

Hanford Individual Dose Assessment Project

FINAL REPORT

December 2000

Sponsored by:

Idaho Department of Health and Welfare
Division of Health
Elke Shaw-Tulloch, State Representative
Manager, Environmental Health Education Programs

Oregon Department of Human Services
Health Division
Laura Chenet Leonard, MPH, State Representative
Hanford Health Programs

Washington State Department of Health
John Erickson, State Representative
Director, Radiation Protection
Ellen Haars, Project Manager

Report prepared by:

Cedar River Associates Consulting, Inc.
Bea Kelleigh and Rhonda Peterson



Idaho
Department of Health and Welfare
Division of Health



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Health Division



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I. Summary

A. Background

The U.S. government made plutonium for nuclear weapons at the Hanford Nuclear Reservation in south central Washington state for more than 40 years beginning in 1944. As a result of that activity, the site released radioactive materials into the air, the soil and the Columbia River, primarily between 1944 and 1972.

Between 1987 and 1995, a dose reconstruction study, the Hanford Environmental Dose Reconstruction (HEDR) Project, worked to determine what radioactive materials Hanford had released during its plutonium production years and to estimate what radiation doses people might have received from these releases. This study involved a very complex set of tasks including: finding and reviewing 30- to 45-year-old records on Hanford's production of plutonium, historical weather information, census and demographic information, and information about milk and food sources and distribution; and estimating how radioactive materials moved through the environment to contaminate the land, water and food sources. The HEDR Project developed complex computer models that took into account what radionuclides Hanford released, how much radiation was released, how the releases moved through the environment, the ways in which people were exposed, and many variables for differences in individuals.

The HEDR study concluded that iodine 131 accounted for more than 98 percent of the radiation dose that most people received from Hanford's air releases. According to the study, almost all the iodine 131 releases to the air occurred from December 26, 1944 (the first day of plutonium production) through December 31, 1957. The geographical area the HEDR Project studied for the air releases was a 75,000-square-mile area covering parts of Washington, Oregon and Idaho (see Attachment 1).

B. Purpose of the Hanford Individual Dose Assessment Project

At the request of citizens, the Hanford Individual Dose Assessment (IDA) Project was developed as a public service. The Project provided individual thyroid dose estimates for people who lived or spent time in the HEDR study area between December 26, 1944 and December 31, 1957. The Hanford IDA Project was not a study but a service for those who were interested in learning more about their potential radiation dose estimates.

The HEDR Project had estimated doses to *representative* individuals. The Hanford IDA Project estimated *individual* thyroid radiation doses and based them on the scientific work and computer models of the HEDR Project. In addition, the Hanford IDA Project's dose estimate calculations used the information each individual supplied about his or her residences and diet while in the HEDR study area between 1944 and 1957.

The Hanford IDA Project supplied dose requestors with their individual thyroid dose estimate, together with information to help them understand their dose estimate and what it might mean for their health. The Project's individual radiation dose estimates were the first ever to be provided to people who were or may have been exposed off-site by releases from a nuclear weapons plant.

The Hanford IDA Project was developed jointly by the state public health agencies of Idaho, Oregon and Washington, under a cooperative agreement with the federal Centers for Disease Control and Prevention (CDC). The actual generation of dose estimates was centralized in the Washington State Department of Health in Olympia, Washington. The CDC provided funding for the Project. The Project began in late 1994 and launched the individual thyroid dose estimate service to the public in October 1998. The Project ended in December 2000.

C. Key Project Accomplishments (in chronological order)

- Conducted an assessment to determine the approximate number of people who might use the dose estimate service (see Attachment 2).
- Conducted outreach to health care providers, the Columbia Basin tribes, interested organizations, and members of the public to let them know about the dose estimates, to receive their advice about the Project and respond to questions.
- Developed a Hanford IDA Project information sheet for distribution at public meetings and to people requesting information. See Attachment 3 for a copy of the most recent sheet.
- Developed computer programs capable of storing and processing the residence and diet information that each individual who requested a dose estimate had supplied.
- Developed and conducted review and field testing of the *Your Residence History* and *Your Diet History* forms. The field testing was done to check readability and clarity and to ensure that people would be able to use the forms to provide the information needed to calculate their dose estimate.
- Developed the Dose Estimate Resource Packet and conducted technical reviews and field testing to ensure quality and accuracy.
- Developed data entry systems and quality assurance plans to ensure that the dose estimate results reflected an individual's information as closely as possible.
- Established procedures to protect the confidentiality of the information each individual provided.
- Hired and trained staff for the dose delivery process to implement the service.
- Mounted a publicity campaign to reach as many eligible people as possible in the three states and worldwide. This campaign involved direct mail to 40,000+ households, together with media announcements that resulted in at least 100 news articles in the three states plus national print and online media.
- Set up and staffed a toll-free telephone line to provide an easy way for individuals to initiate the dose estimate process and ask questions. The Project responded to a total of 19,135 calls from the public on the toll-free line.
- Developed three status report flyers for individuals who had filled out a form to request their dose estimate. Because of the overwhelming response to the Project's announcement of the service, it took longer to respond to requestors than expected or desired. Periodic status

reports helped to keep the clients informed of the Project's work and progress. See Attachment 4 for a sample.

