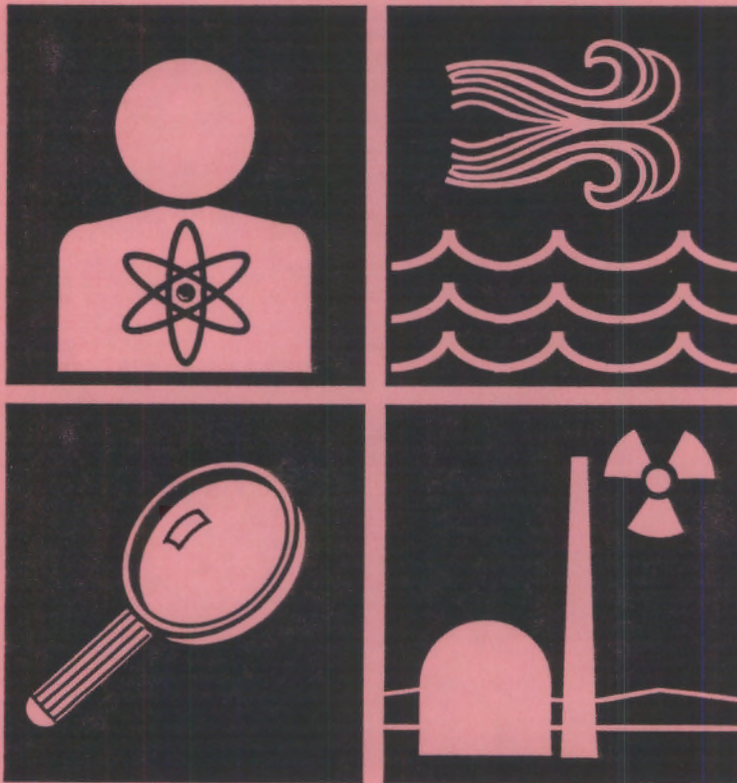


6

FY 1993 Task Plans for the Hanford Environmental Dose Reconstruction Project

D. B. Shipler, Project Manager

October 1991



Prepared for the Technical Steering Panel

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FY 1993 TASK PLANS FOR THE
HANFORD ENVIRONMENTAL DOSE
RECONSTRUCTION PROJECT

D. B. Shipler, Project Manager

October 1991

Prepared for the
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Pacific Northwest Laboratory
Richland, Washington 99352

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D. B. Shipler, Project Management

October 1991

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



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

October 1, 1991

Date

FY 1993 TASK PLANS FOR THE
HANFORD ENVIRONMENTAL DOSE
RECONSTRUCTION PROJECT


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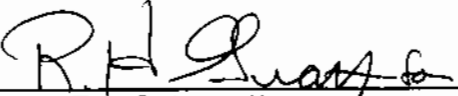
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Dose Reconstruction Project

10/29/91
Date



F. C. Hood, Director
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10/31/91
Date



W. L. Templeton, Manager
NEPA Implementation and Environmental
Documentation,
Office of Hanford Environment

10/31/91
Date

INTRODUCTION

The purpose of the Hanford Environmental Dose Reconstruction (HEDR) Project is to estimate radiation doses from Hanford Site operations since 1944 to individuals and populations. The primary objective of work to be performed in FY 1993 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 FY 1993 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. Table 1 shows the FY 1993 milestones; Table 2 shows estimated costs. The subsequent work scope descriptions are based on the milestones.

This document and the FY 1992 task plans will form the basis for a contract with Battelle and the Centers for Disease Control (CDC). The 2-year dose reconstruction contract is expected to begin in February 1992. This contract will replace the current arrangement, whereby the U.S. Department of Energy directly funds the Pacific Northwest Laboratory to conduct dose reconstruction work.

In late FY 1992, the FY 1993 task plans will be more fully developed with detailed technical approaches, data quality objectives, and budgeted labor hours. The task plans will be updated again in July 1993 to reflect any scope, milestone, or cost changes directed during the year by the TSP.

