N
	D
	J
	F
FY 1992	M
\$61 K	A
	M
	J
	J
	A
	S
	O
	N
	D
	J
	F
FY 1993	M
\$46 K	A
	M
	J
	J
	A
	S
	O
	N
	D
	J
	F
FY 1994	M
\$11 K	A
	M
	J
	J
	A
	S

SUBTASK 0702: PATHWAYS AND DOSE CODE DEVELOPMENT AND DOCUMENTATION (WBS 7.1)

Scope

This subtask will develop and implement second-generation HEDR environmental pathways and dose codes. Two such codes are planned: 1) the air exposure pathways and dose code and 2) the river exposure pathways and dose code. Subtask activities include software engineering and coding support, development and revision of the models on which these codes are based, evaluations of hardware and software capabilities, revision of the computer code design specifications, and software documentation and QA activities. This subtask is part of a coordinated effort with Task 02 (Technical Integration) and Task 08 (Statistics).

Approach

Staff will complete development, implementation, and documentation of the second-generation air exposure pathways and dose code. New or revised models for parameter selection, environmental pathways transport, biomass generation and senescence, animal feeding and feed transport, and commercial foods will be incorporated. This code will be developed with the capability to do individual dose calculations, in particular those in support of the initial phases of the HTDS. Dose calculation methodology will be developed for population groups in FY 1992.

Staff will design, develop, implement, and document the final surface-water (Columbia River) exposure pathways/dose estimation model and code. Activities will be coordinated with Task 04, Environmental Transport. Surface-water transport and pathways models will be used to generate dose estimates for those combinations of time periods and river reaches for which environmental monitoring data are unavailable or inadequate. The design of these models will be documented, and specifications for the development of the computer code(s) will be written. The code development will proceed based on these specifications. Supporting subtask activities include software engineering and coding support, evaluation of related hardware and system software capabilities, code documentation, and implementation of QA procedures. Model

verification and validation activities for both the air pathway model and the surface pathway model will be funded and performed under Task 02 (Subtask 0205).

Enhancements and revisions to the air pathway and dose model/code will be made based on recommendations from peer reviews and initial results of model validation and sensitivity/uncertainty studies to correct model deficiencies and/or decrease uncertainties in the model outputs. Enhancements to the model will also be made to incorporate new data (e.g., surveys on agricultural practices and commercial food distribution) as these data become available. These revisions will be documented and submitted for reverification and validation.

Activities will include the following:

A. Continue Expansion/Refinement of Air Pathway Code

- Develop population dose submodel
- Integrate parameter selection submodel
- Develop individual characteristics submodel (in support of HTDS)
- Include capability for additional radionuclides
- Install/incorporate revised input data sets as they become available
- Incorporate modifications specific to Native American tribes
- Provide for temporal changes in agricultural/dairy practices.

B. Initial Air Pathway Code Documentation

C. Quality Assurance Activities

- Management/Tracking/Documentation of code changes
- Management/Tracking/Documentation of input database updates/additions
- Documentation of code testing, validation, and verification activities
- Logging/documentation of model runs

- a. Parameter values used (or equivalent information, e.g., random number seed, to enable reconstruction of parameter values)
- b. Name(s) and description of output file(s) produced
- c. Interactive or batch log files
- Participate in project audits as required.

Data Quality Objectives

New Data/Information to Be Developed

- Restructured air exposure pathways and dose code that addresses lessons learned in Phase I
- Surface-water pathways/dose model and code
- Model/code verification and validation information
- Revisions/enhancements to air pathways model and code.

Final Use of Data/Information

- Estimation of doses and their uncertainties for 1) individuals, 2) Native American tribes, and 3) other selected population groups. Dose estimates for both air exposure pathways and surface-water exposure pathways will be produced.
- Model verification and validation information
- Model/parameter sensitivity and uncertainty analyses.

Data Quality Objectives

- Accuracy - The objective is that the surface-water and air pathway codes accurately implement the model calculations as defined in the model/code design specification documents. Hand calculations, independent software development reviews, and other software verification methods consistent with the Battelle software control procedures will be used to measure this objective.
- Completeness - The objective is that the surface-water and air pathway models include all radionuclides, exposure pathways, and other factors that could have a significant effect on the dose received by an

individual or population group. Peer reviews and validation studies will be used to measure this objective.

- Comparability - The objective is that the model results are "reasonable" when compared with available environmental monitoring and dosimetry data. Calculated Phase I iodine-131 concentrations on vegetation in Franklin and Walla Walla counties were generally within a factor of two of available environmental monitoring data for the time period of 1945-1947. Other model output is generally expected to be within a factor of three of available validation data. Model validation studies, including direct comparison of model results to historical monitoring data, will be used to measure this objective.

Documentation

The results of peer reviews, hand calculations, software verification procedures, and model validation studies as measures of the degree of achievement of DQOs will be documented as project records.

Milestones to the TSP

- 0702A - Report documenting air exposure pathways and dose code (February 1992). This is for the individual dose model, major pathways. This milestone includes a user manual, technical description, and initial code listing.
- 0702B - Report documenting population dose model, major pathways (October 1992).

Note: The documentation will be revised as the code is revised before it is transferred to a receiving agency at the end of the project.

Project Deliverables

- Data files to project database
- Documentation of revised river pathway model/code
- Report on Columbia River exposure pathway code
- Support of model verification and validation activities and other measures of achievement of DQOs (coordinated with Task 0205)
- Documentation of air pathways model/code enhancements and revisions.

Subtask: 0702, Pathways and Dose Code Development and Documentation

SUBTASK 0703: PATHWAYS AND DOSE MODEL PARAMETER DEVELOPMENT (WBS 7.3)

Scope

This subtask will compile, evaluate, and document radionuclide and transfer parameters used in the HEDR air and river environmental accumulation and dose models. These parameters are primarily radionuclide-dependent, but include some radionuclide-independent parameters. This subtask includes selection of appropriate distributions for the various parameters, including soil-to-plant and feed-to-animal product transfer factors, and human intake-to-dose conversion factors. Development of fetal parameters (radionuclide transfer factors and dose factors) is not included.

Approach

Available scientific literature will be reviewed and evaluated for applicability to the Hanford environment and potentially exposed populations. Model parameter evaluation criteria will be developed to provide a basis for consistent scientific evaluation of parameters. ICRP Publication 56 will be the primary source of age-dependent dose factors. This will be a cooperative effort with Tasks 02 and 08.

Activities include the following:

- Compile, evaluate, and document air exposure pathway iodine-131 radionuclide-dependent parameters
- Develop parameter values where necessary for dynamic environmental transport model
- Compile, evaluate, and document surface-water exposure pathway radionuclide-dependent parameters.

Data Quality Objectives

New Data/Information to Be Developed

A set of verified radionuclide-dependent parameters and their variabilities (uncertainties and/or distributions) used for estimating doses from air and surface-water exposure pathways.

Final Use of Data/Information

Parameter values will be used in the model to estimate doses received by individuals in the project domain, plus any other dose estimates undertaken in out years.

Data Quality Objectives

- Accuracy - The objective is to develop best estimates of parameter values that are consistent with available data, information, and expert opinion. The attainment of this objective will be assessed by peer reviews.
- Precision - The objective is to develop, for each parameter, a distribution of possible values that is consistent with available data, information, and expert opinion. The attainment of this objective will be assessed by peer reviews.
- Completeness - The objective is to ensure that all pertinent information on each parameter has been evaluated and incorporated as appropriate. This will be done by defining and agreeing on the parameters and literature to be searched. Completeness will be verified by expert judgment and peer review.
- Comparability - The objective is that the final set of parameter values and their uncertainties be within the range of values found in the literature. Direct comparison will be used to ensure comparability and it will be measured by evaluating and technically justifying the results of the comparison.

Documentation

Sections of the reports on iodine-131 model parameters to the TSP will summarize the DQO process measurements and results.

Milestones to the TSP

- 0703A - Letter Report: Iodine-131 parameters and dose factors used in Phase I (May 1992). This is a summary of a literature review of all radionuclide-dependent parameters to support the air exposure pathways and dose models. The report will include age-specific dose factors.

- 0703B - Letter Report: Iodine-131 parameters and dose factors, work beyond Phase I, revised model (September 1992). Distributions and best estimates of parameters will be given, as will the basis for their selection for the HEDR Project.
- 0703C - Letter Report: Key radionuclides parameters (July 1993). Distributions of key radionuclide parameters for the revised air model and surface-water model.

Project Deliverables

None.

Subtask: 0703, Pathways and Dose Model Parameter Development

SUBTASK 0704: PATHWAYS AND DOSE MODEL/CODE VERIFICATION AND VALIDATION

Scope

Verification and validation activities will be performed in accordance with the requirements in accordance with the requirements and methodologies developed and approved by the TSP and CDC as a result of the FY 1993 plan on this subject.

Milestones to the TSP

None.

Project Deliverables

- Summary of results to Task 01 for the project final report.

Subtask: 0704, Pathways and Dose Model/Code Verification
and Validation

Note: This subtask has no milestones to the TSP/CLC.

FY 1992 \$0 K	O	+
	N	+
	D	+
	J	+
	F	+
	M	+
	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
FY 1993 \$0 K	O	+
	N	+
	D	+
	J	+
	F	+
	M	+
	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
FY 1994 \$37 K	O	+
	N	+
	D	+
	J	+
	F	+
	M	+
	A	+
	M	+
	J	+
	J	+
	A	+
	S	+

SUBTASK 0705: DOSE CALCULATIONS (WBS 7.2)

Scope

Calculations to estimate radiation doses to individuals and population groups will be performed under this subtask. It includes dose estimates from the air, groundwater and surface-water pathways, other special exposure pathways, specific radionuclides, and special release events or time periods. Included are dose estimates from exposure via air pathways for population groups of the Native American tribes, the HTDS, and any real or representative individuals or population groups as determined by the TSP and CDC.

Approach

This subtask will use data provided by other tasks and subtasks within the project to make estimates of radiation dose.

The dose calculations will be conducted based on the time period of concern and the availability of data required as input to the HEDR codes. For example, annual air-pathway dose calculations for iodine-131 will be conducted based on daily air concentrations for the 41 x 51 grid for the period from 1944 through 1949. Iodine-131 air-pathway dose calculations for the period from 1973 to 1991 will be derived from Hanford annual reports and will not be done on a grid-by-grid basis. Similar time-period-dependent dose calculations will be done for the air pathway for radionuclides other than I-131 and for the surface-water pathway. This specific modeling approach was developed under Task 02 in 1992 and has been approved by the TSP and CDC (Shipler 1992).

The timing and methodology of some dose calculations during the contract period is dependent upon the receipt of data from the HTDS and Native American tribes.

Activities will include the following:

- Complete iodine-131 air exposure pathway dose estimates for the HTDS pilot study
- Revise Phase I iodine-131 dose estimates
- Complete key radionuclide air-pathway dose calculations for key radionuclides

- Conduct surface-water dose calculations
- Conduct dose calculations based on tribal data
- QA activities (run logs, other)

Data Quality Objectives

New Data/Information to Be Developed

Estimates of doses received by various real and representative individuals and population groups.