- Provided 7,987 persons with their individual thyroid dose estimate.

II. Dose Estimates Requested and Delivered

A. Level of Interest Assessment

The HEDR Project had estimated that the population occupying the 75,000-square-mile study area numbered approximately 797,000 in 1945 and had grown to 935,000 in 1950. These numbers were the only estimates available to the Hanford IDA Project about the population eligible for an individual thyroid dose estimate.

To predict how many of these individuals still living might be interested in receiving their dose estimate, the Hanford IDA Project conducted a level-of-interest assessment in 1996. This assessment was conducted by mail using a mail-back postcard (Attachment 2). The mailing went to a random sample of individuals on the mailing lists of the Hanford Health Information Network (HHIN) in each of the three states, plus those who had moved outside the three-state area. This assessment projected that approximately 25,000 people would be interested in receiving their individual dose estimate.

B. Public's Response to the Announcement of Service

The Hanford IDA Project launched the dose estimate service to the public in October 1998 with a publicity campaign and a mailing to the more than 40,000 households on HHIN's and HEDR's mailing lists. (To maintain the confidentiality of these lists, the Hanford IDA Project supplied the materials to HHIN and HEDR, and paid for the mailings.) The direct mailings included the *Your Residence History*, which was the first of two forms a person needed to complete in order to receive an individual dose estimate. The Project's media campaign included a toll-free number people could call to initiate the service.

The public's response to the announcement was substantial. Within two months, more than 8,000 people had returned their forms and another 7,000 had called requesting additional forms or assistance in filling out the forms.

C. Dose Estimates Delivered

The Hanford IDA Project calculated and delivered a total of 7,987 individual thyroid dose estimates. This number included 316 individuals whose forms had come in after September 23, 1999, and were placed on a waiting list. The Project had created the waiting list when it was not clear if the Project would be able to fill all the requests by its scheduled ending date of March 28, 2000. However, additional federal funding allowed the Project to continue through the end of December 2000. The Project extended the deadline to send in *Your Residence History* forms to January 31, 2000, and was able to provide individual thyroid dose estimates to people who met this deadline. The table on page 4 shows the number of dose estimates delivered, grouped by state of current residence.

The Project was not able to process 545 requests because of incomplete information on the *Your Residence History*, or because the requestor was not eligible (did not live in the HEDR study area or was not there within the 1944 – 1957 time frame).

**Hanford IDA Project
Individual Iodine 131 Thyroid Dose Estimates Delivered
By Location of Current Residence**

State/Location	Number (percent) of Dose Estimates Delivered	State/Location	Number of Dose Estimates Delivered
Washington	4,485 (56%)	North Carolina	13
Oregon	1,271 (16%)	Illinois	11
Idaho	937 (12%)	Tennessee	11
California	402 (5%)	Oklahoma	10
Arizona	103 (1%)	Alabama	9
Florida	90 (1%)	Iowa	9
Texas	59 (<1%)	Louisiana	9
Montana	58 *	Michigan	9
Colorado	46	Wyoming	9
Nevada	41	Kentucky	8
Utah	36	Arkansas	7
Alaska	34	Connecticut	7
New York	26	New Hampshire	6
Minnesota	24	South Dakota	6
New Mexico	22	South Carolina	5
Virginia	22	Indiana	4
Pennsylvania	21	North Dakota	4
Wisconsin	21	West Virginia	4
Ohio	19	New Jersey	3
Outside USA	19	U.S. Military – abroad	3
Georgia	16	Mississippi	2
Missouri	15	District of Columbia	1
Hawaii	14	Maine	1
Kansas	14	Vermont	1
Massachusetts	14	Delaware	0
Maryland	13	Rhode Island	0
Nebraska	13		

**Total: 7,987 individual dose estimates
Sent to 48 states and the District of Columbia, plus 22 foreign addresses**

* The remainder of the entries are less than 1 percent of the total number of doses delivered.

