Hanford Environmental Dose Reconstruction Project

Monthly Report

December 1989

Prepared for the Technical Steering Panel

DISCLAIMER

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HANFORD ENVIRONMENTAL DOSE
RECONSTRUCTION PROJECT

Monthly Report

December 1989

Prepared for the Technical Steering Panel

Pacific Northwest Laboratory
Richland, Washington 99352

1993-1994
1993-1994

1993-1994

1993-1994

1993-1994

1993-1994

HANFORD ENVIRONMENTAL DOSE RECONSTRUCTION PROJECT

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HARBOR ENVIRONMENTAL CASE REORGANIZATION PROJECT

Page 1 of 1

PREFACE

This monthly report summarizes the technical progress and project status for the Hanford Environmental Dose Reconstruction (HEDR) Project (structure shown in Figure 1) being conducted at Pacific Northwest Laboratory (PNL) under the direction of a Technical Steering Panel (TSP). The TSP is composed of experts in numerous technical fields related to this project and represents the interests of the public. The U.S. Department of Energy (DOE) funds the project.

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

EXECUTIVE SUMMARY*

The objective of the Hanford Environmental Dose Reconstruction Project is to estimate the radiation doses that populations could have received from nuclear operations at Hanford since 1944. The project is being managed and conducted by Pacific Northwest Laboratory under the direction of an independent Technical Steering Panel.

The Technical Steering Panel consists of experts in environmental pathways, epidemiology, surface-water transport, ground-water transport, statistics, demography, agriculture, meteorology, nuclear engineering, radiation dosimetry, and cultural anthropology. Included among the members are appointed technical members representing the States of Oregon and Washington, cultural and technical experts nominated by the Indian tribes in the region, and an individual representing the public.

* This Executive Summary was approved by the Technical Steering Panel in September 1988.

The project is divided into the following technical tasks. These tasks address each of the primary steps in the path from radioactive releases to dose estimates:

- source terms
- environmental transport
- environmental monitoring data
- demographics, agriculture, and food habits
- environmental pathways and dose estimates.

The source terms task will develop estimates of radioactive emissions from Hanford facilities since 1944. These estimates will be based on historical measurements and production information.

The environmental transport task will reconstruct the movement of radioactive materials from the areas of release to populations. Movement via the atmosphere, surface water (Columbia River), and ground water will be studied.

The environmental monitoring task will assemble, evaluate, and report historical environmental monitoring data. A major effort of this task is to separate Hanford as a source of radionuclide concentrations in the environment from concentrations due to natural sources and nuclear testing fallout.

The demographics, agriculture, and food habits task will develop the data needed to determine the populations that could have been affected by the releases. Population and demographic information will be developed for the general population within the study area. This information will also be developed for several special population groups including the Native American Tribes in the study area, Army personnel stationed at Hanford, Hanford construction workers, and migrant farm workers.

In addition to population and demographic data, the food and water consumption patterns and sources of food and water for these populations must be estimated since these provide a primary pathway for the intake of radionuclides.

Historical dairy farming practices and milk distribution systems will be studied because milk is a significant pathway for iodine-131 to enter the human body. Cows could have eaten vegetation contaminated with this radionuclide.

The environmental pathways and dose estimates task will use the information produced by the other tasks to estimate the radiation doses populations could have received from Hanford.

Project reports, which have been approved by the Technical Steering Panel, and references used in the reports will be made available to the public in a public reading room. Project progress will be documented in monthly reports, which are available to the public.

extension to the project
project budget will be determined in monthly reports, which are
and which are used in the reports will be used to determine the project in a budget
Project reports which have been approved by the project steering committee

com. have received from the project
information provided by the project steering committee to determine the project steering committee
the steering committee will be used to determine the project steering committee

project steering committee will be used to determine the project steering committee
project steering committee will be used to determine the project steering committee
project steering committee will be used to determine the project steering committee

MANAGEMENT SUMMARY

PROGRESS

This summary covers progress for the month of December 1989.

- completed the following scheduled milestones*:
 - 03-C *Recommendation Regarding Development of Libraries Specific to Hanford for ORIGEN Code*^(a)
 - 03-D *Description of Chemical Form and Atmospheric Chemistry of Iodine Emissions*
 - 04-B *Atmospheric Modeling Approach*
 - 04-C *Phase I Atmospheric Model and Input Data*
 - 04-D *Phase I Atmospheric Model Results*
 - 06-A *Review of Literature on Public Interaction*
 - 06-D *Initial Description of the Milk Production and Distribution System for the HEDR Phase I Study Area*
 - 12-C *List Dominant Radionuclides*
TSP Meeting Planning and Preparation
- published the TSP-approved, revised HEDR work plan
- continued planning for FY 1990
- continued work on the internal draft of the Phase I summary report
- received TSP Directive 89-10, "Contracts with Tribes"^(b)
- presented a project status update and information on Phase II planning and decisions at the December TSP meeting along with preliminary Phase I information from several different tasks
- continued internal PNL clearance on several draft reports, which will be submitted to the TSP and become part of the Phase I summary report
- continued contract negotiations with Indian tribes

* Appendix B lists the reports documenting these milestones.

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

(b) Table 1.1 lists the current status of TSP Directives.

- continued work on the communications strategy, including conducting focus groups with Yakima Valley, Franklin county, and Pendleton area farmers and individuals interviews by a decision analysis consultant
- continued developing computer modules for calculating doses
- continued declassifying early-day, Hanford-originated documents of potential interest/use in the HEDR Project
- continued working on expanding existing QA plan to include project-specific data quality objectives. Met with a member of the TSP to discuss this issue. Developed a brief set of guidelines.
- conducted a review and comparison of preliminary results of the first module of the Monte Carlo and multiplicative lognormal codes.