Milestones consist of major reports and letter reports. *Major reports* are TSP-directed documentation of completed, major HEDR activities. The TSP reviews and approves 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.

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

TABLE 1. FY 1993 Milestones

<u>Milestone Number</u>	<u>Milestone</u>	<u>Start Date</u>	<u>End Date</u>
0101G	FY 1993 revised task plans	1/93	4/93
0101H	Project Management Plan revision	4/93	8/93
0205E	Letter Report: Project model validation plan	10/92	4/93
0205F	Letter Report: Output display document	5/93	9/93
0303C	Iodine-131 source term report, 1944-1991	10/92	12/92
0303D	Report on key radionuclides released to air, 1944-1991	10/92	6/93
0304B	Report on key reactor releases to the Columbia River, 1944-1991	10/92	6/93
0305A	Letter Report: Radionuclide release model	10/92	9/93
0404C	Report on Columbia River modeling approach	10/92	9/93
0405B	Letter Report: Atmospheric model database status	10/92	9/93
0502C	Summary Report: Environmental monitoring data located to date	10/92	9/93
0602C	Food consumption report, general population	10/92	3/93
0603D	Milk production/distribution report, 1944-1991, 19 counties	10/92	3/93
0603E	Milk production/distribution report, beyond 19 counties	10/92	9/93
0703C	Letter Report: Key radionuclide parameters	10/92	9/93
0705A	Report on iodine-131 doses, 41 x 61 grid, 1944-1991	10/92	6/93
0705B	Doses from key radionuclides in Columbia River water, 1944-1991	10/92	9/93
0705C	Doses from key radionuclides released to air, (excluding iodine-131), 1944-1991	10/92	9/93

TABLE 1. (contd)

<u>Milestone Number</u>	<u>Milestone</u>	<u>Start Date</u>	<u>End Date</u>
0803B	Model reliability report	10/92	9/93
1002B	Letter Report: Review of QA plan	11/92	4/93
1003B	Letter Report: Internal audit	5/93	9/93
1103B	Progress report summarizing information resources work	10/92	9/93
1203C	Letter Report: Media analysis, 1992	1/93	1/93
1203D	Letter Report: Mid-year media analysis, 1993	6/93	6/93

TABLE 2. HEDR Task Numbers, Work Breakdown Structure, and Proposed Budget for FY 1993

<u>WBS Element (a)</u>	<u>Task</u>	<u>Subtask</u>	<u>Task Manager</u>	<u>Budget (\$ in thousands)</u>
	01	Project Management	DB Shipler	1,076
1.1, 1.2		0101 Project Planning and Control		680
1.3, 1.4, 1.6, 1.7		0103 Project Administration		380
1.5		0104 Project Peer Review		16
	02	Technical Integration	BA Napier	323
2.8		0201 Technical Planning, Control and Reporting		51
2.1, 2.2, 2.6, 2.7		0204 Project Technical Coordination and Analysis		132
2.3, 2.4, 2.5		0205 Pathways and Dose Model Requirements		140
	03	Source Terms	CM Heeb	484
3.6		0301 Technical Planning, Control and Reporting		55
3.2		0303 Radioactive Releases to Air		174
3.4		0304 Radioactive Releases to Water		212
3.5		0305 Release Model Development, Verification, and Validation		43
	04	Environmental Transport	SB Yabusaki	574
4.4		0401 Technical Planning, Control and Reporting		50
4.1.1, 4.1.2, 4.1.3, 4.1.5, 4.1.6		0402 Atmospheric Model Development and Evaluation		193
4.3		0404 Surface-Water Transport		204
4.1.4		0405 Atmospheric Model Database		27
4.1.8		0406 Atmospheric Model Calculations		100
	05	Environmental Monitoring Data	RL Dirkes	238
5.6		0501 Technical Planning, Control and Reporting		30
5.2		0502 Terrestrial Monitoring Data		97
5.3		0504 Surface-Water Monitoring Data		66
5.4		0505 Air Monitoring Data		45