D. Dose Estimate Process

From the perspective of the person requesting an individual dose estimate, four steps were involved:

1. Introductory brochure and *Your Residence History* (Attachment 5). Individuals received these materials by mail in the Project's initial direct mailing, by calling the Project's toll-free line, or by downloading them from the Project's Web site.
2. *Your Residence History*. Individuals were asked to complete and mail the form within four weeks of receiving it. The Hanford IDA Project staff used the information an individual supplied on this form to create a personalized *Your Diet History*. The *Your Diet History* was mailed to the person requesting the dose estimate.
3. *Your Diet History* (Attachment 6). Individuals were asked to complete this form and mail it back within 45 days.
4. Calculation of the thyroid dose estimate and mailing with explanatory materials. The Hanford IDA Project used the HEDR computer models and the information an individual provided about past residences and diet to calculate the person's dose estimate. The Project mailed the resulting individual dose estimate charts to the person in the form of a Dose Estimate Resource Packet (Attachment 7).

The Hanford IDA Project developed all the materials used in this process. See IV.D.2. Forms and Materials Development on pages 8-9 for further information.

III. HEDR Models and Hanford IDA Project Dose Estimates

A. HEDR Computer Codes

In 1994, the HEDR Project calculated Hanford radiation dose estimates for representative individuals for the air and the Columbia River pathways. One of the goals for the HEDR Project was to create computer models that could be used to calculate dose estimates for real individuals. The HEDR Project's Technical Steering Panel (TSP) stated that one hope was to provide a means for calculating individual dose estimates for all radionuclides Hanford released throughout its operating years (1944–1972).

The Hanford IDA Project made use of the HEDR study's scientific work and computer models. The Hanford IDA Project originally had hoped to provide individual dose estimates for both the air and the river pathways, and for multiple radionuclides. However, further refinements were needed to the HEDR computer models for calculating individual dose estimates other than iodine 131 released to the air between 1944 and 1957. Since the Hanford IDA Project was not itself a study, it was possible to provide individual dose estimates only for these iodine 131 releases. The CDC is coordinating further scientific work on the river pathway and other tasks to complete the TSP's recommendations.

The HEDR computer codes for modeling releases of iodine 131 through the air pathway included source term calculations (estimates of the amounts of iodine 131 Hanford released to the air), air transport modeling (how the iodine 131 was transported through the air), and environmental concentration estimation (how iodine 131 affected the air, water and food supply). These computer codes also included estimates of uncertainty in the dose estimates.

To create a computer model for individual dose estimates, the HEDR scientists took the approach of calculating 100 dose estimates for each person to provide a range of possible doses rather than a single dose estimate number. Each of the 100 dose estimates used a different set of values for hundreds of random variables (for which values were not known with certainty). The random variables included, for example, wind speed and direction, frost dates, plant growth parameters, animal eating habits, food distribution networks and dose conversion factors. This approach—running a person’s dose estimate 100 times with different variables—provided a dose estimate range within which a person’s dose was likely to have occurred.

B. Individual Dose Estimates

The Hanford IDA Project was a free public service for those who were interested in obtaining their individual estimated thyroid dose. The Project was not a study. The Hanford IDA Project was careful to publicize that its dose estimates were estimations only, since the information was not available to determine the exact dose a person had received. The Project did not use the aggregate results of the individual dose estimates for research purposes or to make comparisons. Those who received individual dose estimates were self-selected and were not necessarily representative of the exposed population.

Individuals requesting a dose estimate provided the Hanford IDA Project with information about their past residence locations between 1944 and 1957, diet of milk and other foods, time spent outdoors, and their birth date and gender. The Hanford IDA Project’s computer program processed this information, used the HEDR codes to calculate an individual dose estimate, then organized the results into user-friendly reports.

It is important to note that the Hanford IDA Project accepted the information an individual provided on the *Your Residence History* and *Your Diet History* and used it to calculate the person’s thyroid dose estimate. If an individual’s response to a question on one of the forms was unclear, the Project made an effort to get in touch with that person to clarify the intended response. If the person could not be reached, the Project’s procedure was to make an assumption and document it for the person’s file. If a person provided a range where a single number was called for (such as in the number of servings of milk consumed per day), the Project used the average of the values the individual gave.

Knowing an individual’s place(s) of residence within the HEDR study area was particularly important in order to place the person in the correct section (node) of the HEDR study area. The HEDR scientists had divided the study area into 1,102 nodes. For each node, they estimated various factors of environmental exposure such as wind patterns and dairy distribution in the area.

The Project provided each individual with an estimated dose range (5th and 95th percentiles) and the median dose estimate of the range. To avoid multiple decimal-place numbers, the Project expressed the dose estimates in millirad. To aid the individual in making comparisons, the Project also provided the estimated dose range and median in rad, milligray and gray. The Project prepared several charts and tables of each individual’s dose estimate to provide the information in a user-friendly format.