MAJOR ISSUES AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- complete the following scheduled milestones* in January:
 - 03-E *I-131 in Irradiated Fuel at time of Processing from 12-44 Through 12-47*
 - 04-E *Phase I Surface Water Conceptual Model and Calculations*
 - 06-B *Phase I Demo Analysis for HEDR Project*
 - 06-C *Phase I Food Consumption Estimates for HEDR Project*
 - 07-A *Computer Code Design Specifications*
 - 07-B *Thyroid Data Summary*
 - 07-C *Radionuclide Transfer Factors*
- continue work to expand existing QA plan to include project-specific data quality objectives
- continue clearing reports documenting Phase I activities and submitting them to the TSP

* Reports documenting these activities will be submitted to the TSP for review, comment, and approval in the month indicated above and later included in the Phase I summary report.

- continue work on the Phase I summary report, including reviewing for data traceability and submitting for external peer review
- continue planning for FY 1990
- continue contract negotiations with tribes
- continue focus groups and individual interviews
- complete the preliminary code implementation
- continue to compare dose estimation and uncertainty analyses for the multiplicative lognormal code with that from the Monte Carlo code to check for agreement and errors
- continue to identify and collect documents and data of potential interest to the HEDR Project that address activities during the years from reactor startup through 1949.

BUDGET STATUS

Projected expenditures through December 1989 \$ 790K

Actual expenditures through December 1989 \$ 870K

VARIANCE EXPLANATION

None. Several milestones were not met due to the underestimation of time required for the internal review and clearance process. The following milestones have been rescheduled for January 1990:

- 04-E *Phase I Surface Water Conceptual Model and Calculations*
- 06-B *Phase I Demo Analysis for HEDR project*
- 06-C *Phase I Food Consumption Estimates for HEDR Project*
- 07-A *Computer Code Design Specifications*
- 07-B *Thyroid Data Summary*

CAPITAL STATUS

FY 1990 budget under consideration.

PROJECT SUMMARY REPORT

1. IDENTIFICATION NUMBER: DE-AC076RLO 1830		2. PROGRAM/PROJECT TITLE: HANFORD ENVIRONMENTAL DOSE RECONSTRUCTION					3. REPORTING PERIOD: DECEMBER 1989																							
4a. PARTICIPANT NAME AND ADDRESS: PACIFIC NORTHWEST LABORATORY P. O. BOX 999 RICHLAND, WA 99352		4b. CLIENT NAME AND ADDRESS: DOE/RL RICHLAND WA 99352					5. START DATE: OCTOBER 1989																							
							6. COMPLETION DATE: SEPTEMBER 1990																							
7. FY 90	8. MONTHS	O	N	D	J	F	M	A	M	J	J	A	S	FY91																
9. COST STATUS:																														
a. \$ EXPRESSED IN THOUSANDS																														
b. BUDGET & REPORTING NO./SUB. ACCT NO.																														
12578 GEO2210110																														
c. FIN. NO.																														
d. ACTUAL COSTS PRIOR YEARS																														
6332																														
e. FY BUDGET 2650 **																														
f. TOTAL BUDGET																														
g. FY FUNDS AUTH projected 2650																														
h. TOTAL FUNDS AUTH 5829																														
COSTS		i. PLANNED	250	300	240	250	290	200	190	190	190	190	180	180																
		j. ACTUAL	253	290	342																									
		k. VARIANCE	-3	10	-102																									
		l. CUM PLANNED	250	550	790	1040	1330	1530	1720	1910	2100	2290	2470	2650																
		m. CUM ACTUAL	253	544	870																									
		n. CUM VARIANCE	-3	6	-80																									
10. LEGEND: PLANNED ACTUAL ——— PROJECTED FUNDS AUTH. ——— 90% FUNDS SPENT ▴																														
11. MILESTONES																														
<table border="0" style="width: 100%;"> <tr> <td style="width: 40%;">01 Phase I Report</td> <td style="width: 60%; text-align: center;">○</td> </tr> <tr> <td>03-A Hanford Site Operations and Facilities</td> <td style="text-align: center;">●</td> </tr> <tr> <td>03-B Radionuclide List Decay Schemes</td> <td style="text-align: center;">●</td> </tr> <tr> <td>03-C Recommendation Regarding Development of Libraries Specific to Hanford for ORIGEN Code</td> <td style="text-align: center;">●</td> </tr> <tr> <td>03-D Description of Chemical Form and Atmospheric Chemistry of Iodine Emissions</td> <td style="text-align: center;">●</td> </tr> <tr> <td>03-E I-131 in Irradiated Fuel at time of Processing from 12-44 Through 12-47</td> <td style="text-align: center;">○</td> </tr> <tr> <td>04-A Preliminary Response to Directive 88-4, Ground Water</td> <td style="text-align: center;">●</td> </tr> <tr> <td>04-B Atmospheric Modeling Approach</td> <td style="text-align: center;">●</td> </tr> </table>															01 Phase I Report	○	03-A Hanford Site Operations and Facilities	●	03-B Radionuclide List Decay Schemes	●	03-C Recommendation Regarding Development of Libraries Specific to Hanford for ORIGEN Code	●	03-D Description of Chemical Form and Atmospheric Chemistry of Iodine Emissions	●	03-E I-131 in Irradiated Fuel at time of Processing from 12-44 Through 12-47	○	04-A Preliminary Response to Directive 88-4, Ground Water	●	04-B Atmospheric Modeling Approach	●
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04-B Atmospheric Modeling Approach	●																													
LEGEND: SCHEDULED △ TO TSP ○ TIME LINE ——— DEVIATION TIME NOW: COMPLETED ▲ ● DEVIATION ◇ PROGRESS ———																														
12. NAME/SIGNATURE OF PARTICIPANTS PROG/PROJ MANAGER & DATE H A Haerer																														