Final Use of Data/Information

Basis for 1) scoping additional studies and 2) identifying pathway code and parameter needs.

Data Quality Objectives

- Accuracy - The objective is to estimate doses using models that have been evaluated and refined using validation studies and sensitivity/uncertainty analyses. The attainment of this objective will be assessed by peer review.
- Precision - The objective is to quantify the precision of dose estimates for a specific population group (or individual) by conducting uncertainty analyses using estimated parameter uncertainties and appropriate error propagation procedures. The attainment of this objective will be assessed by peer review.
- Completeness - The approach is to follow the HEDR modeling approach developed in 1992 under Task 02 to calculate doses based on the quality and abundance of data available for source-term and environmental transport data. Completeness will be verified by direct comparison with the modeling approach objectives.
- Representativeness - The representativeness of dose estimates will be determined based on validation comparisons made between environmental modeling data and predictions of the HEDR models.

Documentation

The results of achieving and measuring the quality objectives will be included as a section in each dose report to the TSP and CDC.

Milestones to the TSP

- 0705A - Dose report for iodine-131 for the project domain, revised model, 1944-1991, reference individuals (June 1993). Report will discuss changes in dose estimates from those calculated in Phase I.
- 0705B - Doses from key radionuclides in Columbia River water, 1944-1991 (September 1993)
- 0705C - Report on doses from key radionuclides released to air, excluding iodine-131 for the project domain, revised model, 1944-1991, for reference individuals (September 1993)
- 0705D - Native American Phase I doses (new model). Report will be provided to the TSP and CDC in cooperation with the Native American Working Group.

Project Deliverables

- HTDS pilot study doses to file
- Native American dose results (new model) to Task 06 and the Project Office.

Subtask: 0705, Dose Calculations

FY 1992
\$40 K

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

FY 1993
\$113 K

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

► 0705A, Report on iodine-131 doses, 41 x 51 grid, 1944-1991

► 0705B, Doses from key radionuclides in Columbia River water, 1944-1991

► 0705C, Doses from key radionuclides released to air (excluding iodine-131), 1944-1991

► 0705D, Doses for Native Americans

FY 1994
\$134 K

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

QUALITY ASSURANCE

Quality assurance activities for task management consist of providing oversight to all Task 07 activities to ensure that all work is performed in accordance with QA requirements outlined in the project QA Plan and under each subtask in these task plans.

Subtask 0702 will use Battelle SCPs for design documentation of computer codes. Actual coding and code maintenance will also conform to the SCP requirements. A code Final Internal Development Review will be performed before calculations for members of the public are released.

Dose calculations will be controlled and documented using existing Battelle SCPs for software application. Application logs will be kept of all computer-generated results.

No original data will be generated for Subtask 0703. The major QA activity, therefore, is to ensure that all data (model parameter values) gathered from other sources and used in the project are the best and most appropriate available. All available radionuclide parameter data will be collected and evaluated to determine the scientific validity and applicability to the geographical area around the Hanford Site. Criteria to be considered include data source (original study or summary report), objective of the study from which the data were derived, the study methods and assumptions, nuclide chemical form, and study ecosystem. Data availability is a major concern; where sufficient data are available, a determination will be made of the number of values needed for an acceptable range (to determine the uncertainty range). It is anticipated, however, that in most cases there will be a paucity of data and all available data will need to be considered. Where data are unavailable, estimates of the values will be made using documented assumptions.

INTERACTIONS

All of the subtasks within this task will require interaction with Task 02 (Technical Integration). In addition, Subtasks 0702, 0703, and 0602 will require interface with Task 08 (Statistics). Tribal dose calculations (0705) require data input from Task 06 (Demography, Food Consumption, and Agriculture).

ORGANIZATION

TSP Quality Assurance and Technical Integration Subcommittee

D. S. Barth, Chair

B. Shleien, TSP, Pathways Representative

G. Roessler, TSP, Dosimetry Representative

K. Kopecky, TSP, Statistics Representative

07	Environmental Pathways and Dose Estimates	W. T. Farris, Task Leader
0701	Environmental Pathways and Dose Estimates Technical Planning, Control, and Reporting	W. T. Farris, Subtask Leader
0702	Pathways and Dose Code Development and Documentation	S. V. Shoemaker, Subtask Leader T. A. Ikenberry
0703	Pathways and Dose Model Parameter Development	S. F. Shindle, Subtask Leader T. A. Ikenberry
0705	Dose Calculations	T. A. Ikenberry, Subtask Leader

TASK 08: STATISTICS

SCOPE

Estimates of doses individuals received from radionuclides in air and water emissions from Hanford since 1944 cannot be reconstructed with certainty. The purpose of the Statistics Task is to provide centrally managed statistical support to project technical tasks to

- assess the reliability (validity and uncertainty) of dose estimates obtained using dose models
- develop required input to dose models.

Statistical methods will be implemented in all technical aspects of the project with the overall objective of ensuring that the uncertainties of dose estimates are characterized in an accurate and useful manner. In order to ensure an efficient, consistent, and integrated approach to dealing with statistical issues that arise in each of the technical areas of the project, centrally managed statistical support will be integrated into each technical task. Centrally managed statistical support will be integrated into the technical activities of the project, to participate, assist, or advise in 1) development and evaluation of DQOs; 2) design, analysis, and reporting of evaluations of monitoring data and validation studies; 3) development of model and database specifications; 4) conduct of screening sensitivity and uncertainty analyses to determine which pathways and model parameters are most important to accurate assessments of dose; 5) use of uncertainty analysis to estimate uncertainties in dose estimates; and 6) writing and/or review of reports documenting project procedures and results.

Task activities will be conducted in the following subtasks:

- Statistics Technical Planning, Control, and Reporting (0801)
- Statistics Support for Project Technical Task Work (0802)
- Analysis of Model Reliability (0803).

SUBTASK 0801: STATISTICS TECHNICAL PLANNING, CONTROL, AND REPORTING (WBS 8.7)

Scope

The scope of work includes those activities, not part of other Task 08 subtasks, necessary to do the following:

- provide specific statistical support that is integrated into the project
- prepare Task 08 work plans, budgets, and monthly reports
- control schedules and cost
- maintain effective communication with the TSP, TSP subcommittees, and HEDR Project management, including TSP meetings and travel
- plan and review all task activities.

Approach

Task management will be accomplished through coordination with other project technical tasks and the TSP, using established project procedures.

Milestones to the TSP

None.

Project Deliverables

- Input to monthly reports
- Input to task plans
- Memos to project file of task accomplishments.

Subtask: 0801, Statistics Technical Planning, Control, and Reporting

Note: This subtask has no milestones to the TSP/CDC.

FY 1992
\$38 K

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

FY 1993
\$45 K

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

FY 1994
\$11 K

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

SUBTASK 0802: STATISTICS SUPPORT FOR PROJECT TECHNICAL TASK WORK
(WBS 8.2, 8.3, 8.4, 8.5, 8.6)

Scope

This subtask provides statistical support to HEDR Project tasks to help develop information needed to estimate doses and their uncertainties. Assistance to tasks will include, as needed, 1) developing DQOs and evaluating their attainment, 2) analyzing and evaluating environmental radionuclide data, 3) estimating missing source term and environmental data, 4) evaluating when it may be possible to use simpler transport models, 5) reviewing HEDR Project reports and technical papers for the appropriate use and description of statistical methods, and 6) developing and applying methods for eliciting information from experts.

Approach

The scope of work will be achieved by working closely on a regular basis with other project tasks to provide statistical expertise as needs arise. The approach used by this subtask is

- work closely with the TSP, HEDR Project management, the HEDR Technical Coordinator, and task/subtask leaders to ensure that the statistical needs of the project are recognized and are being addressed
- develop and apply statistical analyses that are appropriate for identified problems.

This subtask is closely related to Subtask 0803. Activities of the two subtasks are closely coordinated so that the total statistical needs of the project are met in a timely and defensible manner.

Data Quality Objectives

New Data/Information to Be Developed

Results and statistical analyses generally related to uncertainties of data and model inputs.

Final Use of Data/Information

Acceptability of processes and basis for decisions of usefulness.

Data Quality Objectives

- Accuracy - The objective is to ensure that appropriate statistical methods are used in all cases. The attainment of this objective will be assessed by peer reviews.
- Precision - The objective is to ensure that all tasks are using the same type of statistical analyses for the same type of problem, i.e., that there is consistency across the project with regard to statistical methods. The attainment of this objective will be assessed by peer reviews.
- Completeness - The objective is to assist all technical tasks in using statistics to achieve their goals and DQOs. The attainment of this objective will be assessed by peer reviews.
- Representativeness - The objective is that statistical methods used in the HEDR Project are among the methods considered to be appropriate for the problems being addressed. The attainment of this objective will be assessed by peer reviews.
- Comparability - The objective is that the statistical support provided for the HEDR Project is at least equal to the support that could be provided by any other statistics group. The attainment of this objective will be assessed by peer reviews.

Documentation

Memo report to Project Office on the achievement and measurement of quality objectives for Subtask 0802.

Milestones to the TSP

- 0802A - Iodine-131 conversion factor report (July 1992).

Project Deliverables

- Memo reports on specific task support to task leaders and the Project Office
- Memo report to Project Office on the achievement and measurement of quality objectives for Task 08.

Subtask: 0802, Statistics Support for Project Technical Task Work

Note: This subtask has no milestones to the TSP/CDC.

SUBTASK 0803: ANALYSIS OF MODEL RELIABILITY (WBS 8.1)

Scope

This subtask supports other tasks by assessing the reliability of dose estimates for specific individuals and population groups. This support includes sensitivity and uncertainty analyses, model validation studies, and computer code verification activities. In addition, assistance will be provided to develop model parameter distributions, implement models, and develop and implement computer graphics. A major effort will be to implement the sensitivity/uncertainty plan for the air-pathway model. Also, a sensitivity/uncertainty analysis plan for the surface water pathway model will be developed and implemented.

Approach

The air pathway dose model is a combination of a number of models developed by a number of different tasks. The STRM is developed by Task 03. The results of this model are used by the Air Dispersion Model developed by Task 04. The results of the air dispersion model are in turn used by the environmental accumulation and dose models developed by Task 07. Within the environmental accumulation model there are submodels, such as the milk model developed by Task 06.

Uncertainties in each of these models will be quantified by running each of the codes multiple times, each time estimating a single dose using values of parameters that are randomly selected from specified probability density functions. The probability density function for a given parameter will be obtained from the scientific literature, expert opinion, and/or actual measurements of the parameter. The uncertainties in the parameters are propagated through each model and ultimately to the final dose estimates.

Sensitivity analyses, which determine the parameters and pathways that contribute the most to dose uncertainties, will be conducted separately on the different models described above. The most important parameters will be determined on the basis of their partial rank correlation coefficients with the models' output. The uncertainty/sensitivity analyses will be used to

determine if additional refinements of the models will result in improved accuracy and precision of the dose estimates.