Native Americans in the region may have had different diets and lifestyles than the majority of residents had. Some of these differences could not be taken into account in the Hanford IDA Project's dose estimates. However, the CDC has developed representative dose estimates for each of the nine Indian tribes in the HEDR study area.

At the end of the Hanford IDA Project, the records of dose estimates calculated were stored, with confidentiality maintained, in the Washington State Records Center. These records will be kept for six years, as approved by the Washington State Records Committee. The Hanford IDA Project computer software and documentation were archived in the Washington State Archives, also as approved by the Washington State Records Committee.

IV. Project Coordination, History and Operations

The Hanford IDA Project was complex and multifaceted. Its work represented the efforts of three state health agencies in conjunction with a federal agency. These agencies worked together to provide a public service that had never been offered before: providing individual radiation dose estimates to people who were exposed off-site from a federal nuclear weapons plant. This project involved a variety of disciplines, including health physics, computer programming, coding and data entry, nutritional epidemiology, health education, public health, survey research, and public involvement. All these factors about the Project added to the challenges of planning and managing the Project's work.

A. Structure and Responsibilities

- **Hanford IDA Project Oversight Committee** – The Oversight Committee consisted of a representative from each of the three state public health agencies, and the Project Manager at the Washington State Department of Health (DOH). The Oversight Committee was the Project's decision-making body and oversaw all aspects of the Project. Their work was guided and informed by consultation with the Project's Extended Oversight Committee. See Attachment 8 for a list of the Oversight and Extended Oversight Committee members.
- **Extended Oversight Committee** – This committee consisted of the Oversight Committee, CDC staff, staff/technical consultants of the three states who had been involved with the HEDR Project, members of the Hanford IDA Project staff, two members of the public and Project consultants. In addition, liaisons from the Inter-Tribal Council on Hanford Health Projects (ICHHP) and the Hanford Health Effects Subcommittee (HHES), attended many of the Extended Oversight Committee meetings. The Extended Oversight Committee met quarterly during the Project's development phase and less frequently in the Project's last two years.
- **Technical Issues Work Group** – This work group of the Extended Oversight Committee addressed a variety of technical issues related to using the HEDR computer models to calculate individual dose estimates. The Work Group met during part of the Extended Oversight Committee's meetings and held telephone conference calls as needed between meetings.
- **Strategic Planning Work Group** - This work group of the Extended Oversight Committee focused on policy issues and on planning for implementation of the dose estimate service, including the announcement plan. The Work Group met during part of the Extended

Oversight Committee's meetings and held telephone conference calls as needed between meetings.

- **Idaho Division of Health** – Idaho coordinated and chaired the HEDR Task Completion Work Group, in which all three states participated. The same Idaho Division of Health staff member served on the Hanford IDA Project Oversight Committee and chaired the Strategic Planning Work Group. The representative was responsible for maintaining the HEDR toll-free information and referral line, and for distributing HEDR and Hanford IDA Project information on request. In the Project's last years, the HEDR toll-free number was one of two numbers used to provide general Project information to the public. Another Idaho representative served on the Technical Issues Work Group and provided historical and technical information to the Extended Oversight Committee.
- **Oregon Health Division** – An Oregon representative served on the Oversight Committee and the Strategic Planning Work Group, headed the Project's outreach activities for Tribal programs and health care providers, and contracted with consultants in survey design and nutrition epidemiology to assist in designing audience-appropriate forms. The Oregon representative also responded to questions about the Hanford IDA Project on a toll-free information and referral line, and distributed Project information on request. Other Oregon representatives provided historical and technical information to the Extended Oversight Committee.
- **Washington State Department of Health** – Washington served as the lead administrative agency for the cooperative agreement among the three states and CDC. Washington also provided the project manager and operated and staffed the dose delivery process, including health physics. A Washington representative served on the Oversight Committee and headed the Technical Issues Work Group.
- **CDC** – A CDC representative served on the Extended Oversight Committee and, with other CDC staff, provided health physics and computer technical consultation and review throughout the Project's life. CDC supplied the HEDR computer models to the Hanford IDA Project and funded the Hanford IDA Project's cooperative agreement.
- **Project consultants** – The Project used two consultants primarily in its development phase. Cedar River Associates Consulting, Inc. assisted with: strategic planning; development and field testing of the introductory brochure, Dose Estimate Resource Packet and other materials; and public announcement activities, including national media relations. Heuristech Consulting assisted with developing the Project's computer system to calculate individual doses.
- **Project staff** – The staff for the Project operated from and were employed by the Washington DOH as state employees or temporary contract workers. During the Project's development phase, the staff included a full-time radiation health physics/computer specialist, a full-time project manager, and a full-time outreach coordinator. For implementation, the staff included a full-time production coordinator, up to five environmental technicians, one senior secretary and two office assistants, plus the project manager and the radiation health physicist with computer expertise.