PROJECT SUMMARY REPORT

PROJECT SUMMARY REPORT - TECHNICAL STEERING PANEL

1. IDENTIFICATION NUMBER: DE-AC076RLO 1830		2. PROGRAM/PROJECT TITLE: HANFORD ENVIRONMENTAL DOSE RECONSTRUCTION - TSP						3. REPORTING PERIOD: DECEMBER 1989						
4a. PARTICIPANT NAME AND ADDRESS: PACIFIC NORTHWEST LABORATORY P. O. BOX 999 RICHLAND, WA 99352				4b. CLIENT NAME AND ADDRESS: DOE/RL RICHLAND WA 99352				5. START DATE: OCTOBER 1989						
								6. COMPLETION DATE: SEPTEMBER 1990						
7. FY 90	8. MONTHS	O	N	D	J	F	M	A	M	J	J	A	S	FY91
9. COST STATUS:														
a. \$ EXPRESSED IN THOUSANDS														
b. BUDGET & REPORTING NO./SUB. ACCT NO. 12578 GEO2210110														
c. FIN. NO.														
d. ACTUAL COSTS PRIOR YEARS														
e. FY BUDGET 688														
f. TOTAL BUDGET														
g. FY FUNDS AUTH														
h. TOTAL FUNDS AUTH 688 (unburdened)														
COSTS		I. PLANNED	57	57	57	57	57	57	57	57	58	58	58	58
		J. ACTUAL	17	21	30									
		K. VARIANCE	40	36	27									
		L. CUM PLANNED	57	114	171	228	285	342	399	456	514	572	630	688
		M. CUM ACTUAL	17	38	68									
		N. CUM VARIANCE	40	76	103									
10. LEGEND: PLANNED ACTUAL _____ PROJECTED FUNDS AUTH. _____ 90% FUNDS SPENT														
11. MILESTONES		O	N	D	J	F	M	A	M	J	J	A	S	FY91
LEGEND: SCHEDULED TIME LINE _____ DEVIATION TIME NOW: _____ COMPLETED DEVIATION PROGRESS _____														
12. NAME/SIGNATURE OF PARTICIPANTS PROG/PROJ MANAGER & DATE H A Haerer														

Table 1.1 Status of Directives

STATUS OF DIRECTIVES					
		Complete	Ongoing	Phase I	Phase II
88-1	(a) Proposals (b) Source Terms		X	X	
88-2	Vegetation			X	X
88-3	Status Reports		X		
88-4	Ground Water			X	X
88-5	Maps	X			
88-6	Resumes	X			

Table 1.1 Status of Directives, contd.

STATUS OF DIRECTIVES					
		Complete	Ongoing	Phase I	Phase II
89-1	Indian Tribes			X	
89-2	Bioassay Data			X	X
89-3	Document Handling		X		
89-4	Reactor Purging			X	X
89-5	Phased Approach		X		
89-6	Meeting Materials		X		

Table 1.1 Status of Directives, contd.

STATUS OF DIRECTIVES					
		Complete	Ongoing	Phase I	Phase II
89-7	Tech Communication			X	X
89-8	Phase II Planning			X	
89-9	Project QA Plan		X	X	
89-10	Contracts with Tribes			X	

Table 1.1 Status of Directives (contd.)

STATUS OF DIRECTIVES				
		Complete	Ongoing	Phase II
88-10	Complete with fines			
88-9	Project OA Plan	X		
88-8	Phase I Planning		X	
88-7	Tech Communication		X	X

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Source Terms

OBJECTIVE

Source terms are the amount and type of radioactive materials released to the environment. Members of the Source Terms Task will develop estimates of radioactive emissions since 1944 from Hanford facilities based on historical measurements and production information. Source term estimates will be used by Environmental Transport Task members to reconstruct the concentrations of radionuclides in the environment.

Uncertainty in calculated and measured data can result from many factors. Uncertainties in measured emissions may result from early measurement techniques; for calculated emissions, from the differences in the published variables that are used to perform calculations. By comparing the uncertainty in the available data, task staff will determine the most accurate method for developing source terms. For time periods where measured values do not exist, source terms must be calculated from available information. The proposed methods and results of this task will be reviewed, evaluated, and approved by the TSP.

PROGRESS

Activities for this reporting period included the following:

- completed the following scheduled milestones:
 - 03-C *Recommendation Regarding Development of Libraries Specific to Hanford for ORIGEN Code*
 - 03-D *Description of Chemical Form and Atmospheric Chemistry of Iodine Emissions, retitled, "Fission Product Iodine During Early Hanford-Site Operations: Its Production and Behavior During Fuel Processing, Off-Gas Treatment and Release to the Atmosphere"*
- continued internal PNL clearance on several draft reports, which will be submitted to the TSP and become part of the Phase I summary report

- presented Source Term Task information for Phase I at the December TSP meeting
- attended TSP subcommittee meeting on Source Terms in December
- met with the chairman of the TSP subcommittee on Source Terms to discuss Source Term Task activities and the scope of future activities.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- complete the following scheduled milestone:
03-E I-131 in Irradiated Fuel at Time of Processing from 12-44 through 12-47
- document fuel dissolution dates at the PUREX Plant, 1984-1986, from identified records.

Environmental Transport

OBJECTIVE

Members of the Environmental Transport Task will reconstruct the movement of radioactive materials (the source term information) from the areas of release to the accessible environment. Movement via the atmosphere, Columbia River, and ground water will be studied.

To track the releases to the atmosphere from the Hanford Site, meteorological data are needed including wind speed, wind direction, and other data that affect the dispersion of the releases. Mathematical models will be applied to these meteorological data and the source term data to calculate concentrations of radionuclides in the air and on the ground. The TSP will review, evaluate, and provide direction concerning the proposed models.

Reconstruction of the transport of radionuclides in the Columbia River will be based primarily on historical studies of the Columbia River and its tributaries. Computer models will be used to reconstruct radionuclide concentrations in the river for time periods when data were limited or unavailable.

The movement of radionuclides in the ground water will be initially reconstructed by using ground-water monitoring data to estimate the contribution to the surface-water pathway. As in the case of the surface-water pathway, some modeling might be required where data are lacking.