The scope of work will be achieved by working on a regular basis with other project tasks using established project procedures. Attention will be directed at implementing the uncertainty/sensitivity analysis plan that will be documented in the Milestone 0803A report. The technical approach to conducting work for the 0803A report includes the following activities:

- Use partial rank correlation coefficients to evaluate the sensitivity of model segments that are linear in response to input. The sensitivity of segments that give nonlinear responses will be evaluated by setting appropriate parameters to constants and determining changes in model predictions resulting from uncertainties in remaining parameters (with Tasks 03, 04, and 07).
- Develop methods to assess the spatial sensitivity of model output, such as predictions made by the air model (with Task 04).
- Develop the approach for conducting sensitivity/uncertainty analyses for the surface water pathway model (with Task 04).
- Develop approaches for validating models as appropriate to the level of data available for that purpose (Tasks 02 and 05).
- Verify that the computer codes properly implement the mathematical models specified for use. An example is testing that all the distributions of parameters are actually generated by the computer as stated. More generally, codes will be compared with design specifications to ensure their implementation is correct. This work will be conducted in conjunction with Tasks 03, 04, and 07.

Data Quality Objectives

New Data/Information to Be Developed

Results of sensitivity, uncertainty, verification, and validation analyses.

Final Use of Data/Information

Assess reliability of dose estimates. Basis for decisions on needs for further code development.

Data Quality Objectives

- Accuracy - The objective is to accurately quantify the uncertainties of the dose estimate. This will be achieved by accurately estimating the uncertainties of the parameters used by the model and propagating these uncertainties correctly throughout the computer models. The attainment of this objective will be assessed by peer reviews of the computer models and the parameters used within them.
- Completeness - The objective is to produce accurate uncertainties for all dose estimates. Additionally, sensitivity analyses will be performed for all distinct cases. The attainment of this objective will be assessed by peer reviews.
- Representativeness - The objective is that the computer models accurately represent the conceptual models and that the conceptual models accurately represent all the pathways by which a dose may have been received. The attainment of this objective will be assessed by peer reviews.
- Comparability - The objective is that the models will be the most reliable that can be produced. The attainment of this objective will be assessed by peer review and validation studies where possible.

Documentation

Memo report to Project Office on the achievement and measurement of quality objectives for Subtask 0803.

Milestones to the TSP

- 0803A - Letter Report: Project sensitivity/uncertainty analysis plan (December 1992). This letter report will support a TSP decision at the end of FY 1992 on methods and extent of sensitivity and uncertainty analyses required to meet project goals.
- 0803B: Model reliability (verification, sensitivity, and uncertainty) report (September 1993). This milestone will report on progress in implementing the methods in report 0803A for the air-pathway model and the sensitivity/uncertainty plans for the surface-water pathway model.

Subtask: 0803, Analysis of Model Reliability

Project Deliverables

- Draft work plan for FY 1992 sensitivity/uncertainty activities (March 1992)
- Memo reports on each analysis to cognizant task leaders and the Project Office
- Memo report to Project Office on the achievement and measurement of quality objectives for Subtask 0803.

QUALITY ASSURANCE

All Statistics Task work will follow PNL QA requirements as described in the HEDR Project QA Plan. In addition, the Statistics Task will maintain, in HEDR Project files, notes of meetings with other technical tasks as regards purpose, scope of discussions, recommendations and decisions, and future action items. Also, records will be kept of the purpose, methods, results, and interpretations of statistical analyses.

INTERACTIONS

The Statistics Task works with project technical tasks to coordinate and advise on statistical activities across the project. Communications with D. Barth and K. Kopecky of the TSP will be maintained to ensure compliance with statistics-related TSP direction.

Sensitivity/uncertainty analyses will be conducted in conjunction with Tasks 03, 04, and 07. Model validation activities will be done in conjunction with Tasks 02 and 05. We will also work with Task 02 on model output display and with Task 06 on estimating food consumption, production, and distribution parameters and in eliciting information from experts.

ORGANIZATION

TSP Quality Assurance and Technical Integration Subcommittee

D. S. Barth, Chair

K. J. Kopecky, TSP, Statistics Representative

08	Statistics Task	R. O. Gilbert, Task Leader
0801	Statistics Technical Planning, Control, and Reporting	R. O. Gilbert, Subtask Leader J. C. Simpson
0802	Statistical Support for Project Technical Task Work	R. O. Gilbert, Subtask Leader J. C. Simpson T. B. Miley D. L. Streng D. J. Bates P. E. Redgate
0803	Analysis of Model Reliability	J. C. Simpson, Subtask Leader R. O. Gilbert D. J. Bates

TASK 09: RECORDS MANAGEMENT

SCOPE

Records Management provides storage and control of completed project records, inspects the records to verify they meet QA requirements, maintains an automated inventory of project records, and provides reference service to project staff and the TSP. This task ensures that project records are organized and managed according to approved procedures to meet legal, regulatory, and QA requirements. Records Management also provides technical assistance, training, personnel, facilities, and services to ensure that these objectives are met.

This task consists of the following elements:

- Records Management Technical Planning, Control, and Reporting (0901)
- Project Records Management (0902)
- Records Turnover Package (0903).

SUBTASK 0901: RECORDS MANAGEMENT TECHNICAL PLANNING, CONTROL, AND REPORTING (WBS 9.3)

Scope

This subtask includes activities not included in other subtasks necessary for overseeing completion of Task 09 work activities and integration of Task 09 activities into the project as a whole. It ensures that project records are organized and managed according to approved procedures to meet legal, regulatory, and QA requirements. Records Management also provides technical assistance, training, personnel, facilities, and services to ensure that these objectives are met.

Approach

Direct records clerk functions, review policies and procedures for compliance, participate in audits and reviews, meet with project and client staff as necessary, and respond to records management queries. Manage task activities in accordance with CDC, HEDR, and Battelle policies and procedures.

Milestones to the TSP

None.

Project Deliverables

- Input to task plans
- Review and revision of Records Inventory and Disposition Schedule (RIDS) (annual activity)
- Input to monthly reports.

Subtask: 0901, Records Management Technical Planning, Control, and Reporting

Note: This subtask has no milestones to the TSP/CDC.

FY 1992
\$15 K

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

FY 1993
\$9 K

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

FY 1994
\$2 K

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

SUBTASK 0902: PROJECT RECORDS MANAGEMENT (WBS 9.1, 9.2)

Scope

This subtask provides storage and control of completed project records, inspects the records to verify they meet QA requirements, maintains an automated inventory of project records, and provides reference service to project staff and the TSP. This subtask also transfers processed project documents to the RL Public Reading Room. Records Management also provides technical assistance, training, personnel, facilities, and services to ensure that these objectives are met.

Approach

Project records are received from the Project Office and verified, processed, and stored in the Battelle Records Center. A computer listing of each transfer package is returned to the project records custodian to verify receipt. Any discrepancies with records are resolved before the project records are processed.

Data Quality Objectives

Records are compared to the transfer form to verify that the identifying information is correct and the transfer package is complete and accurate. The project records custodian is notified of any discrepancies and the transfer form is corrected.

Project records are transferred to the RL Public Reading Room within five working days after they have been received by this task.

Milestones to the TSP

None.

Project Deliverable

- Transfer of processed documents to RL Public Reading Room
- Automated inventory of project records.

Subtask: 0902, Project Records Management

Note: This subtask has no milestones to the TSP/CDC.

FY 1992
\$40 K

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

FY 1993
\$60 K

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

FY 1994
\$21 K

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

SUBTASK 0903: RECORDS TURNOVER PACKAGE (WBS 9.4)

Scope

This subtask includes those activities necessary to prepare and deliver project records to CDC after the contract ends at the end of May 1994.

Approach

Battelle records management procedures will be employed to copy, package, and ship project records to CDC and to store a copy of the records in Battelle records storage.

Milestones to CDC

- 0903A - Ship HEDR records to CDC in Atlanta (September 1994).

Project Deliverables

- A copy of project records to Battelle records storage.

Subtask: 0903, Records Turnover Package

	O	
	N	
	D	
	J	
	F	
FY 1992	M	
\$0 K	A	
	M	
	J	
	J	
	A	
	S	
	O	
	N	
	D	
	J	
	F	
FY 1993	M	
\$0 K	A	
	M	
	J	
	J	
	A	
	S	
	O	
	N	
	D	
	J	
	F	
FY 1994	M	
\$57 K	A	
	M	
	J	
	J	
	A	
	S	► 0903A, Ship HEDR records to CDC

QUALITY ASSURANCE

A HEDR records management procedure applies to this task. No other procedures are expected to be developed.

The Records Management Task maintains and controls the quality records that have been transferred to the Battelle Records Center. Quality records generated by Records Management are immediately transferred to the Project Office for inclusion in the project files.

INTERACTIONS

Records Management deals primarily with the HEDR Project Office, the QA Task for audits and procedure reviews, and the RL Public Reading Room for records transmittals. Records Management provides technical assistance, training, and reference service to project staff as requested.

ORGANIZATION

09	Records Management	D. L. Martin, Task Leader
0901	Records Management Technical Planning, Control, and Reporting	D. L. Martin, Subtask Leader
0902	Project Records Management	D. L. Martin, Subtask Leader D. K. Hanson D. L. Burk J. K. Hays K. Ganley
0903	Records Turnover Package	D. L. Martin, Subtask Leader D. K. Hanson D. L. Burk J. K. Hays K. L. Ganley

TASK 10: QUALITY ASSURANCE

SCOPE

The QA Task ensures continuous QA support and coordination with all project tasks. It also provides QA program implementation support, including

- participating in the development of project QA planning
- guidance to project staff in developing QA and meeting applicable QA requirements
- performing quality verification activities (surveillance) to ensure control of activities and compliance with QA program requirements
- maintain the project QA Plan
- interfacing with the TSP QA and Technical Integration Subcommittee.

This task consists of the following elements:

- Quality Assurance Technical Planning, Control, and Reporting (1001)
- Quality Assurance Program Development (1002)
- Quality Assurance Verification (1003).

SUBTASK 1001: QUALITY ASSURANCE TECHNICAL PLANNING, CONTROL, AND REPORTING (WBS 10.5)

Scope

This subtask includes preparation of task plans, routine reporting, travel requirements, and control of task schedules and costs.

Approach

The project QA engineers work with other tasks on a regular basis to advise on and verify quality activities. Task management and control will be accomplished through Battelle and project mechanisms already in place.

Milestones to the TSP

None.

Project Deliverables

- Task plan input
- Monthly report input
- Presentations to the TSP and its subcommittees.

Subtask: 1001, Quality Assurance Technical Planning, Control, and Reporting

Note: This subtask has no milestones to the TSP/CDC.