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

TABLE 2. HEDR Task Numbers, Work Breakdown Structure, and Proposed Budget for FY 1993

<u>WBS Element</u>	<u>Task</u>	<u>Subtask</u>	<u>Task Manager</u>	<u>Budget (\$ in thousands)</u>
	06	Demography, Food Consumption, and Agriculture	RE Rhoads	300
6.5		0601 Technical Planning, Control and Reporting		40
6.4		0602 Food Consumption		80
6.2		0603 Milk Model Development		80
6.4.2		0605 Native American Data		100
	07	Environmental Pathways and Dose Estimates	TA Ikenberry	375
7.4		0701 Technical Planning, Control and Reporting		52
7.1		0702 Pathways and Dose Code Development and Documentation		120
7.3		0703 Pathways and Dose Model Parameter Development		80
7.2		0705 Dose Calculations		123
	08	Statistics	RO Gilbert	346
8.7		0801 Technical Planning, Control and Reporting		50
8.2, 8.3, 8.4, 8.5, 8.6		0802 Statistics Support for Project Technical Task Work		109
8.1		0803 Analysis of Model Reliability		187
	09	Records Management	DL Alamia	78
9.3		0901 Technical Planning, Control and Reporting		21
9.1, 9.2		0902 Project Records Management		57
	10	Quality Assurance	R Cuello	66
10.5		1001 Technical Planning Control, and Reporting		33
10.1, 10.2, 10.3		1002 Quality Assurance Program Development		20
10.4		1003 Quality Assurance Verification		13
	11	Information Resources	SP Gydesen	155
11.3		1101 Technical Planning, Control and Reporting		42
11.1		1102 Hanford Document Declassification		105
11.2		1103 Hanford Information Resources Identification and Search		8

TABLE 2. HEDR Task Numbers, Work Breakdown Structure, and Proposed Budget for FY 1993

<u>WBS Element</u>	<u>Task</u>	<u>Subtask</u>	<u>Task Manager</u>	<u>Budget (\$ in thousands)</u>
	12	TSP Communications Support	GL Harvey	59
12.7		1201 Technical Planning, Control and Reporting		31
12.1		1202 TSP Public Outreach Support		3
12.2, 12.3		1203 Communications Assessment Research		9
12.4, 12.5, 12.6		1204 TSP Meetings and Materials Support		16
		Subtotal, HEDR Project Tasks		4,074
		Contingency		0
		Subtotal, Project Tasks Plus Contingency		4,074
		Technical Steering Panel		900
		Native American Research (a)		327
		TSP Contract Administration		60
		TOTAL		5,361

(a) Proposed budget includes \$275K for Native American Research, \$15K for Indian Health Services management costs, and \$37K for Native American Research contingency.

(b) Assumes that another agency will administer the TSP contracts beginning February 1, 1992.

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TASK 01: PROJECT MANAGEMENT

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.

The project management plan, and task plans for FY 1993 and out years include the work of project office staff, task leaders and subtask leaders in contributing to these plans.

Milestones to the TSP

- 0101G - FY 1993 revised task plans (April 1993)
- 0101H - Project Management Plan revision (August 1993)

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 quality assurance (QA) function, and by independent Battelle audit functions.

Milestones to the TSP

None. Responses to specific requests are documented by letter.

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.

Milestones to the TSP

None.

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.

Milestones to the TSP

None.

Project Communication Support (WBS 1.7)

Scope

Project communication support includes three aspects:

- providing accurate and timely information to the TSP 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.

Milestones to the TSP

None.

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, based on appropriate analyses, and meet stated objectives.

Milestones to the TSP

None.