PROGRESS

Activities for this reporting period included the following:

- completed the following scheduled milestones:
 - 04-B *Atmospheric Modeling Approach*
 - 04-C *Phase I Atmospheric Model and Input Data*
 - 04-D *Phase I Atmospheric Model Results*
- continued internal clearance of the Phase I support document entitled, "*Columbia River Conceptual Model and Calculations for Phase I of the Hanford Environmental Dose Reconstruction Project*"
- presented information on the atmospheric transport model and the surface-water pathway at the December TSP meeting
- participated in the Environmental Transport Subcommittee meeting.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

WORK PLANNED FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- complete the following scheduled milestone:
 - 04-E *Phase I Surface Water Conceptual Model and Calculations.*

Environmental Monitoring Data

OBJECTIVE

Members of the Environmental Monitoring Data Task will assemble, evaluate, and summarize key historical measurements of the concentrations of radionuclides in the environment around Hanford. Radionuclide concentrations have been measured at various times in such media as air, drinking water, foods, fish, the Columbia River, soil and in other sample materials. These measurements will be evaluated to estimate their accuracies and then used by Environmental Pathways and Dose Estimates Task staff to estimate radiation doses and by Environmental Transport Task staff to calibrate computer models. Methods to attain this objective will be proposed to the TSP for review, evaluation, and approval.

PROGRESS

Activities for this reporting period included the following:

- presented information at the December TSP meeting on the progress and results to date on compiling and developing preliminary data on radionuclide concentrations in vegetation, river water, and fish
- continued work on a summary of the methods and results used to estimate the vegetation conversion and adjustment factors to appear in the Phase I summary report.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- revise draft inputs that will be part of the Phase I summary report
- continue work on uncertainty in instrument conversion factors.

Demographics, Agriculture, Food Habits

OBJECTIVE

Task members will develop the demographic, food consumption, and food production information needed to estimate doses.

Demographic information will be developed for the general population and for several special population groups that are not adequately represented by the U.S. Census, including Native American tribes, Army personnel stationed at Hanford, some Hanford construction workers, and migrant workers.

In addition to demographic data, the sources and quantities of food and water consumed must be estimated, because food and water provide pathways for the intake of radionuclides.

Airborne radionuclides from the plant stacks may have been deposited on fruits and vegetables. Consumption of these foods provided a pathway for radionuclide transport to humans. The pathways will be studied. In addition, milk produced from cows represents a significant food pathway for iodine-131 if the cows were fed vegetation contaminated with radionuclides. Dairy farming practices and milk distribution systems will be studied to locate the populations that may have consumed potentially contaminated milk.

Consumption of contaminated fish and shellfish is also a food pathway for exposure to radioactive materials. Estimates of the amount of potentially contaminated fish and shellfish consumed from the Columbia River and ocean bays will be developed through an extensive review of numerous past studies.

Treated Columbia River water was used by some community members downstream from Hanford. Drinking this water provided a pathway for exposure to

radioactive materials. To estimate the doses from this pathway, it is necessary to know the communities using the water, the amount of water withdrawn, the treatment process, the travel time through the system, and the amount of water consumed. Irrigation water usage downstream from Hanford will also be studied because the radioactive materials in the river water could have been deposited on crops consumed by people or animals. Recreational users of the river could also have been exposed to radiation from the river and shoreline. Food and lifestyle habits of Native Americans that differentiate them from the general population will also be considered. Methods to collect data and to estimate population densities and food consumption have been proposed to the TSP for review, evaluation, and approval.

PROGRESS

Activities for this reporting period included the following:

- completed the following scheduled milestones:
 - 06-A *Review of Literature on Public Interaction*
 - 06-D *Initial Description of the Milk Production and Distribution System for the HEDR Phase I Study Area*
- presented information on milk production and distribution at the December TSP meeting
- issued a supplement to the Kalispel's contract that changed the overhead structure and Work Order No. 1. The Kalispel Tribe is planning to have diet, lifestyle, and population information to PNL by March 1, 1990.
- issued Work Order No. 2 to the Spokane Tribe. They plan to have a work plan in place by February 1, 1990.
- met with Umatilla Tribal staff to discuss HEDR proposal
- attended TSP meeting and met with representatives of the Colville, Kalispel, Umatilla, Nez Perce, and Yakima Tribes.

Milestone 06-E, *Strategies and Approaches for Interactions Between the Public and the HEDR Project*, due February 1990:

- presented information on the communications directive at the December TSP meeting

- conducted individual interviews led by decision analysis consultant, Detlof von Winterfeldt for HEDR audience analysis
- continued focus groups involving Yakima Valley farmers, Franklin county farmers, and Eastern Oregon (Pendleton area) residents to identify audience concerns and information needs regarding HEDR results
- completed draft of "Summary of Literature Review of Risk Communication" for the Phase I study."

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- complete the following scheduled milestones*:
 06-B *Phase I Demography Analysis for HEDR Project*
 06-C *Phase I Food Consumption Estimates for HEDR Project*
- visit the Colville and Kalispel Reservations in early January
- continue focus groups and individual interviews to complete HEDR audience analysis
- continue to work with decision analysis consultant to build decision frameworks for determining Phase II scope.

* These milestones were originally scheduled for completion in December 1989, but have been rescheduled for January 1990. These reports were delayed due to the underestimation of time required to complete the review and clearance process.

 

Now

THE NEXT STEPS IN THE PROCESS

 

Environmental Pathways and Dose Estimates

OBJECTIVE

Task members will use calculated and measured concentrations of radionuclides provided by members of the Environmental Transport Task and the Environmental Monitoring Data Task to calculate doses to populations, typical individuals, and specific individuals. These calculations will include doses via direct transfer of radionuclides from concentrations in air and water to people (via breathing, drinking, immersion, etc.). The calculations will also include doses via radionuclide concentrations in air and water transferred through environmental pathways, such as soil, plants, animals, and fish, to people. All significant decisions on exposure models and input parameters will be presented to the TSP for review, evaluation, and approval.

PROGRESS

Activities for this reporting period included the following:

- presented information regarding bioassay data, vegetation data calculations and monitoring data comparisons at the December TSP meeting

Milestone 07-A, *Computer Code Design Specifications*, due December 1989 and rescheduled for completion in January 1990:

- completed the internal review of the draft design specifications document, which underwent significant modification during review. Final preparation of the report was subsequently delayed until January. Development of the Monte Carlo computer code, which calculates doses to people, is continuing, with the three modules of the part of the model that calculates doses from the air-vegetation-milk pathway now undergoing functional testing. A number of sample cases and hand calculations have been created and are being reviewed.