B. Public Involvement

The Hanford IDA Project included two public representatives as part of the Extended Oversight Committee beginning in 1997. The Extended Oversight Committee's meetings were open to the public and included a scheduled time for public comment. In addition, liaisons from ICHHP and HHES actively participated in the Extended Oversight Committee meetings.

The public representatives on the committee and the HHES liaison participated in the Strategic Planning Work Group. They also provided review and comment on drafts of the Project's informational materials and advised on outreach strategies. In addition, they played key roles in the announcement activities that launched the project's service to the public.

C. Funding

The Hanford IDA Project was funded through a Cooperative Agreement with the CDC. The agreement covered funding for both the Hanford IDA Project and for oversight of the final HEDR Project tasks. Funding flowed to the Washington DOH, which established subcontracts with the Idaho Division of Health, the Oregon Health Division and the Project's consultants.

The agreement was originally for a three-year period (September 1994 – March 1998). In April 1998, the agreement was extended through March 2000. In early 2000, the Hanford IDA Project applied for and received a further extension and additional federal funding through December 2000 in order to complete individual dose estimates for everyone who was interested and had completed a *Your Residence History* by January 31, 2000.

The cost for work on both the Hanford IDA Project and oversight of the final HEDR technical work totaled \$3.8 million from September 1994 through December 2000.

D. History and Operation

1. Computer Work

The Hanford IDA Project dose estimate process relied on a program called CIDER to perform the actual dose estimate calculation. "CIDER" is short for Calculation of Individual Doses from Environmental Radionuclides. Pacific Northwest Laboratories developed CIDER for the HEDR Project. The CIDER program used a database of environmental concentrations of iodine 131 produced by other HEDR computer codes.

The Hanford IDA Project developed a database program in Microsoft Access to collect the information from an individual's *Your Residence History* and to produce a *Your Diet History*. A mapping program called Maptitude (by Caliper Corporation) worked with the Access database to produce maps of an individual's past residence location(s). When a person returned the *Your Diet History*, the Hanford IDA Project staff entered that person's diet information into the database.

The Project's computer program organized the residence and diet data into a format used by CIDER. The CIDER program calculated a dose estimate and returned 100 possible dose results for each age group, location and exposure pathway that applied to the individual. The Hanford

IDA database program summarized the dose estimate results from CIDER and produced an individualized *Your Thyroid Dose Estimate* report.

2. Forms and Materials Development

The Forms and Materials

- **Introductory Brochure** – The brochure, *How to Get Your Hanford Radiation Dose Estimate*, introduced the Hanford IDA Project and enclosed the four-page *Your Residence History*. (Both are in Attachment 5.) Using a question-and-answer format, the brochure explained the dose estimates available, the steps involved, and how a person might use the information. It also provided a three-state outline map showing the location of the HEDR study area and a county map of the study area.
- **Your Residence History** – This was the first of two detailed forms the Hanford IDA Project developed in order to gather the information needed to calculate an individual thyroid dose estimate. This four-page form asked for the following information: (1) name, current address, gender and birth date; (2) whether the person spent the majority of time out-of-doors when in the HEDR study area; (3) residences in the HEDR study area, including dates, addresses and whether the person drank milk at that location from a cow owned by family or neighbors; and (4) vacation locations, including dates, address and the cow-milk question. The form could be folded into a prepaid mailer to return to the Hanford IDA Project.
- **Your Diet History** – This was the second of two forms the Hanford IDA Project developed to gather the information needed to calculate an individual thyroid dose estimate (see Attachment 6). It was a multi-page, comb-bound booklet that the Hanford IDA staff created individually for each person who had completed a *Your Residence History*. The *Your Diet History* included detailed maps of the residence locations the individual had listed in the first form, which the individual needed to check and confirm the locations. The bulk of the form involved questions about the individual's diet at different ages. A postage-paid return envelope was included with the form.
- **Dose Estimate Resource Packet** – The packet (Attachment 7) consisted of seven pieces:
 1. Cover letter explaining what was in the packet and where to find the individual dose estimate
 2. *Your Thyroid Dose Estimate and What It May Mean for Your Health*, a four-page overview that included the person's individual thyroid dose and information about how it was prepared and what it might mean for an individual's health
 3. *Your Iodine 131 Thyroid Dose Estimate and Information To Help You Understand It*, a booklet that included detailed charts of the individual's dose estimate and more detailed information about what the dose estimate might mean for health. It also included information about related projects and studies of interest, Hanford's radioactive releases and how people may have been exposed.
 4. *Update*, a sheet to update the information on projects that was printed in the *Your Iodine 131 Thyroid Dose Estimate* booklet
 5. *Questions and Answers About Radiation and Thyroid Disease*, an information sheet from the Hanford Thyroid Disease Study
 6. *Directory*, a list of information sources from the Hanford Health Information Network
 7. A bookmark printed with phone numbers to call for further information.