FY 1992
\$15 K

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

FY 1993
\$16 K

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

FY 1994
\$4 K

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

SUBTASK 1002: QUALITY ASSURANCE PROGRAM DEVELOPMENT
(WBS 10.1, 10.2, 10.3)

Scope

This subtask provides QA project planning and QA guidance to project staff to assist staff in meeting applicable QA requirements.

Approach

The project QA Plan provides the basis for this subtask. Guidance is provided to project staff in procedure implementation guidance/interpretation, resolution of QA problems, QA training, document reviews (procedures, reports, and task plans), procedure development, and processing deficiencies.

Data Quality Objectives

Included in technical task plans.

Milestones to the TSP

- 1002A - Letter Report: Review of project QA Plan (April 1992).
- 1002B - Letter Report: Review of project QA Plan (April 1993)

Project Deliverables

- Memo reports of program development activities to task leaders and Project Office
- Decision procedure
- Action tracking procedure.

Subtask: 1002, Quality Assurance Program Development

SUBTASK 1003: QUALITY ASSURANCE VERIFICATION (WBS 10.4)

Scope

This subtask performs audits, including QA verification activities (surveillances), to ensure control of activities and compliance with QA program requirements through the duration of the project.

Approach

HEDR audits and surveillances are conducted in accordance with applicable Battelle QA and project QA procedures. An internal audit will be performed yearly on project technical and administrative QA activities. In addition, quarterly surveillance plans will be submitted to the project manager, and surveillances will be performed at a minimum in the following areas:

- software control (code verification, database control, etc.)
- hand calculations
- project records control
- training
- data traceability of results
- compliance to established DQOs
- documentation of internal/external peer reviews.

Data Quality Objectives

Not applicable.

Milestones to the TSP

- 1003A - Letter Report: Internal audit (September 1992)
- 1003B - Letter Report: Internal audit (September 1993).

Project Deliverables

- Memo reports of surveillance activities or formal PNL QA surveillance reports to task leaders and Project Office.

Subtask: 1003, Quality Assurance Verification

QUALITY ASSURANCE

Quality assurance activities are addressed by each technical task and requirements are contained in the project QA Plan and task plan.

INTERACTIONS

The task leader will coordinate with other project staff to ensure that all staff are working to the same requirements. This is accomplished through the identification and documentation of QA requirements in a QA Plan and through periodic monitoring of project activities during the life of the project.

ORGANIZATION

TSP Quality Assurance and Technical Integration Subcommittee
D. S. Barth, Chairman

10	Quality Assurance	D. L. Stewart, Task Leader
1001	Quality Assurance Technical Planning, Control, and Reporting	D. L. Stewart, Subtask Leader
1002	Quality Assurance Program Development	D. L. Stewart, Subtask Leader
1003	Quality Assurance Verification	R. Cuello, Subtask Leader

TASK 11: INFORMATION RESOURCES

SCOPE

Identify, search, retrieve, declassify (if necessary) and make available to HEDR staff and the public those documents necessary to meet project needs. Needs center around two types of information: 1) that necessary to estimate doses people may have received and 2) that on operational and radioactive material releases to satisfy public interest. The first objective has priority within the scope, cost, and schedule constraints of the project. Two types of information are needed: 1) facilities' operational information necessary to calculate amounts of radioactive materials generated and released to the environment and 2) monitoring information indicating concentrations of radioactive materials in environmental media and how those concentrations were measured or calculated.

Evaluating, annotating, and recording these documents in databases will be accomplished through work approved in other tasks. The entire process includes the following activities:

- identifying - examining (screening) author, subject, periodical and serial indices and other computer-generated lists
- searching - physically looking for documents
- retrieving - acquiring documents from their filed, stored or archived locations
- evaluating - reading documents to determine content and usefulness
- describing - developing annotated bibliographies of reviewed documents
- declassifying - reading of documents by an Authorized Derivative Declassifier to determine whether the document could be declassified as is or declassified with certain material deleted
- making available - processing and placing in the RL Public Reading Room or other publicly available locations and distributing to interested TSP and HEDR staff.

Hanford Site documents to be searched for were generated by contractors, subcontractors, and government agencies managing and performing work at Hanford during various times [du Pont, General Electric (GE), the Atomic Energy Commission, DOE, etc.] from 1944 through 1990. These documents included those that were classified "confidential" or "secret." There is currently no "top secret" information on Hanford Site operations.

Some documents, especially older ones, have been destroyed over the years when the storage retention dates assigned to them were reached. Titles of some of these destroyed documents are on record.

Early Hanford documents began with the prefix "HW-3-" or "HW-7-" followed by four numbers. After GE left in 1965, each of the contractors set up its own document numbering system, and no more HW document numbers were issued. There is no single central document listing for Hanford documents generated after 1965.

The DOE has declared that all Hanford plutonium production- and operations-related information generated between 1944 through 1972 is declassified. Any documents found and deemed useful for meeting HEDR objectives may be declassified with or without deletions in accordance with DOE guidance by Authorized Derivative Declassifiers.

This task consists of the following elements:

- Information Resources Planning, Control, and Reporting (1101)
- Hanford Document Declassification (1102)
- Hanford Information Resources Identification and Search (1103).

SUBTASK 1101: INFORMATION RESOURCES PLANNING, CONTROL, AND REPORTING
(WBS 11.3)

Scope

That work, not directly related to work under WBS 11.1 and 11.2, necessary to develop detailed task plans, prepare for and participate in meetings required by TSP and Battelle management, meet requirements of the TSP and Battelle project management for project and TSP reporting for technical

evaluations, management reviews and peer reviews, meet requirements of the TSP, CDC, and Battelle project management for administration, records and information management, and fiscal control, and meet quality requirements of the TSP, CDC, and Battelle.

Approach

Planning of the work to be performed on this task will be carried out in accordance with TSP Directive 90-1 (the planning/budgeting process approved by the TSP at its February 1991 planning/budget workshop), Battelle project management systems, HEDR Project Office requirements, and the Battelle/CDC contract.

Control of task work will be accomplished through reviews of ongoing work, technical approach, and quality objectives by the task leader.

The HIRTS will be updated daily or as new material becomes available. At the completion of the project, the entire tracking system will be placed in the public domain. Updates will be prepared when warranted by the additions, but it will be updated at least semiannually.

Databases that address currently classified documents (1944-1960) will be updated as actions occur. Those identified by the public, CDC, or TSP have been declassified and made publicly available as staff and funding permit.

Milestones to the TSP

None.

Project Deliverables

- Input to monthly reports
- Input to task plans
- Database to files and RL Public Reading Room
- Retrieved documents to staff.

Subtask: 1101, Information Resources Planning, Control, and Reporting

Note: This subtask has no milestones to the TSP/CDC.

	O	+
	N	+
	D	+
	J	+
	F	+
FY 1992	M	+
\$43 K	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
	O	+
	N	+
	D	+
	J	+
	F	+
FY 1993	M	+
\$51 K	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
	O	+
	N	+
	D	+
	J	+
	F	+
FY 1994	M	+
\$19 K	A	+
	M	+
	J	+
	J	+
	A	+
	S	+

SUBTASK 1102: HANFORD DOCUMENT DECLASSIFICATION (WBS 11.1)

Scope

The scope is work necessary to declassify, with or without deletions, Hanford-originated documents identified to be of use to the project. Documents generated from 1944 and 1972 that have been placed on a priority list by Battelle, the TSP, CDC and/or the public will be addressed first.

Approach

Declassified documents will be processed and made available in accordance with Battelle procedures. In accordance with DOE Orders and national and local classification guides, Hanford-Site-originated documents are reviewed and evaluated for declassification. Only Authorized Derivative Declassifiers will be utilized in this activity. Those documents containing information key to project objectives will be given the highest priority and upon declassification they will be made available to the public, using Battelle procedures. Those of secondary interest and/or use will be declassified as staff availability and funding permit.

Data Quality Objectives

Not applicable.

Milestones to the TSP

- 1102A - Letter Report: Declassified, prioritized list of documents identified by the TSP to be of potential use to HEDR (September 1992). If declassification has been completed, this report will be a title listing with associated actions taken on each document. If declassification is not yet complete, the report will discuss the status of declassification to date and will estimate time to complete it. The declassification action listing may be used by the TSP as a basis for deciding whether additional documents need to be declassified or whether this initial prioritized listing is sufficient.

Project Deliverables

- Lists of declassified documents to task leaders, Project Office, and RL Public Reading Room.

Subtask: 1102, Hanford Document Declassification

SUBTASK 1103: HANFORD INFORMATION RESOURCES IDENTIFICATION AND SEARCH
(WBS 11.2)

Scope

That work necessary to identify, search for, retrieve, and evaluate Hanford-originated documents deemed of interest for further use in reconstructing environmental doses. The evaluation process for this task is iterative and is conducted in parallel with evaluation work of other tasks to support searching activities to determine what information impacts other information needs and what information is related to other information sources. Searching and retrieval will be essentially completed in FY 1992.

This subtask also includes funding for RL Public Reading Room support for cataloging and disseminating HEDR-generated materials.

Approach

When a request for specific documents or a specific category of documents is received, the sources described in the task scope, above, will be checked to identify titles, authors, or key words of documents (both classified and unclassified) that might contain the requested information. The use of many sources, some of which overlap or refer the user to related documents, will help ensure a thorough search. TSP members and HEDR staff from other tasks will also search for documents using the same process.

Once a document is identified, it will be searched for and retrieved using approved DOE and Battelle procedures and its title will be added to the HIRTS database. HIRTS contains bibliographic information on each report such as document number(s), author(s), title, date, document form (hard copy or microfilm), location (RHA-712 or 3760), public availability, and names of people who requested copies. The database currently contains more than 5,300 citations and goes from 1944 to the present. A printed listing of Hanford-originated documents in HIRTS is kept in the RL Public Reading Room and is updated periodically. Databases of task-specific evaluated and annotated documents are kept by other HEDR tasks in accordance with project guidelines and will be periodically made available to the RL Public Reading Room.

HEDR staff receiving a Hanford historical document potentially useful to their work will evaluate the document to determine whether it can indeed be used. Documents that are evaluated by TSP and HEDR staff (of other than Task 11) will be annotated (briefly described) and entered into databases.

The general process to be used to ensure a high level of confidence that the identification and search for information is sufficient to complete task work is the development of "search trees," as shown in Figure 12.1.

FIGURE 12.1. Typical Search Tree

The search trees for a specific type of information consist of the following types of information sources applicable to the subject:

- an initial list of documents from the sources listed in the task scope
 - documents written by the authors of the initial documents
 - documents referenced in the initial documents
 - documents not referenced in the initial documents but written by the authors of the references
 - documents referenced by the references
- documents found by key word searches (e.g., iodine, stacks, emissions)
 - documents written by authors of documents found by word searches
 - references in documents found by key word searches
 - documents written by the authors of the references found by key word searches
 - documents referenced in those referenced documents written by the authors of documents found by key word searches
- other sources
 - all periodic documents in records facilities
 - author's and associates' files
 - interviews with current or former Hanford employees
 - anecdotal information logs and notes.