Milestone 07-B, Thyroid Data Summary, due December 1989 and rescheduled for completion in January 1990:

- presented *Evaluation of Hanford Thyroid Bioassay Data* at the Richland TSP meeting. The final report, *Evaluation of Thyroid Radioactivity Measurement Data from Hanford Workers, 1944-1946*, was completed and submitted to internal clearance.

Milestone 07-C, *Radionuclide Transfer Factors*, due January 1990:

- traveled to Pullman, Washington, to visit the extensive library on environmental transfer data at the Washington State University. A report is being prepared on this topic.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for the subsequent months includes the following:

- complete the following scheduled milestones:
 - 07-A *Computer Code Design Specifications**
 - 07-B *Thyroid Data Summary**
 - 07-C *Radionuclide Transfer Factors*
- complete the preliminary code implementation
- provide initial estimates of dose for a limited subset of cases.

* Milestones 07-A and 07-B have been rescheduled for completion in January 1990. These reports were delayed due to the underestimation of time required to complete the review and clearance process.

Information Resources

OBJECTIVE

Members of the Information Resources Task will work with the other task members to meet information needs, including ensuring that all data referenced in the reports are publicly available and establishing a microcomputer-based tracking system for ready retrieval of historical information.

PROGRESS

Activities for this reporting period included the following:

- declassified 17 early-day, Hanford-originated documents of potential interest/use in the HEDR Project and provided them to appropriate task leaders and the public domain
- continued to search for documents that address silver reactor capabilities, performance, and incidents
- continued to search for documents containing pertinent information of stack filter samples and scrubber samples during 1946 through 1949
- added new citations to the tracking system that now numbers over 2900
- provided the DOE-RL Public Reading Room with 36 documents of potential interest/use in the HEDR Project
- filled information requests from TSP and HEDR Task members
- completed the search of technical progress letters for information on stack gas disposal. No relevant information was identified for the period 1945 through mid-year 1947. The publication of HW-89072 completed this activity.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Planned work for subsequent months includes the following:

- make necessary arrangements to determine the existence or non-existence of Hanford Site-originated documents that were transferred to the corporate headquarters of du Pont and General Electric during the years 1944 through 1964
- continue to add input to the information resources tracking data base
- continue to provide documents to the DOE-RL Public Reading Room in an orderly, timely fashion
- develop a list of Hanford-originated raw data logs/notes of potential interest/use to the HEDR Project
- continue to identify and collect significant documents that address silver reactor capabilities, performance, and incidents
- identify documents that present information on stack filter samples and scrubber samples for 1946 through 1949
- watch for information that may explain in detail, and support data in, "green run" document HW-17381 DEL
- continue to identify and collect documents and/or data of potential interest/use to the HEDR Project that address activities during the years from reactor startup through 1949.

Records Management

OBJECTIVE

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

PROGRESS

Activities for this reporting period included the following:

- received and processed project records
- transferred three packages of records to the DOE-RL Public Reading Room
- completed the project and task Records Inventory and Disposition Schedule, revision 2, and submitted to HEDR project office for Manager and Custodian signatures.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- continue processing incoming project records
- continue transferring processed project records to the DOE-RL Public Reading Room
- review Technical Procedures RMP-1 and RMP-2 and update if necessary.

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Quality Assurance

OBJECTIVE

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

PROGRESS

Activities for this reporting period included the following:

- met with a member of the TSP to discuss QA/Quality Control (QC) Project Plans (QAPP) with emphasis on project specific and data quality objectives. A brief set of guidelines setting forth the minimum adequate contents of the QAPP will be prepared and implemented for Phase II. To avoid delays in Phase I, it was recommended that as much as possible relevant QA/QC data, assumptions, or value judgements be included in Phase I reports to assist the project leaders in the preparation of more complete QAPPs for Phase II.
- continued working on expanding existing QA plan to include project-specific data quality objectives
- continued providing QA program implementation guidance to project staff in areas of computer software modeling, databases, and internal/external review of Phase I results.

MAJOR PROBLEM AREAS AND ACTIONS TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- review Phase I report for adequate data traceability and to assure that as much as possible, relevant QA/QC data, assumptions, or value judgements are included
- continue working with HEDR staff to expand existing QA Plan to include project-specific data quality objectives as directed by the TSP
- continue to perform surveillance of software control requirements
- issue remaining HEDR procedures: HEDR-TP-3, *HEDR Documentation of Critical Decisions* and HEDR-TP-4, *HEDR Data Quality Objectives*
- develop guidelines that set forth the minimum contents of the QA Plan.

Statistics

OBJECTIVE

Task members will provide statistical support to members of technical tasks and will develop and apply sensitivity and uncertainty analyses. Sensitivity analyses will be used to identify parameters with the greatest influence on dose estimates. Using sensitivity analyses results, project staff can focus resources where the benefit in terms of accurate dose estimates is greatest. Uncertainty analyses enable task leaders to determine the extent to which the accuracy and precision of the dose estimates are influenced by accuracy and precision in the input parameters.

PROGRESS

Activities this reporting period included the following:

- continued to write a computer code to conduct dose estimation and uncertainty/sensitivity analyses using the multiplicative lognormal (ML) method. Results from this method will be compared with results obtained from the Monte Carlo (MC) dose estimation/uncertainty analysis code to determine if the two codes provide essentially the same estimates of doses and their uncertainties. If so, the ML code will be used in conjunction with the MC code during Phase II to more efficiently evaluate uncertainties and sensitivities of dose estimates.
- conducted a review and comparison of preliminary results of the first module of the MC and ML codes. This comparison was made by estimating iodine-131 time integrated air concentrations, average monthly deposition rates, and month-ending soil concentrations for December 1945 and January 1946 at a given location (Adams County 1) using three methods: the MC code, the ML code, and Latin Hypercube Sampling. The objective of the comparison was to help resolve why preliminary estimates of the month-ending soil concentrations for January 1946 obtained using the ML and MC codes did not agree. The Latin Hypercube Sampling results agreed with the MC code results, but

not with the ML results. As a consequence, efforts were begun to check for errors in the ML code. These kinds of comparisons and checking will continue throughout the HEDR Project.