TASK 02: TECHNICAL INTEGRATION

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

Scope

This subtask includes activities not included in other subtasks necessary for overseeing completion of Task 02 work activities and integration of Task 02 activities into the project as a whole. Activities include the following:

- project planning, 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.

Milestones to the TSP

None.

Project Deliverables

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

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

Scope

Provide overall technical guidance, coordination, communication, and integration between all other tasks. Ensure that the outputs 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. Provide coordination with agencies and projects associated with, but independent of, the HEDR project, such as the Hanford Thyroid Disease Study (HTDS). The project integrator serves as the Battelle contact with the Native American Working Group and the HTDS.

Milestones to the TSP

None.

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

Scope

Develop requirements to enable the enhanced computer code to estimate individual doses and population doses for defined pathways of exposure, incorporate enhanced atmospheric dispersion capabilities, and conduct 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.

Model validation activities will continue. 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. Validation of additional portions of the model with Hanford data will continue.

Work in this subtask will result in two letter reports in 1993: a project model validation plan and an output display document for project model design. The validation plan will establish methods for using existing monitoring data to validate portions of the overall project model. The plan will

set criteria and requirements for the activities to be conducted in Tasks 04, 07, and 08. The output display document will develop user-friendly interactive mechanisms for the dose calculation modules. This document will set requirements and criteria for development work in Task 07 on the project turnover package.

Milestones to the TSP

- 0205E - Letter Report: Project model validation plan (April 1993)
- 0205F - Letter Report: Output display document (September 1993)

TASK 03: SOURCE TERMS

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

Scope

This subtask includes activities not included in other subtasks necessary for overseeing completion of Task 03 work activities and integration of Task 03 activities into the project as a whole. Activities include the following:

- project planning, 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.

Milestones to the TSP

None.

Project Deliverables

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

SUBTASK 0303: RADIOACTIVE RELEASES TO AIR (WBS 3.2)

Scope

This subtask will provide source term inputs to the atmospheric transport model for iodine-131, ruthenium-103, ruthenium-106, cobalt-60, cerium-144, and tellurium-132. This means the nominal daily values will be provided for the operating life of the separations plants. Actual output files to the atmospheric transport model will be produced by the release model code.

Monthly summary information 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	
krypton-85 (1944-1960)	

The time period is 1947-1991 for iodine-131 and 1944-1991 for the other radionuclides identified in this section, except for krypton-85. If a decision to declassify the production data post-1960 is made, krypton-85 releases will be provided for the 1961-1991 period. If post-1960 data remains classified, krypton-85 release estimates will be made the subject of a classified report, which will be available to appropriately cleared TSP members.

Milestones to the TSP

- 0303C - Iodine-131 source term report, 1944-1991 (December 1992)
- 0303D - Report on key radionuclides released to air, 1944-1991, (June 1993)

SUBTASK 0304: RADIOACTIVE RELEASES TO WATER (WBS 3.4)

Scope

In FY 1993, this subtask will complete source terms for radionuclides released to the Columbia River from the eight original single-pass HPRs. Weekly 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, weekly releases will be provided during the U.S. Geological Survey study period for scandium-46, manganese-54, and cobalt-60.

Milestone to the TSP

- 0304B - Source terms report for releases to surface water from reactors, 1944-1991 (June 1993). Provides input to FY 1994 source term history document.

Project Deliverable

- Source term estimates to Subtask 0404 for use in the surface-water model (March 1993)

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 provides a stochastic input mechanism for the atmospheric and river transport 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 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.

Milestone to the TSP

- 0305A - Letter report: Radionuclide release model (September 1993)

TASK 04: ENVIRONMENTAL TRANSPORT

SUBTASK 0401: ENVIRONMENTAL TRANSPORT TECHNICAL PLANNING, CONTROL, AND REPORTING (WBS 4.4)

Scope

This subtask includes activities not included in other subtasks necessary for overseeing completion of Task 04 work activities and integration of Task 04 activities into the project as a whole. Activities include the following:

- project planning, 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.