Data quality objectives will be developed for each approved task/subtask scope to ensure that sufficient information is found and evaluated to provide a high level of confidence that any documents that may exist but have not been found would not have a significant impact on final dose estimates or their uncertainties.

Sensitivity analyses will be performed on the dose model to determine the change required in the input information (e.g., curies released) to change the

dose estimates or their uncertainties by specified significant amounts. If the change is small, then further searches and evaluations of documents will not be required.

Documents deemed of potential interest/use to the project and/or the public will be sent to appropriate HEDR staff, placed in the RL Public Reading Room, and sent to the Office of Scientific and Technical Information (OSTI) in Oak Ridge, Tennessee. OSTI abstracts, indexes, and inputs the documents to energy databases, which can be electronically searched on several commercial systems.

Data Quality Objectives

New Data/Information to Be Developed

As potentially relevant information is identified, it is added to the existing list of Hanford-Site-originated documents of potential interest/use to the HEDR Project, which is available at the RL Public Reading Room.

Final Use of Data/Information

1) Basis for further review by technical tasks/TSP, 2) declassification if needed, and 3) placing documents in RL Public Reading Room and providing public release nationally through OSTI.

Data Quality Objectives

- Completeness - The objective is that the list contain titles of Hanford-Site-originated documents currently located at DOE and/or DOE contractor facilities that contain 1) information potentially useful to estimating radionuclide releases from Hanford or 2) data on radioactive contamination of Hanford and its environs. Any unidentified information is not expected to have a significant effect on project-reconstructed release quantities or dose estimates based on them. The approach to achieve completeness is that currently available subject and author indices to archival documents will be searched to identify those potentially containing data of interest to the project. Unclassified and declassified documents will be directed to appropriate technical tasks, the TSP, and CDC, placed in the RL Public Reading Room, and made publicly available at the national level. Currently classified documents identified by cleared TSP members as containing potentially useful data will be declassified (with or

without deletions) and made publicly available. Quality assurance and peer review will be applied to the process and results to ensure completeness.

Documentation

A section in the report to the TSP and CDC will summarize the quality process and results.

Milestones to the TSP

- 1103A - Letter Report: Status of document search and DQO efforts (December 1992). The report will describe the process used to identify, retrieve, and distribute to HEDR staff Hanford information used in dose reconstruction.
- 1103B - Letter Report: Status of document search and DQO efforts (September 1993).

Project Deliverables

- Complete search and retrieval of new documents identified by other tasks (June 1992).

Subtask: 1103, Hanford Information Resources Identification and Search

QUALITY ASSURANCE

Information Resources is identified as Impact Level III and will comply with the PNL Good Practices Standard that is in Part II of PNL-MA-70.

INTERACTIONS

Information Resources identifies and collects documents of potential use to other tasks to meet their technical objectives. For example, documents addressing ruthenium releases will be supplied to Task 03 to aid them in developing ruthenium source terms.

ORGANIZATION

TSP Communications Subcommittee

M. L. Blazek, Chair

N. J. Germond, TSP, Declassification Representative

11	Information Resources	G. L. Harvey, Task Leader
1101	Information Resources Planning, Control, and Reporting	G. L. Harvey, Subtask Leader P. M. Cleavenger S. P. Gydesen R. K. Jahnel D. Krisher
1102	Hanford Document Declassification	S. P. Gydesen, Subtask Leader R. M. Iten D. S. Lewis W. A. Snyder
1103	Hanford Information Resources Identification and Search	S. P. Gydesen, Subtask Leader

TASK 12: TSP COMMUNICATIONS SUPPORT

SCOPE

Task staff assist the TSP Communications Subcommittee in developing communications strategies to effectively communicate technical information to the public and to identify and address public concerns; establish public information mailing lists; work with local, regional and national news media to provide project information; develop fact sheets on topics of interest; make project-related documents publicly accessible; and conduct public meetings to present project progress and receive and respond to public comments.

Battelle support of these activities is being reduced in FY 1992-1994.

The work is divided into the following subtasks:

- TSP Communications Support Technical Planning, Control, and Reporting (1201)
- TSP Public Outreach Support (1202)
- Communications Assessment Research (1203)
- TSP Meetings and Materials Support (1204)
- Dose Estimating Turnover Package (1206).

SUBTASK 1201: TSP COMMUNICATIONS SUPPORT TECHNICAL PLANNING, CONTROL, AND REPORTING (WBS 12.7)

Scope

This subtask involves these activities not included in other subtasks necessary to plan and control TSP Communications support activities. Included in this subtask are planning and budgeting; monthly reporting; and meeting attendance, including TSP Communications Subcommittee meetings.

Approach

This subtask management requires regular involvement with TSP Communications Subcommittee members, project personnel, Battelle management, and other TSP, project management, and task components.

Activities include the following:

- Develop, plan, and control communications activities and tasks that support TSP Communications Subcommittee goals and objectives
- Develop details for FY 1993 and 1994 task plans
- Provide adequate reporting and proper documentation to track activities and encounters in such a manner as to accurately depict task status and project progress
- Maintain generally accepted QA practices as they apply to all activities conducted by the task leader, Project Manager, Chair of the TSP Communications Subcommittee, and Battelle management.

Milestones to the TSP

None.

Project Deliverables

- Input to Project Task Plans
- Input to monthly reports.

Subtask: 1201, TSP Communications Support Technical Planning, Control,
and Reporting

Note: This subtask has no milestones to the TSP/CDC.

	O	+
	N	+
	D	+
	J	+
	F	+
FY 1992	M	+
\$24 K	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
	O	+
	N	+
	D	+
	J	+
	F	+
FY 1993	M	+
\$18 K	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
	O	+
	N	+
	D	+
	J	+
	F	+
FY 1994	M	+
\$6 K	A	+
	M	+
	J	+
	J	+
	A	+
	S	+

SUBTASK 1202: TSP PUBLIC OUTREACH SUPPORT (WBS 12.1)

NOTE: The activities described in this subtask are currently funded only for FY 1992. Should the TSP and CDC decide to fund this subtask in FY 1993 and 1994, these activities will continue.

Scope

Support the development and use of various communications vehicles and methods by the TSP Communications Subcommittee. Battelle HEDR staff support the TSP in the planning, development, and use of public outreach support activities and products.

Approach

At TSP Communications Subcommittee request, the TSP videotape, poster, and other project-generated documents will be distributed to various audiences.

Milestones to the TSP

None. (Reports and assistance are provided to the TSP Communications Subcommittee.)

Project Deliverable

- Memo reports to Project Office.

Subtask: 1202, TSP Public Outreach Support

Note: This subtask has no milestones to the TSP/CDC.

	O	+
	N	+
	D	+
	J	+
	F	+
FY 1992	M	+
\$4 K	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
	O	+
	N	+
	D	+
	J	+
	F	+
FY 1993	M	+
\$0 K	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
	O	+
	N	+
	D	+
	J	+
	F	+
FY 1994	M	+
\$0 K	A	+
	M	+
	J	+
	J	+
	A	+
	S	+

SUBTASK 1203: COMMUNICATIONS ASSESSMENT RESEARCH (WBS 12.2, 12.3)

Scope

Support audience analysis research to ensure that the TSP's communications efforts are effective and that the TSP is aware of public attitudes, needs, and concerns.

Approach

Audience analysis activities include the following:

- Attend all TSP quarterly public meetings and communicate observations, areas of public interest or concern, and opportunities for better public dialogue through written and verbal reporting to the TSP Communications Subcommittee and project management
- Collect media articles from local, regional, and national newspapers and magazines that relate to the project; distribute them to the TSP, project management, and the RL Public Reading Room two or three times a year as appropriate
- Provide an informal review of media articles collected between August and December 1991 as to the concerns of various audiences (e.g., public, agencies, special interest groups) and issues of interest. The evaluation will compare the concerns and issues of previously reviewed articles (January through July 1991); provide the same type of review in mid-year 1992.

Milestones to the TSP

- 1203B - Letter Report: Media analysis, 1991 (February 1992)
- 1203C - Letter Report: Mid-year media analysis, 1992 (July 1992)
- 1203D - Letter Report: Media review, 1992 (February 1993)
- 1203E - Letter Report: Mid-Year media review, 1993 (July 1993).

Project Deliverables

- Memo reports to Project Office.

Subtask: 1203, Communications Assessment Research

SUBTASK 1204: TSP MEETINGS AND MATERIALS SUPPORT (WBS 12.4, 12.5, 12.6)

Scope

This subtask will assist the TSP Communications Subcommittee in providing logistical support and arrangements, as necessary, for public presentations including meetings, workshops, and briefings. The subtask will also coordinate and arrange Battelle staff activities and responsibilities to participate in informational workshops. The subtask will provide materials for the development of TSP public information materials and review draft materials when requested by the TSP.

Approach

Presentation coordination activities include the following:

- Arrange and coordinate date and time of public presentations
- Contact Subcommittee and identify available speaker for invitation
- Schedule the selected TSP member and communicate the vital presentation information to him/her
- Discuss and determine appropriate briefing for requester
- Assist in providing logistical support and arrangements as necessary
- Attend presentation if necessary.

TSP materials support activities include the following:

- Provide photos, slides, and publication materials for the development of public information materials
- Develop computer graphics and viewgraphs for presentation and publication purposes
- Provide review and evaluation of public information materials being developed by Subcommittee members and staff including newsletters, fact sheets, reports, and press releases.
- Provide editing and writing support to Subcommittee members and staff as needed for the production of public information materials, includes technical reports, fact sheet quarterly newsletter articles, and press releases.

Milestones to the TSP

None. Services and products are provided to the TSP Communications Subcommittee.

Project Deliverables

- Memo reports to Project Office.

Subtask: 1204, TSP Meetings and Materials Support

Note: This subtask has no milestones to the TSP/CDC.

FY 1992 \$28 K	O	+
	N	+
	D	+
	J	+
	F	+
	M	+
	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
FY 1993 \$15 K	O	+
	N	+
	D	+
	J	+
	F	+
	M	+
	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
FY 1994 \$7 K	O	+
	N	+
	D	+
	J	+
	F	+
	M	+
	A	+
	M	+
	J	+
	J	+
	A	+
	S	+

SUBTASK 1206: DOSE ESTIMATING TURNOVER PACKAGE

NOTE: This subtask is currently unfunded. Should the TSP and CDC decide to fund it at some later date, the activities described below will be conducted.

Scope

This subtask would develop a preliminary plan for the definition of a turnover package of hardware, software, and the appropriate communications activities associated with the transfer and use of the package by a designated agency. This plan would define the package and communication activities and provide a schedule for implementing activities.

Milestones to the TSP

None.

Project Deliverable

- A preliminary plan for the turnover package to Task 01 for inclusion in the project final report.

Subtask: 1206, Dose Estimating Turnover Package

Note: This subtask currently has no milestones to the TSP/CDC.