- continued developing a strategy for conducting uncertainty/sensitivity analyses during Phase II
- wrote a draft paper that will appear in the HEDR Project Phase I report called, "Preliminary Uncertainty and Sensitivity Analysis of the Conversion Factor for Historic Iodine-131 Gross Beta Vegetation Measurements"
- submitted an abstract of the following paper for presentation at the annual Health Physics Society meetings in June, 1990, "Uncertainty Analysis of the Conversion Factor for Historic Iodine-131 Gross Beta Vegetation Measurements."

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

- develop and implement the strategy for Phase II uncertainty and sensitivity analyses
- continue to compare results of the MC and ML dose-estimation, uncertainty analysis codes to check for agreement and errors
- revise the preliminary analyses reported in the paper, "Preliminary Uncertainty and Sensitivity Analysis of the Conversion Factor for Historic Iodine-131 Gross Beta Vegetation Measurements."

Project Technical Coordination

OBJECTIVE

The objective of the Project Technical Coordination Task is to provide a general technical overview of the project to ensure that appropriate information is generated from the technical tasks for performing the final dose calculations.

PROGRESS

Activities this reporting period included the following:

- completed the following scheduled milestone:

12-C List Dominant Radionuclides

- traveled to Vienna, Austria, to participate in the International Atomic Energy Agency (IAEA) Coordinated Research Program on Validation of Model Predictions (VAMP) on December 4-8. The no-cost research proposal, "Validation of the HEDR Model with Chernobyl Data", was accepted by the IAEA. The meeting was very valuable in the collection of recent information on radionuclide interception, weathering, and behavior in urban and rural environments. The HEDR iodine data base was submitted as a case for other models to use for intercomparison. This was tentatively accepted by the VAMP organizers.
- presented *Overview of HEDR Model: Air Pathway* and *Overview of HEDR Model: Surface Water Pathways* at the December TSP meeting
- met with staff of the Fred Hutchinson Cancer Research Center to discuss the format and contents of the exposure questionnaire to be administered to the public for the Thyroid Morbidity Study.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for the subsequent months includes the following:

- continue defining the overall structure of the needed HEDR data base and the type of data needed for smooth project integration.

APPENDIX A

Communications Log

COMMUNICATIONS LOG - DECEMBER 1989

INITIATED BY	CONTACT	AFFILIATION	TYPE	SUBJECT
PNL/W. Haerer	John Till	TSP, Chairman	Telephone	Ongoing discussions re:HEDR Project
PNL/W. Haerer	Bernard Shleien	TSP, Executive Secretary	Telephone	Ongoing discussions re:HEDR Project
TSP/J. Stohr	Bonnie Dennis	PNL	Telephone	Ongoing discussions re: meeting planning
PNL/L. Morgan	Maurice Robkin	TSP	Telephone	Schedule for visit in January
TSP/M. Robkin	Larry Morgan	PNL	One-on-one	Planning/scoping discussions for the source terms task, calculations for estimation of I-131 releases for Phase I, source terms data-Phase I water pathway
PNL/R. Cuello	Delbert Barth	TSP	Site Visit	TSP Directive-Data Quality Objectives
PNL/R. Rhoads	Scott Davis	Fred Hutchinson	Telephone	January meeting
PNL/R. Rhoads	Mary Lou Blazek	TSP	FAX	Draft Q & A pamphlet
PNL/A. Thurman	Tri-Cities Residents		Telephone	Audience analysis focus groups
PNL/S. Marsh	Virgil Kupp	Pendleton Paper	Telephone	Interview for media analysis
PNL/S. Marsh	Pendleton residents		Telephone	Participation in Pendleton focus group
PNL/C. Bruneau	David Ernst	Spokane Tribe	Telephone	Work Order No. 2
PNL/C. Bruneau	Madeline Queahpama	Warm Springs Tribe	Telephone	HEDR proposal
PNL/C. Bruneau	Donna Powaukee	Nez Perce Tribe	Telephone	Work Order No. 3
PNL/C. Bruneau	Rick Gay	Umatilla Tribe	Telephone	Contract proposal
PNL/C. Bruneau	David Bonga	Kalispel Tribe	Telephone	Work order to conduct research

COMMUNICATIONS LOG - DECEMBER 1989

INITIATED BY	CONTACT	AFFILIATION	TYPE	SUBJECT
PNL/C. Bruneau	Gay/Burke	Umatilla Tribe	Meeting	Contract proposal
PNL/C. Bruneau	Dusty Seyler	Coeur d'Alene	Telephone	Rewriting proposal
PNL/C. Bruneau	Cara Carroll	Colville Tribes	Telephone	Set up meeting to introduce Cara to HEDR Project
PNL/C. Bruneau	Delano Saluskin	Yakima Nation	Telephone	Modifying HEDR contract
TSP/B. Shleien	Bonnie Dennis	PNL	Telephone	Allowable expenses on TSP invoices
HEAL/J. Thomas	Shirley Gydesen	PNL	Telephone	Hanford production declassification through 1960
TSP/M. Robkin	Shirley Gydesen	PNL	Telephone	Information request
PNL/P. Cleavenger	Bernard Shleien	TSP	Telephone	Report HHS-FDA-89-8276

APPENDIX B

List of HEDR and HEDR-Related Materials

Note: *HEDR materials* were presented to the TSP as project milestones or as handouts accompanying a presentation at a public meeting.

HEDR-related materials present aspects of dose reconstruction in the open scientific literature; TSP approval is not required.