Milestones to the TSP

None.

Project Deliverables

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

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

Scope

Model reliability studies will be continued. These studies will determine the major sources of uncertainty in the atmospheric model calculations. Specific aspects model reliability to be studied and evaluation methods will be determined following the model sensitivity/uncertainty workshop to be held in FY 1992.

If the TSP determines that use of a less complex atmospheric transport model is acceptable for the period from 1958 through 1991, a model for that period will be prepared, tested, and documented.

Milestones to the TSP

None.

Project Deliverable

- Input to Task 08 for model reliability report

SUBTASK 0404: SURFACE-WATER TRANSPORT (WBS 4.3)

Scope

The modeling and scope described in this subtask are dependent on results of two TSP decisions made in FY 1992 regarding the use of monitoring data vs. modeling and whether to extend the surface-water study region.

The FY 1993 scope described here includes

- developing modeling approach for water concentrations
- conducting hydraulic modeling of water concentrations for selected locations.

Work will begin on preparing the source term database and simple dilution/decay routing model for the final production runs of time- and location-varying radionuclide concentrations in the Columbia River. Modeling will be limited to the reach of the Columbia River downstream from Priest

Rapids Dam to the vicinity of Celilo Falls near The Dalles for about 8-10 locations and about 13 radionuclides. The time period under study is 1944 through about 1970, though modeling calculations may be performed only for specific years.

Summary of Subtask Activities

- Develop Modeling Approach
 - review available river models
 - select model based on project needs
 - test model applicability
 - adapt to computer system
 - test with small database (source/sampled)
 - initial testing of uncertainty analysis (with Task 08)
 - finalize modeling approach
- Conduct Hydraulic Modeling of Water Concentrations
 - prepare input database
 - calculate time-varying water concentrations
 - submit results to Task 07
- Prepare Final Report
 - describe model
 - discuss results

Milestone to the TSP

- 0404C - Report that describes the Columbia River modeling approach and the river locations and time periods considered (September 1993). A discussion of the simulation results will be presented for each location.

Project Deliverable

- Radionuclide concentrations described in above milestone to Task 07 for dose estimation (June 1993)

SUBTASK 0405: ATMOSPHERIC MODEL DATABASE (WBS 4.1.4)

Scope

The atmospheric model database will be extended to cover the period from 1958 through 1991.

Milestone to the TSP

- 0405B - Letter Report: Atmospheric model database status (September 1993)

SUBTASK 0406: ATMOSPHERIC MODEL CALCULATIONS (WBS 4.1.7)

Scope

Atmospheric transport calculations will be made to support the calculation of 1) iodine-131 doses for the full HEDR study domain for all years, and 2) doses from other key radionuclides for the full study domain for all years. The results of the atmospheric transport calculations will be provided to Task 07 as input for dose calculations.

Milestones to the TSP

None.

Project Deliverable

- Atmospheric transport calculations for key radionuclides, including iodine-131, for 1944-1991, provided to Task 07

TASK 05: ENVIRONMENTAL MONITORING DATA

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 planning, 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.

Milestones to the TSP

None.

Project Deliverables

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

SUBTASK 0502: TERRESTRIAL MONITORING DATA (WBS 5.2)

Scope

In FY 1993, this subtask consists of summarizing soil, foodstuffs, and vegetation monitoring data. Data from this subtask are provided to update the Environmental Monitoring Document Database.

Soil and Foodstuffs Monitoring Data Availability

An inventory summarizing the soil and foodstuffs monitoring data available during the years 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 document is intended to provide an historical account of the soil and foodstuffs monitoring activities and provide a reference point to identify and facilitate future data retrieval and evaluation efforts as appropriate. This activity will also provide the information necessary for decision making relative to planning subsequent HEDR activities.

Vegetation Monitoring Data Availability

An inventory summarizing vegetation monitoring data available during the years 1951 through 1991 will be completed. This activity continued from FY 1992. 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 for all media found through FY 1993.