FY 1992 \$0 K	O	+
	N	+
	D	+
	J	+
	F	+
	M	+
	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
FY 1993 \$0 K	O	+
	N	+
	D	+
	J	+
	F	+
	M	+
	A	+
	M	+
	J	+
	J	+
	A	+
	S	+
FY 1994 \$0 K	O	+
	N	+
	D	+
	J	+
	F	+
	M	+
	A	+
	M	+
	J	+
	J	+
	A	+
	S	+

QUALITY ASSURANCE

Generally accepted QA practices will be applied to all activities by the task leader, Project Manager, Chair of the TSP Communications Subcommittee and Battelle management.

INTERACTIONS

Task 12 staff work with the TSP Communications Subcommittee to receive specific direction on all activities, provide professional counsel and present options and recommendations for communication activities, and report progress.

ORGANIZATION

TSP Communications Subcommittee M. L. Blazek, Chair

12	TSP Communications Support	G. L. Harvey, Task Leader
1201	TSP Communications Support Technical Planning, Control, and Reporting	G. L. Harvey, Subtask Leader
1202	TSP Public Outreach Support	G. L. Harvey, Subtask Leader
1203	Communications Assessment Research	G. L. Harvey, Subtask Leader
1204	TSP Meetings and Materials Support	G. L. Harvey, Subtask Leader A. H. McMakin
1206	Dose Estimating Turnover Package	G. L. Harvey, Subtask Leader

REFERENCES

Glen, J. L. 1973. Relation Among Radionuclide Content and Physical, Chemical, and Mineral Characteristics of Columbia River Sediments. USGS Professional Paper 433-M, U.S. Government Printing Office, Washington, D.C.

Haushild, W. L., G. R. Dempster, Jr., and H. H. Stevens, Jr. 1973. Distribution of Radionuclides in the Columbia River Streambed from the Nuclear Reactors, Hanford Reservation, to Longview, Washington. TID-26531, U.S. Department of Interior, Geological Survey, Water Resources Division, Portland, Oregon.

Haushild, W. L., G. R. Dempster, Jr., and H. H. Stevens, Jr. 1975. Distribution of Radionuclides in the Columbia River Streambed, Hanford Reservation to Longview, Washington. USGS Professional Paper 433-0, U.S. Government Printing Office, Washington, D.C.

Heeb, C. M. 1991. Uncertainties in Source Term Calculations Generated by the ORIGEN2 Computer Code for Hanford Production Reactors. PNL-7223 HEDR, Pacific Northwest Laboratory, Richland, Washington.

Shipler, D. B. 1992. FY 1992 Revised Task Plans for the Hanford Environmental Dose Reconstruction Project. PNL-7757 HEDR Rev. 1, Pacific Northwest Laboratory, Richland, Washington.

Walters, W. H., R. L. Dirkes, and B. A. Napier. 1992. Literature and Data Review for the Surface-Water Pathway: Columbia River and Adjacent Coastal Areas. PNL-8083 HEDR, Pacific Northwest Laboratory, Richland, Washington.

APPENDIX A

PROJECT WORK BREAKDOWN STRUCTURE

APPENDIX A

PROJECT WORK BREAKDOWN STRUCTURE

- 1.0 Project Management
 - 1.1 Project planning and control
 - 1.1.1 Work breakdown structure/dictionary
 - 1.1.2 Network development and control
 - 1.1.3 Planning guidance
 - 1.1.4 Corrective action planning
 - 1.1.5 Project Management Information System
 - 1.1.6 Project management reports
 - 1.1.6.1 HEDR monthly report
 - 1.1.6.2 Financial reports
 - 1.1.6.3 Scope/cost/schedule reports
 - 1.1.6.4 Battelle management reports
 - 1.2 Project documents
 - 1.2.1 Document hierarchy
 - 1.2.2 Project plan (deleted)
 - 1.2.3 Project Management Plan
 - 1.2.4 Task plans
 - 1.2.5 Quality assurance plan
 - 1.2.6 Other HEDR documents
 - 1.3 Project administration
 - 1.3.1 TSP liaison and response to requests
 - 1.3.2 CDC liaison
 - 1.3.3 Task management and coordination
 - 1.3.4 Staff development
 - 1.3.5 Battelle management liaison
 - 1.3.6 Project computer administration
 - 1.4 Records control
 - 1.4.1 Commitment tracking
 - 1.4.2 Document clearance
 - 1.4.3 Records transfer
 - 1.4.4 Records database management
 - 1.5 Peer review
 - 1.5.1 Plans review
 - 1.5.2 Presentation review
 - 1.5.3 Document review
 - 1.5.4 Technical review
 - 1.6 Subcontract administration
 - 1.6.1 TSP contracts
 - 1.6.2 Native American contracts
 - 1.6.3 Consultant contracts
 - 1.7 Project communications support
 - 1.7.1 Communication planning
 - 1.7.1.1 Communication policy/guidelines development
 - 1.7.2 Communications reviews
 - 1.7.2.1 Finalize Phase I reports

- 1.7.3 Meeting/workshop support
- 1.7.4 Project communications products
- 1.7.5 Response to public requests
- 2.0 Project Technical Integration
 - 2.1 Technical sensitivity/uncertainty analysis
 - 2.2 Technical coordination and integration
 - 2.2.1 Planning integration
 - 2.2.2 Public communication
 - 2.2.3 TSP coordination
 - 2.2.4 Native American Working Group liaison
 - 2.2.5 Data integration
 - 2.2.6 Review and interpretation of technical results
 - 2.3 Population dose model requirements
 - 2.3.1 Code design specifications
 - 2.3.2 Dominant radionuclides
 - 2.3.3 Dominant pathways
 - 2.3.4 Characteristics of population groups
 - 2.4 Individual dose model requirements
 - 2.4.1 Code design specifications
 - 2.4.2 Dominant radionuclides
 - 2.4.3 Dominant pathways
 - 2.4.4 Characteristics of individuals
 - 2.5 Code verification/validation
 - 2.5.1 IAEA model intercomparison
 - 2.5.2 Model/code verification and validation plan
 - 2.6 HTDS coordination
 - 2.7 Data management oversight
 - 2.7.1 Data management plan
 - 2.8 Technical planning, control, and reporting
 - 2.8.1 Project planning/task planning
 - 2.8.2 Meetings
 - 2.8.2.1 TSP/public meetings
 - 2.8.2.2 Project meetings
 - 2.8.3 Documentation, reporting, and publications
 - 2.8.4 Quality objectives, achievements, and verification
 - 2.8.5 Project integration/interactions
- 3.0 Source Terms
 - 3.1 Release data availability and review
 - 3.1.1 Data on releases to air
 - 3.1.2 Data on releases to water
 - 3.2 Releases to air
 - 3.2.1 Early iodine releases from separations facilities (1944-1947)
 - 3.2.2 Late iodine releases to air (1947-present)
 - 3.2.3 Releases from separations areas (200 areas)
 - 3.2.3.1 Releases from separations facilities
 - 3.2.3.1.1 Releases from 1944-1957
 - 3.2.3.1.2 Releases from 1957-1990
 - 3.2.3.2 Releases from other separations areas

- 3.2.4 Releases from reactor areas (100 areas)
- 3.2.5 Releases from laboratory/test reactor areas (300/400 areas)
- 3.3 Hanford historical releases
- 3.4 Waterborne releases
 - 3.4.1 Waterborne releases (1944-1957)
 - 3.4.2 All waterborne releases
 - 3.4.3 Groundwater releases
- 3.5 Release model development (day time)
 - 3.5.1 Iodine release model (input to pathways and dose model) - air
 - 3.5.2 Other nuclide release model
 - 3.5.2.1 Air
 - 3.5.2.2 Water
 - 3.5.3 Model validation and verification
- 3.6 Technical planning, control, and reporting
 - 3.6.1 Project planning/task planning
 - 3.6.2 Meetings
 - 3.6.2.1 TSP/public meetings
 - 3.6.2.2 Project meetings
 - 3.6.3 Documentation, reporting, and publications
 - 3.6.4 Quality objectives, achievements, and verification
 - 3.6.5 Project integration/interactions
- 4.0 Environmental Transport
 - 4.1 Atmospheric transport
 - 4.1.1 Model restructuring and revision
 - 4.1.1.1 Wind (uncertainty)
 - 4.1.1.2 Stability (spatial variation and uncertainty)
 - 4.1.1.3 Mixing layer (calculation, spatial variation, uncertainty)
 - 4.1.1.4 Precipitation (uncertainty, spatial variation)
 - 4.1.1.5 Temperature (uncertainty)
 - 4.1.1.6 Wind profiles (uncertainty)
 - 4.1.1.7 Surface roughness (find data)
 - 4.1.1.8 Characteristic turbulence velocity (uncertainty)
 - 4.1.1.9 Diffusion coefficients (revise, uncertainty)
 - 4.1.1.10 Deposition (resistance model, spatial variation, uncertainty)
 - 4.1.1.11 Washout (uncertainty and spatial variation)
 - 4.1.1.12 Plume rise (uncertainty)
 - 4.1.1.13 Transport at center of mass
 - 4.1.1.14 Mass balance
 - 4.1.1.15 Multiple sources
 - 4.1.1.16 Polar grid close-in workers)
 - 4.1.1.17 Input/output modification
 - 4.1.2 Wind field modeling
 - 4.1.2.1 Literature search and model evaluation
 - 4.1.2.2 Tests
 - 4.1.2.3 Implementation
 - 4.1.3 Model sensitivity
 - 4.1.3.1 Release time
 - 4.1.3.2 Wind data (resolution)

- 4.1.3.3 Temperature (plume rise)
 - 4.1.3.4 Precipitation
 - 4.1.3.5 Mixing layer thickness
 - 4.1.3.6 Surface roughness
 - 4.1.3.7 Diffusion parameterization
 - 4.1.3.8 Deposition parameterization and deposition velocity
 - 4.1.4 Meteorological database
 - 4.1.4.1 Hourly data (wind, stability, precipitation, and temperature)
 - 4.1.4.2 Daily data (precipitation)
 - 4.1.4.3 Surface roughness
 - 4.1.5 Model validation
 - 4.1.5.1 Validation data sets
 - 4.1.5.2 Detailed validation plan
 - 4.1.5.3 Validation model runs
 - 4.1.6 Final documentation
 - 4.1.6.1 Database
 - 4.1.6.2 Computer model
 - 4.1.7 Calculations
 - 4.1.7.1 HTDS
 - 4.1.7.2 Chronic releases
 - 4.1.7.3 Special studies (e.g., "green run")
 - 4.1.7.3.1 Database preparation
 - 4.1.7.3.2 Model modification
 - 4.1.7.3.3 Model documentation
 - 4.1.7.3.4 Calculation
 - 4.1.8 Special studies
 - 4.1.8.1 Resuspension
 - 4.1.8.2 Thunderstorms
 - 4.1.8.3 Air chemistry of iodine-131
- 4.2 Groundwater transport
 - 4.2.1 Well data analysis
 - 4.2.1.1 On-site well data evaluation
 - 4.2.1.2 Off-site well data evaluation
 - 4.2.2 Air deposition to groundwater transfer
 - 4.2.3 Off-site migration
 - 4.2.3.1 Effects on off-site wells
 - 4.2.3.2 Effects on the river
- 4.3 Surface-water transport
 - 4.3.1 Monitoring data evaluation
 - 4.3.1.1 Data/information assembly
 - 4.3.1.2 Develop bibliography
 - 4.3.1.3 Data quality evaluation
 - 4.3.1.4 Data gaps reconciliation (time/location)
 - 4.3.2 Conceptual modeling
 - 4.3.2.1 Basic river processes
 - 4.3.2.2 Significant locations/times
 - 4.3.2.3 Numerical modeling approach