- **Information sheet** – The information sheet (see sample in Attachment 3) was first produced in September 1996. Its purpose was to explain the Hanford IDA Project’s purpose, plans and sponsoring agencies. The Project updated the sheet periodically as needed.
- **Poster for Indian tribes and nations** – As part of the Hanford IDA Project’s outreach to the Columbia Basin Indian tribes and nations, the Project developed a poster to raise awareness about the dose estimates that were available. The Project provided multiple copies of posters and flyers to the tribes for their distribution. Some tribes placed these materials in their clinics; some distributed them to tribal members in mailings.
- **Web site** – The Project created a Web site to explain the Project’s purpose and plans. As the Project’s work progressed, other materials were added to the Web site. These included: the full *Your Residence History* (which could be printed, filled out and mailed to the Project); a sample of one of the informational pieces in the Dose Estimate Resource Packet; the news release announcing the start of the dose estimate service; and a question-and-answer piece based on the Project’s speaking points, which had been developed to aid staff in responding to questions from the media and the public at the start-up of the service. This Web site (<http://www.doh.wa.gov/ida>) will be maintained for a period of time by the Washington DOH.

Review and Field Testing

The work required to calculate individual dose estimates was originally viewed as largely a matter of computer programming. However, as the work progressed and was tested, it became clear that other expertise, such as nutritional epidemiology and survey research, was also needed to construct the programs and forms.

The Hanford IDA Project Extended Oversight Committee, including the two public representatives, reviewed the Project’s forms and informational materials. Each piece went through several rounds of review and revision. Drafts of the forms were field tested by individuals eligible to receive a dose estimate. In addition, the Dose Estimate Resource Packet received technical review by four scientists/physicians and a public representative. Based on the review comments, the forms and materials were revised for accuracy, completeness and ease of understanding. The reviews improved the forms and materials but took time to complete, which extended the development process.

Once the forms and materials were developed, the Project conducted an extensive field test of the computer programs and forms. Based on this testing, the Project made revisions to improve the process and make the forms easier to understand, and to increase ease and accuracy of entering the information into the Project’s computer system. In addition, the Project created quality assurance procedures to assure that the dose estimates would reflect an individual’s information as closely as possible.

3. Announcement and Publicity

Throughout the Project’s development phase, Project representatives from the three states conducted a number of outreach activities. They briefed the state health agency heads, and made presentations to and received comments and advice from a variety of interested groups. Such groups included HHES, ICHHP and HHIN staff. Outreach to health care professionals included newsletters mailed from the state public health agencies to state and regional health care

providers, presentations at the Health of the Hanford Site Conferences (sponsored by the University of Washington School of Medicine), and information for continuing medical education seminars. In addition, Project representatives and CDC staff visited the nine Columbia Basin Tribes to explain the Project, listen to their concerns, discuss areas of interest and respond to questions.

In the year leading to implementation of the dose estimate service, the Project developed an announcement strategy. The goal was to announce the availability of the dose estimate service and reach as many eligible persons as possible. Since there was no budget for advertising, the Project relied on an active media campaign—in the form of news releases and follow-up calls to news media—coupled with direct mailings. All efforts were carefully timed and coordinated to reach all target audiences at approximately the same time.

Activities to announce start-up of the Project's service in late October 1998 included mailing of the introductory brochure and *Your Residence History* to all 40,000+ households on HHIN's and HEDR's mailing lists, sending news releases from each of the three states, and holding simultaneous news conferences in Richland and Spokane, Washington. This strategy secured advance print and broadcast coverage, day-of coverage for the two simultaneous news conferences, and several months of follow-up coverage. Local and regional media relations were handled by each state, with national media relations handled by Cedar River Associates. Collectively, these efforts resulted in at least 100 news articles (1,200 column inches) in regional and national print and online media outlets.

4. Staffing and Work Flow

Planning for service start-up took place at the same time as development of the announcement plan. Since the Project was using a media campaign for the announcement, it was clear there would be a large influx of calls immediately after the announcement and mailings. Staff needed to be trained and in place to handle these calls and begin the service. The Project developed plans for staffing and training, and procedures for confidentiality and for processing the requests and forms.

During implementation, the Project staff focused on responding to questions from the public, tracking and entering data from the *Your Residence History* and *Your Diet History* forms, resolving questions raised in processing the forms, conducting the computer work to calculate dose estimates, and sending the resulting dose estimate and informational materials to each requestor. See Attachment 9 for a flow sheet describing the dose estimate process and Attachment 10 for the quality assurance check sheets. An ongoing effort was made to increase efficiency and to process the various forms in a consistent manner. User Notes, Administrative Notes and Resolutions guides were developed for *Your Residence History* and *Your Diet History*. A tracking sheet was developed and updated weekly to indicate both the work completed and the unfinished work.