HEDR REPORTS/PAPERS/PRESENTATION HANDOUTS TO THE TSP - TO DATE

Title	Author	PNL Clear. Date	Clearance No.	Additional Information	Status
Hanford Environmental Dose Reconstruction Project Monthly Report	Haerer, HA	ongoing	PNL-6450 HEDR	Monthly report-cleared one time for documentation	Periodic report; TSP approval not necessary
Hanford Environmental Dose Reconstruction Project - Work Plan	Haerer, HA	9/88	PNL-6696 HEDR	Superseded by new work plan	TSP approved
Work Plan for the Hanford Environmental Dose Reconstruction Project	Haerer, HA	12/89	PNL-6696 HEDR REV 1		TSP approved; published 12/89
Proposed Approach for Developing Information on Population Food Consumption and Lifestyles of Native Americans in the HEDR Study Area	Rhoads, RE, and Bruneau, CL	10/88	PNL-6803 HEDR	Working document	TSP comments were incorporated into PNL-6834 HEDR
Summary Report of HEDR Workshop on Sensitivity and Uncertainty Analysis	Sagar, B., and Liebetrau, AM	1/89	PNL-SA-16804 HEDR	Summary of workshop held January 16-18, 1989	Sent to Till 3/89 - no written response provided to PNL
Demographic, Agricultural, Food Consumption, and Lifestyle Research for the Hanford Environmental Dose Reconstruction Project	Beck, DM, Rhoads, RE, Harkreader, SA, Bruneau, CL, Darwin, RF, and Eckert, RL	3/89	PNL-6834 HEDR	Incorporates TSP comments	TSP received 3/89; no written response provided to PNL
Response to TSP Directive 88-4, Ground-Water Contamination Data	Freshley, MD	3/89	PNL-6847 HEDR		TSP received 3/89; no written response provided to PNL
Defining Demographic Categories for Phase I	Napier, BA, and Beck, DM	5/89	PNL-SA-17035 HEDR	Presentation handout for the TSP mtg, May 18-20, '89, Toppenish, WA	Handout; approval not required
A History of Major Hanford Operations Involving Radioactive Material	Ballinger, MY, and Hall, RA	7/89	PNL-6964 HEDR		TSP reviewed; PNL addressing comments
Feasibility of Using ¹²⁹ I Concentrations in Human Tissue to Estimate Radiation Dose From ¹³¹ I	McCormack, WD	10/89	PNL-6889 HEDR		TSP approved 9/89; published
Hanford Environmental Dose Reconstruction	Bruneau, CL	1989	PNWD-1323 HEDR	Informational brochure used in PNL's work with Tribes	TSP approval not required
Radionuclide Sources and Radioactive Decay Figures Pertinent to the HEDR Project	Heeb, CM	10/89	PNL-7177 HEDR		Sent to TSP 11/1/89

HEDR REPORTS/PAPERS/PRESENTATION HANDOUTS TO THE TSP - TO DATE

Title	Author	Date	PNL Clear. No.	Additional Information	Status
Hanford Environmental Dose Reconstruction Project	Haerer, HA	12/89	PNL-SA- 17661 S HEDR	Presentation handout for the TSP mtg, December 11-13, 1989, Richland, WA	Handout; approval not required
Communications Directive	Rhoads, RE	12/89	PNL-SA-17653 S HEDR	Presentation handout for the TSP mtg, December 11-13, 1989, Richland, WA	Handout; approval not required
Preliminary Evaluation of Thyroid Bioassay Data From Hanford Workers, 1944-1946	Ikenberry, T, and Napier, BA	12/89	PNL-SA-17670 S HEDR	Presentation handout for the TSP mtg, December 11-13, 1989, Richland, WA	Handout; approval not required
Overview of Project Model - Air Pathway	Napier, BA	12/89	PNL-SA-17673 S HEDR	Presentation handout for the TSP mtg, December 11-13, 1989, Richland, WA	Handout; approval not required
Source Terms - Air Pathway	Morgan, LG	12/89	PNL-SA-17657 S HEDR	Presentation handout for the TSP mtg, December 11-13, 1989, Richland, WA	Handout; approval not required
Atmospheric Transport Model	Freshley, MD	12/89	PNL-SA-17662 S HEDR	Presentation handout for the TSP mtg, December 11-13, 1989, Richland, WA	Handout; approval not required
Environmental Monitoring Data: Vegetation, 1945-1947	Woodruff, RK	12/89	PNL-SA-17671 S HEDR	Presentation handout for the TSP mtg, December 11-13, 1989, Richland, WA	Handout; approval not required
Preliminary Calculated and Measured Concentrations of Iodine-131 in Vegetation for Phase I	Napier, BA	12/89	PNL-SA-17674 S HEDR	Presentation handout for the TSP mtg, December 11-13, 1989, Richland, WA	Handout; approval not required
Milk Production and Distribution	Beck, DM	12/89	PNL-SA-17659 S HEDR	Presentation handout for the TSP mtg, December 11-13, 1989, Richland, W	Handout; approval not required
Overview of Project Model - Surface-Water Pathway	Napier, BA	12/89	PNL-SA-17672 S HEDR	Presentation handout for the TSP mtg, December 11-13, 1989, Richland, W	Handout; approval not required
Source Terms - Surface-Water Pathway	Morgan, LG	12/89	PNL-SA-17657 S HEDR	Presentation handout for the TSP mtg, December 11-13, 1989, Richland, WA	Handout; approval not required
Surface-Water Pathway	Freshley, MD	12/89	PNL-SA-17660 S HEDR	Presentation handout for the TSP mtg, December 11-13, 1989, Richland, WA	Handout; approval not required
Environmental Measurements - Columbia River	Poston, TM, and Dirkes, R	12/89	PNL-17669 S HEDR	Presentation handout for the TSP mtg, December 11-13, 1989, Richland, WA	Handout; approval not required
Phase II Planning	Haerer, HA	12/89	PNL-SA-17661 S HEDR	Presentation handout for the TSP mtg, December 11-13, 1989, Richland, WA	Handout; approval not required