Milestone to the TSP

- 0502C - Status report summarizing all monitoring data located through FY 1993 in air, water, and vegetation (September 1993)

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

Scope

Columbia River Monitoring Database

Media-specific databases for water, fish, sediment, shellfish, and waterfowl will be established for the years 1944-1991 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 (4-6), radionuclides (10-12), and locations of concern (10-15) 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 Environmental Monitoring Document Database.

Milestones to the TSP

None.

Project Deliverables

- River monitoring data to Milestone 0502C, the report summarizing all monitoring data found through FY 1993
- Monitoring data provided to Tasks 04 and 07 for calculations

SUBTASK 0505: AIR MONITORING DATA (WBS 5.4)

Scope

An inventory summarizing the air monitoring data available during the years 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. Data from this subtask are provided to update the Environmental Monitoring Document Database.

Milestones to the TSP

None.

Project Deliverable

- Air monitoring data provided as input to Milestone 0502C, the report summarizing all monitoring data found through FY 1993

TASK 06: DEMOGRAPHY, FOOD CONSUMPTION AND AGRICULTURE

SUBTASK 0601: DEMOGRAPHY, FOOD CONSUMPTION AND AGRICULTURE TECHNICAL PLANNING, CDNTROL, 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 planning, 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.

Milestones to the TSP

None.

Project Deliverables

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

SUBTASK 0602: FOOD CONSUMPTION (WBS 6.4)

Scope

In FY 1993, food consumption information will be completed for general population groups.

Milestone to the TSP

- 0602C - Food consumption report, general population (March 1993)

SUBTASK 0603: MILK MODEL DEVELOPMENT (WBS 6.2)

Scope

Data collection and evaluation and model development and testing on the production and distribution of milk will be completed. This work, continued from FY 1992, involves the 19-county HEDR study area for the time period 1945-1991. At the end of FY 1992, 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 1993.

Milestones to the TSP

- 0603D - Milk production/distribution report, 1944-1991, 19 counties (March 1993)
- 0603E - Milk production/distribution report, beyond 19 counties (TSP decision) (September 1993)

Project Deliverable

- Milk production/distribution data to Task 07 for HTDS calculations (December 1992)

SUBTASK 0605: NATIVE AMERICAN DATA (WBS 6.4.2.1)

Scope

Population, lifestyle, food consumption, and food source information needed to perform additional Native American dose estimates will continue to be collected by tribes.

Milestones to the TSP

None.

Project Deliverable

- Native American data to Task 07

TASK 07: ENVIRONMENTAL PATHWAYS AND DOSE ESTIMATES

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. Activities include the following:

- project planning, 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.

Milestones to the TSP

None.

Project Deliverables

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

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

Scope

- development of surface water dosimetry model/code, in support of milestone 0705B
- begin small-scale air and surface-water model verification and validation and begin sensitivity and uncertainty testing, in support of FY 1995 milestone report on model verification/sensitivity/uncertainty
- air model revisions and enhancements; in support of milestones 0705A and 0705C

Milestones to the TSP

None.

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

Scope

This subtask will compile, evaluate and document key radionuclide parameters used in the HEDR air exposure pathways and dose model. These parameters are primarily radionuclide-dependent, but may 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. Includes development of parameter values and distributions to support calculations. Work supports Milestone 0705C, "Doses from key radionuclides." Development of fetal parameters (radionuclide transfer factors and dose factors) is not included.

The atmospheric pathway radionuclides include iodine-131, ruthenium-106, ruthenium-103, cobalt-60, cerium-144, and tellurium-132.

The river pathway radionuclides include phosphorus-32, zinc-65, arsenic-76, neptunium-239, sodium-24, manganese-56, copper-64, chromium-51, iodine-131, and tellurium-132.