The volume of calls was the highest immediately after the Project's announcement appeared in the news media. The Project's "speaking points," a document in question-and-answer format, was developed to aid staff in responding to questions from the news media and the public. In addition to responding to calls, much of the staff's effort initially was focused on filling requests

for *Your Residence History* forms, establishing records of clients in the database, and assisting people who had questions about the forms.

Processing the *Your Residence History* and *Your Diet History* forms took longer than anticipated due to the overwhelming public response and the care needed to help people complete the forms. Until HHIN closed in May 2000, the Project referred to HHIN all callers with general questions about Hanford's releases and the potential health effects. Project staff responded to specific questions about the Project and its forms. In the Project's last years, the Project's Idaho and Oregon representatives took on the responsibility for responding to requests for information from the public, and for filling requests for *Your Residence History* forms.

V. Issues and Challenges

In addition to the operational challenges discussed above, the Hanford IDA Project faced a number of challenges stemming from the controversial nature of the issues involved. Following are the main issues that faced the Project and a brief discussion of how the Project addressed them.

A. Information Needed for the "Best" Doses

As noted above, the Hanford IDA Project used HEDR's scientific work and computer models to calculate individual iodine 131 thyroid dose estimates. It was clear from discussions with people eligible to receive a dose estimate, and with groups such as HHES, that the affected citizens wanted dose estimates that were accurate and complete. For some people, "complete" meant taking into account as much detailed information as possible about the factors known to affect dose, such as diet and location/residence within the HEDR study area.

With citizen input, the Hanford IDA Project Oversight Committee decided to give people a way to provide extensive information about their past residences in the HEDR study area and their diet, and to use this information in calculating the individual's dose estimate. Doing so required developing detailed forms to gather this information, and in the case of the *Your Diet History*, creating an individualized form for each person. The Project field tested both the *Your Residence History* and the *Your Diet History* with people eligible to receive a dose estimate, to make sure that they could complete and understand the forms.

Individual dose estimate calculations that included the more detailed information about past residences and diet more closely reflected the individual's exposure factors. However, since all the dose estimates had a wide range of uncertainty, there was no way to tell for certain where the person's true dose lay within the uncertainty range.

Using more detailed residence and diet information had the disadvantage of requiring longer and more complex forms. This may have kept some people from participating. The forms also required more staff time to process than a simpler form would have needed, and lengthened the time required to produce an individual dose estimate.

B. Responding to the “What Good Is It?” Question

“What good is an individual dose estimate?” was a question the Hanford IDA Oversight Committee heard from individuals who were eligible for a dose estimate, from the news media, and from within their own health agencies. The dose estimate alone did not answer the underlying question: Will this affect my health, and if so, how?

In planning for the Project and in field testing of materials, the Project asked eligible people why they might want their dose estimate or how they might use it. There were four principal reasons:

1. To provide information that individuals could use in discussing their health concerns with their health care providers and their family;
2. To answer longstanding questions people had concerning their radiation exposure from Hanford and to document that experience;
3. To keep with their health records in case future health studies confirm a link between radiation dose at specific dose levels and health effects; and
4. To provide information that might assist them in applying for future health programs.

The “what good is it” question arose especially because there is not yet sufficient scientific agreement about how to calculate individual risk estimates for health effects. The Hanford IDA Project’s Oversight Committee decided to provide, along with the individual dose estimates, the scientific information that was available about health risk and to note the areas where scientists disagreed. This approach may not have provided a satisfying answer for everyone who received an individual dose estimate since the health information was general and could not be used to interpret an individual’s health risk.

The Project received some questions and criticism for not including estimates of individual risk along with the dose estimates. However, since there was a difference of scientific opinion, the Oversight Committee made a professional decision not to provide individual risk estimates. Instead, the Committee decided the most honest and straightforward approach was to reflect the breadth of scientific opinion in the Dose Estimate Resource Packet.

C. Factors Limiting the Scope of the Service

The Hanford IDA Project calculated individual dose estimates for iodine 131 air releases from 1944 to 1957 within the HEDR study area, based on the HEDR codes. The Project determined that the HEDR codes for other exposures and radionuclides needed further scientific work or were not available. This meant that the Hanford IDA Project could not provide scientifically defensible individual dose estimates for (1) people living outside the HEDR study area, (2) other radionuclides, (3) exposures from the Columbia River, or (4) exposures received on the Hanford site. The latter was of concern particularly to military veterans who had been stationed at Hanford or were involved in military activities there. In addition, the HEDR codes did not offer a way to add together radiation doses from other sites, such as the Nevada Test Site.