HEDR REPORTS/PAPERS/PRESENTATION HANDOUTS TO THE TSP - TO DATE

Title	Author	Date	Clearance No.	Additional Information	Status
Atmospheric Transport and Dispersion Modeling for the Hanford Environmental Dose Reconstruction Project	Ramsdell, JV	12/89	PNL-7198 HEDR		To TSP for review 12/89
Preliminary Summaries for Vegetation, River and Drinking Water and Fish Radionuclide Concentration Data (DRAFT)	Woodruff, RK	12/89	PNL-17641 HEDR		To TSP for review 12/89
Atmospheric Transport Modeling and Input Data for Phase I of the Hanford Environmental Dose Reconstruction Project	Ramsdell, JV, and Burk, KW	12/89	PNL-7199 HEDR		To TSP for review 12/89
Fission Product Iodine During Early Hanford-Site Operations: Its Production and Behavior During Fuel Processing, Off-Gas Treatment and Release to the Atmosphere	Burger, LL	12/89	PNL-7210 HEDR		To TSP for review 12/89
The Hanford Environmental Dose Reconstruction Project: Background Information	Byram, SJ	12/89	PNL-SA-17658S HEDR		For use with focus groups; TSP approval not required
Summary of Literature Review of Risk Communication	Byram, SJ	12/89	PNL-7226 HEDR		To TSP for review 1/90
Milk Cow Feed Intake and Milk Production and Distribution Estimates for Phase I	Beck, DM	12/89	PNL-7227 HEDR		To TSP for review 1/90
Uncertainties in Source Term Calculations Generated by the ORIGEN2 Computer Code for Hanford Production Reactors	Heeb, CM	12/89	PNL-7223 HEDR		To TSP for review 1/90
Selection of Dominant Radionuclides for Phase I of the HEDR Project	Napier, BA	12/89	PNL-7231 HEDR		To TSP for review 1/90

LIST OF HEDR-RELATED PAPERS/PRESENTATIONS

Title	Author	PNL Clear. Clearance		Audience	Status
		Date	No.		
Estimating Atmospheric Dispersion for Reconstruction of Doses from Hanford Operations	Ramsdell, JV	6/88	PNL-SA-15818 HEDR	Presented at the 69th Annual Meeting of the Pacific Division of the American Association for the Advancement of Science, June 19-12, 1988 Corvallis, OR	Presented 6/88
Potential Applications of Geographical Information Systems for Analyzing Hanford Environmental Dose Reconstruction Data	Stephan, JG, Napier, BA, Baker, DA, and Millard, WD	3/89	PNL-SA-16767 HEDR	Presented at the Regional Symposium of the HPS Computer Applications in Health Physics, March 16-17, 1989 Richland, WA	Presented 3/89
The Hanford Environmental Dose Reconstruction Project: The Role of Applied Sociology	Beck, DM	4/89	PNL-SA-16880 HEDR	Presented at the Pacific Sociological Association Meeting, April 13-16, 1989 Reno, NV	Presented 4/89
Temporal Variations in Atmospheric Dispersion at Hanford	Ramsdell, JV	9/89	PNL-SA-17375 HEDR	Presented at the Hanford Symposium on Health & the Environment, Richland, WA Oct 16-19	Presented 10/89
The Hanford Environmental Dose Reconstruction Project: Overview	Haerer et al.	9/89	PNL-SA16859 HEDR	Presented at the Hanford Symposium on Health and the Environment, October 16-19, Richland, WA	Presented 10/89
The Hanford Environmental Dose Reconstruction Project: Technical Approach	Napier, BA	9/89	PNL-SA-16874 HEDR	Presented at the Hanford Symposium on Health & the Environment Richland, WA, Oct 16-19	Presented 10/89
Principle Component Analysis for Atmospheric Modeling	Skyllingstad, ED	10/89	PNL-SA-17164 HEDR	Conference on Probability & Statistics (Am Met Soc), Monterey, CA Oct 1-6	Presented 10/89
The Identification of Terrain-Induced Circulations Using Principal Components	Skyllingstad, ED and Schwartz, MN	10/89		Presented at the American Meteorological Society Conference on Probability and Statistics, October 1-5, 1989 Monterey, CA	Presented 10/89
Demographic Forecasting Using Trends from Ratio Correlation Variables	Beck and Pittinger			Demography (journal) or Journal of Rural Society	Planning for 1990
Reconstructing Historical Milk Prod/Dist Systems	Beck, DM			Journal of Health Physics	Planning for 1990

LIST OF HEDR-RELATED PAPERS/PRESENTATIONS

Title	Author	PNL Clear.	Clearance	Audience	Status
		Date	No.		
Sensitivity and Uncertainty Analyses for Environmental Dose Reconstruction	Sagar, et al.	11/89		Presented at a workshop on uncertainty, Nov 13-16, 1989, Santa Fe, NM	To be presented 11/89
Reconstructing Food Consumption Habits: The Backcasting Method	Callaway and Carr			Journal of Health Physics	Planning for 1990
Statistical Aspects of Reconstructing the I-131 Dose to the Thyroid of Individuals Living Near the Hanford Site in the mid-1940s	Gilbert, RO	9/89		Workshop: Statistics of Human Radiation Exposure to Ionizing Radiation, April 2-4, 1990, Oxford, UK	Abstract submitted to workshop
Using the Ratio-Correlation Methods for Backcasting	Beck and Swanson	Spring/90		Chapter in applied demog book	to be published Spring '90
Experience in Collaborative Research with Native American Tribes *	Bruneau, CL, and Rhoads, RE			Journal (not yet determined)	Planning for 1990
Uncertainty in 64-66 Data on Fish, Water, and Sediment	Poston, TM			Health Physics Society Mtg, Anaheim, CA	Planning for 1990
Uncertainties/Biases in 45-47 Vegetation Measurements	Mart, EI, and Woodruff, RK			Health Physics Soc. Mtg	Planning for 1990 or 1991
Communicating Radiation Dose Estimates to Affected Populations	HEDR Staff			Journal of the Society for Risk Analysis	Planning for 1990
Reconstructing Demography of Native Americans*	Beck, DM, and Bruneau, CL			Journal of Rural Sociology	Planning for 1990
Fish Concentration Ratios	Poston, TM			Journal (not yet determined)	Planning for 1990
Uncertainty Analysis of the Conversion Factor for Historic Iodine-131 Gross Beta Vegetation Measurements	Streng, DL	12/89	PNL-SA-17713 A HEDR	Health Physics Soc. Mtg	To be presented 6/90

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

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