- 4.3.3 Calculation of concentrations
 - 4.3.3.1 Initial screening calculations
 - 4.3.3.2 Concentrations at points of interest
 - 4.3.3.3 Database for dose model
 - 4.4 Technical planning, control, and reporting
 - 4.4.1 Project planning/task planning
 - 4.4.2 Meetings
 - 4.4.2.1 TSP/public meetings
 - 4.4.2.2 Project meetings
 - 4.4.3 Documentation, reporting, and publications
 - 4.4.4 Quality objectives, achievements, and verification
 - 4.4.5 Project integration/interactions
- 5.0 Environmental Monitoring Data
 - 5.1 Data availability and review
 - 5.1.1 Document search, review, and collection
 - 5.1.2 Document inventory and database entry
 - 5.1.3 Data evaluation and maintenance
 - 5.2 Terrestrial data (vegetation, crops, food stuffs, and soil)
 - 5.2.1 Document review and inventory
 - 5.2.2 Data extraction and database entry
 - 5.2.3 Sampling methods review and evaluation
 - 5.2.4 Analytical methods review and evaluation
 - 5.2.5 Biases and uncertainties
 - 5.2.6 Hanford contributions
 - 5.3 Surface-water data (Columbia River, sediments, and aquatic biota)
 - 5.3.1 Document review and inventory
 - 5.3.2 Data extraction and database entry
 - 5.3.3 Sampling methods review and evaluation
 - 5.3.4 Analytical methods review and evaluation
 - 5.3.5 Biases and uncertainties
 - 5.3.6 Hanford contributions
 - 5.4 Air data
 - 5.4.1 Document review and inventory
 - 5.4.2 Data extraction and database entry
 - 5.4.3 Sampling methods review and evaluation
 - 5.4.4 Analytical methods review and evaluation
 - 5.4.5 Biases and uncertainties
 - 5.4.6 Hanford contributions
 - 5.5 Groundwater data
 - 5.5.1 Document review and inventory
 - 5.5.2 Data extraction and database entry
 - 5.5.3 Sampling methods review and evaluation
 - 5.5.4 Analytical methods review and evaluation
 - 5.5.5 Biases and uncertainties
 - 5.5.6 Hanford contributions
 - 5.6 Technical planning, control, and reporting
 - 5.6.1 Project planning/task planning
 - 5.6.2 Meetings
 - 5.6.2.1 TSP/public meetings
 - 5.6.2.2 Project meetings

- 5.6.3 Documentation, reporting, and publications
- 5.6.4 Quality objectives, achievements, and verification
- 5.6.5 Project integration/interactions
- 6.0 Demographic, Food Consumption, and Agriculture
 - 6.1 Demographics
 - 6.1.1 General population
 - 6.1.1.1 Phase I area
 - 6.1.1.2 Extension of geographic study area
 - 6.1.1.3 Duration of residence/migration
 - 6.1.2 Special populations
 - 6.1.2.1 Native American tribes
 - 6.1.2.2 Construction workers
 - 6.1.2.3 Military personnel
 - 6.1.2.4 Migrant workers
 - 6.1.2.5 Extension of geographic study area
 - 6.2 Agriculture
 - 6.2.1 Milk production and distribution model
 - 6.2.1.1 Survey of producers - feeding
 - 6.2.1.2 School lunch sources of milk
 - 6.2.1.3 Extension of geographic study area
 - 6.2.2 Vegetables (and fresh fruits) model
 - 6.2.3 Other agricultural models
 - 6.3 Lifestyles
 - 6.3.1 Populations
 - 6.3.2 Individuals
 - 6.4 Food consumption
 - 6.4.1 General population
 - 6.4.1.1 Actual distributions
 - 6.4.1.2 Age-related factors
 - 6.4.1.3 Consumption for infants, and nursing and pregnant women
 - 6.4.1.4 Dairy products, fruits, and vegetables
 - 6.4.1.5 Wildlife and other local products
 - 6.4.2 Special populations
 - 6.4.2.1 Native Americans
 - 6.4.2.2 Construction workers
 - 6.4.2.3 Military personnel
 - 6.4.2.4 Migrant workers
 - 6.5 Technical planning, control, and reporting
 - 6.5.1 Project planning/task planning
 - 6.5.2 Meetings
 - 6.5.2.1 TSP/public meetings
 - 6.5.2.2 Project meetings
 - 6.5.3 Documentation, reporting, and publications
 - 6.5.4 Quality objectives, achievements, and verification
 - 6.5.5 Project integration/interactions

7.0 Environmental Pathways and Dose Estimates

7.1 Code Development

7.1.1 Pathway development

7.1.1.1 Air pathway

- 7.1.1.1.1 Cow/milk
- 7.1.1.1.2 Vegetation
- 7.1.1.1.3 Meat
- 7.1.1.1.4 Poultry/eggs
- 7.1.1.1.5 Immersion
- 7.1.1.1.6 Sky shine
- 7.1.1.1.7 Ground shine
- 7.1.1.1.8 Soil
- 7.1.1.1.9 Inhalation

7.1.1.2 Water pathway

- 7.1.1.2.1 Fish/aquatic biota
- 7.1.1.2.2 Drinking water
- 7.1.1.2.3 Immersion
- 7.1.1.2.4 Boating/fishing/shoreline

7.1.2 Code structuring

- 7.1.2.1 Correlations/demodularization
- 7.1.2.2 Dynamics
- 7.1.2.3 Data handling

7.1.3 Coding implementation

- 7.1.3.1 Writing code
- 7.1.3.2 Verification/bench marking
- 7.1.3.3 Quality assurance

7.1.4 Code documentation

- 7.1.4.1 Theory manuals
- 7.1.4.2 User's manuals
- 7.1.4.3 Dose estimation turnover package

7.1.5 Model/code validation

- 7.1.5.1 Monitoring data
- 7.1.5.2 Bioassay data

7.2 Dose Calculations

7.2.1 Population group doses

7.2.1.1 Native American doses

- 7.2.1.1.1 Yakima
- 7.2.1.1.2 Umatilla
- 7.2.1.1.3 Nez Perce
- 7.2.1.1.4 Colville
- 7.2.1.1.5 Coeur d'Alene
- 7.2.1.1.6 Kalispel
- 7.2.1.1.7 Warm Springs
- 7.2.1.1.8 Spokane

7.2.1.2 Military doses

7.2.1.3 Migrant doses

7.2.1.4 Construction worker doses

- 7.2.2 Individual doses
 - 7.2.2.1 HTDS doses
 - 7.2.2.1.1 Feasibility study doses
 - 7.2.2.1.2 Full study doses
 - 7.2.2.2 Individuals on request
- 7.2.3 Nuclides of interest
 - 7.2.3.1 Iodine doses
 - 7.2.3.2 Ruthenium doses
 - 7.2.3.3 Plutonium doses
 - 7.2.3.4 Other nuclides
- 7.2.4 Pathways of interest
 - 7.2.4.1 Air pathway doses
 - 7.2.4.2 River pathway doses
 - 7.2.4.3 Groundwater pathway doses
 - 7.2.4.4 River irrigation doses
 - 7.2.4.5 Cistern doses
 - 7.2.4.6 Rain-out doses
 - 7.2.4.7 Other pathways of interest
- 7.2.5 Special release events
 - 7.2.5.1 "Green run" doses
 - 7.2.5.2 Fuel failures
 - 7.2.5.3 "Hot particles"
- 7.3 Model parameter development
 - 7.3.1 Dose factors
 - 7.3.2 Transfer factors
 - 7.3.3 Accumulation Factors
- 7.4 Technical planning, control, and reporting
 - 7.4.1 Project planning/task planning
 - 7.4.2 Meetings
 - 7.4.2.1 TSP/public meetings
 - 7.4.2.2 Project meetings
 - 7.4.3 Documentation, reporting, and publications
 - 7.4.4 Quality objectives, achievements, and verification
 - 7.4.5 Project integration/interactions
- 8.0 Statistics
 - 8.1 Technical Integration (Task 02)
 - 8.1.1 Restructuring pathway dose codes
 - 8.1.1.1 Air
 - 8.1.1.2 Water
 - 8.1.2 Developing data management within pathway dose codes
 - 8.1.3 Review task plans and data quality objectives
 - 8.1.4 Review products
 - 8.1.5 Statistics publications
 - 8.2 Source Terms (Task 03)
 - 8.2.1 Review task plan and data quality objectives
 - 8.2.2 Review products
 - 8.2.3 Sensitivity/uncertainty analysis and data management
 - 8.2.4 Review/evaluate/assist with data and calculations

- 8.3 Environmental transport (Task 04)
 - 8.3.1 Review task plan and data quality objectives
 - 8.3.2 Review products
 - 8.3.3 Sensitivity/uncertainty analysis and data management
 - 8.3.4 Review/evaluate/assist with data and calculations
- 8.4 Environmental monitoring data (Task 05)
 - 8.4.1 Review task plan and data quality objectives
 - 8.4.2 Review products
 - 8.4.3 Review/evaluate/assist with data and calculations
 - 8.4.4 Validation of air dispersion model
- 8.5 Demographics, agriculture, food habits (Task 06)
 - 8.5.1 Review task plan and data quality objectives
 - 8.5.2 Review products
 - 8.5.3 Review/evaluate/assist with data and calculations
 - 8.5.4 Sensitivity/uncertainty analysis and data management
- 8.6 Environmental pathways and dose estimates (Task 07)
 - 8.6.1 Review task plan and data quality objectives
 - 8.6.2 Review products
 - 8.6.3 Sensitivity/uncertainty analyses and data management
- 8.7 Technical planning, control, and reporting
 - 8.7.1 Project planning/task planning
 - 8.7.2 Meetings
 - 8.7.2.1 TSP/public meetings
 - 8.7.2.2 Project meetings
 - 8.7.3 Documentation, reporting and publications
 - 8.7.4 Quality objectives, achievements and verification
 - 8.7.5 Project integration/interactions
- 9.0 Records Management
 - 9.1 Battelle records management
 - 9.2 RL Public Reading Room
 - 9.3 Task planning, control, and reporting
 - 9.3.1 Project planning/task planning
 - 9.3.2 Project meetings
 - 9.3.3 Documentation, reporting, and publications
 - 9.3.4 Quality objectives, achievements, and verification
 - 9.4 Project Records Turnover
- 10.0 Quality Assurance
 - 10.1 Quality assurance procedures
 - 10.2 Data quality objectives
 - 10.3 Quality improvement
 - 10.4 Quality verification activities
 - 10.5 Task planning, control, and reporting
 - 10.5.1 Project planning/task planning
 - 10.5.2 Project meetings
 - 10.5.3 Documentation, reporting, and publications
 - 10.5.4 Project integration/interaction