The limitations noted above meant that the Hanford IDA Project could only provide individual dose estimates for the people who had spent time in HEDR’s air releases study area between 1944 and 1957. The Project could not provide individual dose estimates for people who were outside this area or lived there in other time periods, or for other radionuclides. This was a

frustration both to the individuals who wanted the information and to the staff. To provide some assistance, the Hanford IDA Project referred callers to other sources for general information about radiation and health, such as the Hanford Health Information Network.

D. Challenges in Being the First Project of Its Type

The Hanford IDA Project was the first effort to provide individual dose estimates for environmental releases from a nuclear weapons facility. Planning and developing the service took time and required many judgments along the way. There were no models to follow as to the kinds of information that would be most useful to people, how many requests for individual dose estimates to expect or how to operate the dose estimate service. One example of the kind of judgments the Project needed to make was the decision about the level of detail to collect in the *Your Residence History* and *Your Diet History*. (See Information Needed for the “Best” Doses, above.)

Another critical decision the Project had to make was determining the unit of measure in which to report the individual dose estimates. This was a challenge because it was not clear how individuals would most easily understand their dose estimate or how they would use it. The Hanford IDA Project decided to report the individual dose estimates in millirad. Using millirad meant that the dose estimate numbers would more likely be whole numbers, which are more easily understood than scientific notation or a number with multiple decimal places. However, in field testing, several participants asked for their dose estimate in rad, since they had seen that measurement used in news articles and HEDR Project materials. Some also wanted to be able to compare their dose estimate to epidemiologic studies, which often use the international unit, gray. In the end, the Hanford IDA Project provided individual dose estimates in millirad, but also included a chart showing the individual’s dose estimate range and median expressed in rad, gray and milligray, along with an explanation of the conversion factors.

In general, it was a challenge to the Project to decide how best to communicate with the public about the dose estimate service and the information the individual dose estimates would provide. The Project took the approach of addressing many basic questions in the Project’s introductory brochure and other informational materials.

E. Challenges of a Cooperative Agreement

The Hanford IDA Project was developed jointly by the Idaho, Oregon and Washington state public health agencies under a cooperative agreement with the CDC. The dose estimate service itself was centralized, with the staff and computer equipment at the Washington DOH. This arrangement had the advantages of providing consistency of service and messages in all three states, possibly better decisions because they were made collectively, and economies of scale for the service implementation. The disadvantages included the additional time needed for decision-making, the need to reconcile differences in the approaches of the three states, and turnover in state representatives. In addition, when communicating with members of the public, the Project staff had to be careful to recognize the participation of the individual’s home state and not simply identify the Project as being housed at the Washington DOH.

VI. Stakeholder Comments

During the lifetime of the Hanford IDA Project, the three states received many comments and suggestions through citizen participation. The Project received both supportive and critical feedback from the public. Positive comments from the public and from many who received an individual dose estimate included thanks for providing this “first of its kind service,” for providing as much information about dose and exposure as was possible, and for including public participation in the development of the Project.

While many were pleased and satisfied with the material they received from the Project, others requested more information. Some individuals wanted more information on the releases of all radionuclides and how their individual dose estimates were calculated. Others wanted an interpretation of what their dose estimate might mean in terms of risk and how this risk might compare to risks from other activities and sources received during their lifetime. Some who had followed these issues closely wanted iodine 131 dose *and* risk estimates as a first step, followed by similar information for the other biologically significant radionuclides. Still others requested further information on other possible health impacts from radiation and information that would help them know if their illnesses were caused by Hanford’s releases. Project staff most often could answer the questions or point the person in a direction to find the answer. Unfortunately, some questions could not be answered either because there was no known answer or there was ongoing scientific work that had not been completed.

Questions raised by members of the public during the Project’s planning phase included the ability of the Hanford IDA Project to determine a person’s total health impact from iodine 131 doses received, not only from the Hanford releases, but also from iodine releases from other nuclear sites located in the United States and other countries. A second question was about whether or not the federal government was considering, as a next step, looking at the total health impact from iodine 131 doses and doses from other radionuclides at other sites. While an agreed upon method to accomplish the calculation of such doses has not been devised to date, there is ongoing discussion about these issues.

Many callers to the Hanford IDA Project’s information line asked about the value of having an individual dose estimate. For example, they asked: What can I do with a dose estimate? How will having a dose estimate help me? Will it be useful for my doctor to have?

Finally some people questioned the need for such a service, and asked why it took so long to develop and implement. Some individuals continue to request an apology from the government. All written comments the Project received during its tenure have been included in the Hanford IDA Project files.