Milestone to the TSP

- 0703C - Letter Report: Key radionuclide parameters (July 1993)

SUBTASK 0705: DOSE CALCULATIONS (WBS 7.2)

Scope

Air Pathway

- Dose estimates for HTDS pilot study
- Revised Phase iodine-131 dose estimates
- Key radionuclides dose report

Surface-Water Pathway

- Surface-water dose calculations; in support of Milestone 0705B

Native American Dose Estimates

- Continue dose calculations based on tribal data received

Milestones to the TSP

- 0705A - Dose report for iodine-131 for the 41 x 61 grid, 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, revised model, 41 x 61 grid, 1944-1991, for reference individuals (September 1993)

Project Deliverable

- HTDS pilot study doses to file



TASK 08: STATISTICS

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

Scope

This subtask includes activities not included in other subtasks necessary for overseeing completion of Task 08 work activities and integration of Task 08 activities into the project as a whole. Activities include the following:

- project planning, 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.

Milestones to the TSP

None.

Project Deliverables

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

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

Scope

This subtask continues work from FY 1992 to provide statistical support to HEDR Project tasks to help develop information needed to estimate doses and their uncertainties. Assistance to tasks in FY 1993 is expected to include the following activities, as needed:

- developing data quality objectives (DQOs) and evaluating their attainment
- analyzing and evaluating environmental radionuclide data
- estimating missing source term and environmental data
- assisting tasks in preparing project milestone reports, including 0205E (Letter Report: Project model validation plan), 0502C (Letter Report: Radionuclides in vegetation around Hanford Site, 1951-1991), 0703C (Letter Report: Key radionuclide parameters), and 0803B (Project reliability report)
- reviewing HEDR Project reports and technical papers for the appropriate use and description of statistical methods.

Milestones to the TSP

None.

SUBTASK 0803: ANALYSIS OF MODEL RELIABILITY (WBS B.1)

Scope

The Statistics Task will assist HEDR Project tasks to assess the reliability of dose estimates for specific individuals and population groups. Assessment of reliability includes validation of models, sensitivity and uncertainty analyses, and computer code verification. This support will be provided for both air and surface-water pathway doses. In addition, support will be provided to develop model parameter distributions, implement models, analyze and display doses, develop the dose-code turnover package, and develop the major dose report due in FY 1994. A report will be prepared that describes and interprets the reliability analyses conducted.

In FY 1993, greater emphasis will be placed on the surface water pathway dose model than in FY 1992. Also, additional model reliability activities will be conducted for the air-pathway model.

Milestone to the TSP

- 0803B - Model reliability (verification, sensitivity, uncertainty) report (September 1993)

TASK 09: RECORDS MANAGEMENT

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. Activities include the following:

- project planning, task planning
- monthly reports
- meetings (TSP and project)
- meeting presentations
- documentation, reporting, and publications
- responding to TSP 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 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 legal, regulatory, and QA requirements; maintains an automated inventory of project records; and provides reference service to project staff and the TSP. This subtask 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.

Milestones to the TSP

None.

TASK 10: QUALITY ASSURANCE

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

Scope

This subtask includes activities not included in other subtasks necessary for overseeing completion of Task 10 work activities and integration of Task 10 activities into the project as a whole. Activities include the following:

- project planning, task planning
- monthly reports
- meetings (TSP and project)
- meeting presentations
- documentation, reporting, and publications
- responding to TSP 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 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.

Milestone to the TSP

1002B - Letter Report: Review of QA plan (April 1993)

SUBTASK 1003: QUALITY ASSURANCE VERIFICATION (WBS 10.4)

Scope

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

Milestone to the TSP

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

TASK 11: INFORMATION RESOURCES

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

Scope

This subtask includes activities not included in other subtasks necessary for overseeing completion of Task 11 work activities and integration of Task 11 activities into the project as a whole. Activities include the following:

- project planning, 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.

Milestones to the TSP

None.