11.0 Information Resources

- 11.1 Document declassification
- 11.2 Resource identification and availability
- 11.3 Task planning, control, and reporting
 - 11.3.1 Project planning/task planning
 - 11.3.2 Project meetings
 - 11.3.3 Documentation, reporting, and publications
 - 11.3.4 Quality objectives, achievements, and verification

12.0 TSP Communications Support

- 12.1 Public outreach support
 - 12.1.1 Video
 - 12.1.1.1 Production
 - 12.1.1.2 Distribution
 - 12.1.2 Posters
 - 12.1.2.1 Production
 - 12.1.2.2 Distribution
 - 12.1.3 Document accessibility
- 12.2 Communications assessment
 - 12.2.1 Focus groups
 - 12.2.2 Individuals
- 12.3 Audience analysis
 - 12.3.1 Public meeting attendance
 - 12.3.2 Clippings
- 12.4 Presentation coordination
- 12.5 TSP meeting/workshop/symposia support
- 12.6 TSP materials support
 - 12.6.1 Material supply
 - 12.6.2 Reviews
 - 12.6.3 Editing/writing
 - 12.6.4 Document retrieval
- 12.7 Task planning, control, and reporting
 - 12.7.1 Project planning/task planning
 - 12.7.2 Meetings
 - 12.7.2.1 TSP/public meetings
 - 12.7.2.1 Project meetings
 - 12.7.3 Documentation, reporting, and publications
 - 12.7.4 Quality objectives, achievements, and verification

DISTRIBUTION

No. of
Copies

No. of
Copies

OFFSITE

Technical Steering Panel

D. S. Barth
University of Nevada
4505 Maryland Parkway
Las Vegas, NV 89154

W. A. Bishop
2503 Wedgewood Court S.E.
Olympia, WA 98501

M. L. Blazek
Oregon Department of Energy
625 Marion Street N.E.
Salem, OR 97310

G. G. Caldwell
Director
Tulsa City-County Health Dept.
4616 East 15th Street
Tulsa, OK 74112

S. N. Davis
Dept. of Hydrology & Water
Resources
Building 11
University of Arizona
Tucson, AZ 85721

N. J. Germond
224 Iron Mountain Blvd.
Lake Oswego, OR 97034

P. C. Klingeman
Civil Engineering Dept.
Appejin Hall 202
Oregon State University
Corvallis, OR 97331-2302

K. J. Kopecky
Fred Hutchinson Cancer
Research Center
1124 Columbia Street
Seattle, WA 98104

P. D. McGavran
Dept. of Health and Welfare
450 W. State St., 4th Floor
Boise, ID 83720-5450

R. L. Morrill
Dept. of Geography, DP-10
University of Washington
Seattle, WA 98195

A. H. Murphy
Dept. of Atmospheric Sciences
Oregon State University
Corvallis, OR 97331-2209

D. W. Price
Agricultural Economics
Hulbert Hall Room 211
Washington State University
Pullman, WA 99164-6210

M. A. Robkin
Radiological Sciences, SB-75
University of Washington
Seattle, WA 98195

G. S. Roessler
202 Nuclear Sciences Center
University of Florida
Gainesville, FL 32611

B. Shleien
2421 Homestead Drive
Silver Springs, MD 20902

No. of
Copies

A. P. Slickpoo, Sr.
809 Nez Perce Lane
P.O. Box 331
Kamiah, ID 83536

J. E. Till
Route 2 Box 122
Neeses, SC 29107

D. E. Walker, Jr.
P.O. Box 4147
Boulder, CO 80306

Other

- 2 DOE Office of Scientific and
Technical Information
Technical Information Center
P.O. Box 62
Oak Ridge, TN 37830

B. G. Brooks, EH-421
U.S. Department of Energy
Room J-112
Germantown, MD 20545

- 18 K. CharLee
Office of Nuclear Waste Mgmt.
Department of Ecology
719 Sleater Kinney Road, S.E.
Suite 200
Olympia, WA 98504

M. R. Donnelly
Public Health Service
Centers for Disease Control
2201 6th Ave
Mail Stop RX-22
Seattle, WA 98121

A. Fingeret, GC-22
U.S. Department of Energy
Forrestal Bldg., Room 6H-087
1000 Independence Avenue
Washington, DC 20585

No. of
Copies

K. Gebbie, Secretary
Washington Dept. of Health
M.S. ET-21
Olympia, WA 98504

H. A. Haerer
Golder Associates
4104 148th N.E.
Redmond, WA 98052

D. B. Manders
Chronic Disease Epidemiology
Dept. of Health
M.S. EY-12
1408 State Street
Olympia, WA 98504

L. E. Sewell
Centers for Disease Control
1600 Clifton Road
Atlanta, GA 30333

J. Thomas
HEAL
1720 N. Ash
Spokane, WA 99205

ONSITE

- 8 DOE Richland Field Office

R. F. Brich, TSD	A5-55
H. A. Harris, PBB	A7-89
M. W. Tiernan, TSD	A5-55
Public Reading Room (5)	A1-65

- 1 Hanford Environmental Health
Foundation

S. E. Dietert	H1-03
---------------	-------

- 2 Westinghouse Hanford Company

G. D. Carpenter	B2-16
D. E. Wood	H4-51

No. of
Copies

No. of
Copies

54 Battelle, Pacific Northwest
Laboratories

D. M. Anderson	K6-57
A. C. Bampton	K7-73
A. J. Brothers	K6-59
D. S. Broussard	K1-67
S. D. Cannon	K1-25
T. D. Chikalla	P7-75
R. Cuello	Sequim
G. H. Cunningham	K1-59
D. K. Cyphers	K1-38
J. M. Daer (10)	K1-25
D. H. Denham	A3-60
W. T. Farris	K3-54
S. M. Finch	K1-25
M. D. Freshley	K6-77
R. O. Gilbert	K7-34
W. A. Glass	K4-13
R. H. Gray	K1-33
S. P. Gydesen	P8-55
G. L. Harvey	K1-77
C. M. Heeb	K6-42
T. A. Ikenberry	K3-54

E. B. Liebow	HARC
R. C. Liikala	K1-57
D. L. Martin	K3-70
A. H. McMakin	K1-25
B. A. Napier	K3-54
G. R. Petersen	K1-77
J. V. Ramsdell	K6-03
J. A. Shaw	K1-25
D. B. Shipler	K1-25
S. V. Shoemaker	K7-28
J. C. Simpson	K7-34
S. F. Snyder	K3-54
S. A. Stage	K6-03
D. L. Stewart	K6-91
W. L. Templeton	K1-30
M. E. Thiede	P7-54
W. H. Walters	K6-77
W. R. Wiley	K1-46
G. L. Wilfert	K6-54
L. Wilhelmi	K6-15
Publishing Coordination	K1-06
Records Center	K3-70
Technical Library (2)	P8-55

FY93

NOV

DEC

JAN

FEB

MAR

APR

MAY

JUN

JUL

0307A

LETTER REPORT:
HANFORD OPERATIONS

5

INFORMATION RESOURCES
SUMMARY REPORT (1103A)

3

INTEGRATED TASK PLANS -
MID-YEAR REVIEW (01010)

120

LET
MED

A1101

INFORMATION RESOURCES

0205B

LETTER REPORT: KEY
RADIONUCLIDES, REV. 1

A1203D

MEDIA REVIEW

A0101H

REVISE PROJECT MANAGEMENT PLAN

1203D

LETTER REPORT:
MEDIA REVIEW 1992

1002B

REVIEW OF HEDR QUALITY
ASSURANCE PLAN COMPLETED

A1203E

MEDIA REVIEW

A1002B

REVIEW HEDR QA PLAN

A1003B

Q.A. - INTERNAL AUDIT

0204A

LETTER REPORT: DATA
MANAGEMENT PLAN

7

1-131
REPORT (0303B)

0205E

LETTER REPORT: PROJECT
MODEL VALIDATION PLAN

8

AIR SOURCE TERMS
REPORT (0303D)

A0205F

DEVELOP OUTPUT DISPLAY DOCUMENT

0404B

LETTER REPORT: COLUMBIA
RIVER CONCEPTUAL MODEL

A0205E

DEVELOP PROJECT MODEL VALIDATION PLAN

0502A

VEGETATION DATA
REPORT (1945-1951)

17

FOOD CONSUMPTION
REPORT (0602C)

9

SURFACE WATER SOURCE
TERMS REPORT (0304B)

11

SURFACE WATER
TRANSPORT MODEL (0404C)

A0305A

DEVELOP SOURCE TERM RELEASE MODEL DOCUMENTATION

18

1-131 DOSIMETRY
REPORT (0705A)

07

KE
PA

0404

ATMOSPHERIC TRANSPORT CALCULATIONS

0405A

LETTER REPORT: INTERIM
ATMOSPHERIC DATABASE

0803A

PROJECT SENSITIVITY/UNCERTAINTY
ANALYSIS PLAN

0405B

ATMOSPHERIC
MODEL DATABASE

UL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR

FY94

FY94

FY95

MAR

APR

MAY

JUN

JUL

AUG

SEP

OCT

PROJECT FINAL
REPORT (01011)

0903A

PROJECT RECORDS SHIPPED
TO CDC'S ATLANTA, GA

Plot Date 23SEP92
 Data Date 1JUN92
 Project Start 1OCT90
 Project Finish 30SEP94 *

KEY ID
 Activity Bar/Early Dates
 Critical Activity
 Progress Bar
 Milestone/Flag Activity

MILE

ER MODEL DEVELOPMENT

0501A
ENVIRONMENT MONITORING
DATA PHASE I FINAL REPORT

0502B
BIAS/DATA
CORRECTION

ENVIRONMENTAL MONITORING DATA

MODEL DEVELOPMENT

IST: GREEN
0 CNTY) (0603C)

KEY RADIONUCLIDE PARAMETERS

12
POPULATION DOSE
MODEL (0702B)

ESTER & DOSE
D IN RVSD MOL

METRY CALCULATIONS

METRY CALCULATIONS

TER DOSIMETRY CALCULATIONS

STIVITY/UNCERTAINTY ANALYSIS

HEDR PROJE
INTEGRAT
LOGIC DIAGR

FOR PROJECT SUMMARY SCHEDULE
INTEGRATED TASK PLAN LEVEL
IC DIAGRAM BY WBS CODE AND E.F.

Sheet 1 of 1

MILE-LEVEL (1) BY (AREA, ACT, EF) SIZE (5, 6, 5, 4, 30, 10)

Date	Revision	Checked	Approved

C:\P2\HEDR\OT 001

END

**DATE
FILMED**

1 / 4 / 93