Project Deliverables

- Task plan input
- Monthly report input
- Presentations to the TSP and its subcommittees
- Project documentation
- Database to files and RL Public Reading Room
- Retrieved documents to staff

SUBTASK 1102: HANFORD DOCUMENT DECLASSIFICATION (WBS 11.1)

Scope

The scope of work is to declassify, with or without deletions, Hanford-originated documents identified to be of use to the project.

Milestones to the TSP

None.

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 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. FY 1994 work will be for those documents identified as work progresses.

Milestone to the TSP

- 1103B - Progress report summarizing information resources work (September 1993)

TASK 12: TSP COMMUNICATIONS SUPPORT

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

Scope

This subtask includes activities not included in other subtasks necessary for overseeing completion of Task 12 work activities and integration of Task 12 activities into the project as a whole. Activities include the following:

- project planning, task planning
- monthly reports
- meetings (TSP and project)
- meeting presentations
- documentation, reporting, and publications
- responding to TSP requests
- 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 1202: TSP PUBLIC OUTREACH SUPPORT (WBS 12.1)

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.

Milestones to the TSP

Not applicable. Services and support are provided to the TSP Communications Subcommittee as required.

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

Scope

Support routine 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.

Milestones to the TSP

- 1203C - Letter Report: Media analysis, 1992 (January 1993)
- 1203D - Letter Report: Mid-year media analysis, 1993 (June 1993)

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

Scope

Assist the TSP Communications Subcommittee in providing logistical support and arrangements, as necessary, for public presentations including meetings, workshops and briefings. Coordinate and arrange Battelle staff activities and responsibilities to participate in proposed information workshops. Provide materials for the development of TSP public information materials, and review draft materials when requested by the TSP. 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, press releases, etc.
- 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, press releases, etc.

Milestones to the TSP

Not applicable. Services and products are provided to the TSP Communications Subcommittee as required.

APPENDIX

PROJECT WORK BREAKDOWN STRUCTURE

APPENDIX

PROJECT WORK BREAKDOWN STRUCTURE

- 1 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 clearances
 - 1.4.3 Records transfer
 - 1.4.4 Records data base 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 Consultants
 - 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 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 development
 - 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 development
 - 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 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 (1947-1991)
 - 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 1957-1991
 - 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 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 (add, uncertainty)
 - 4.1.1.7 Surface roughness (add, find data)
 - 4.1.1.8 Characteristic turbulence velocity (add, 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 (add, uncertainty)
 - 4.1.1.13 Transport at center of mass (add)
 - 4.1.1.14 Mass balance (add)
 - 4.1.1.15 Multiple sources (add)
 - 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 Data base 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 I-131
- 4.2 Ground-water 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 Data base 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 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 stuff and soil)
 - 5.2.1 Document review and inventory
 - 5.2.2 Data extraction and data base 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, aquatic biota)
 - 5.3.1 Document review and inventory
 - 5.3.2 Data extraction and data base 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 data base 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 Ground-water data
 - 5.5.1 Document review and inventory
 - 5.5.2 Data extraction and data base entry
 - 5.5.3 Sampling methods review and evaluation
 - 5.5.4 Analytical methods review and evaluation
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- 6 Demographics, Agriculture, Food Habits
 - 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
 - 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, nursing women, 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
 - 6.4.2.4 Migrant workers

- 6.5 Technical planning, control and reporting
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- 7 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 Users 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 tribal 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
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 - 7.2.3.3 Plutonium Doses
 - 7.2.3.4 Other nuclides
 - 7.2.4 Pathways of interest
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 - 7.2.4.2 River pathway doses
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 - 7.2.4.4 River irrigation doses
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 - 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
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- 8 Statistics support
 - 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
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 - 9.3 Task planning, control and reporting
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 - 9.3.4 Quality objectives, achievements and verification
- 10 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
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 - 12.1.2.2 Distribution
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 - 12.6.1 Material supply
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