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OAK RIDGE HEALTH STUDIES

Oak Ridge Health Agreement Steering Panel

PHASE 1 REPORT

CITIZEN SUMMARY

Prepared by the
Tennessee Deparment of Health and the
Oak Ridge Health Agreement Steering Panel

Oak Ridge Health Studies — Phase I

October 1993 marks an important milestone in the State of Tennessee's Oak Ridge Health Studies. The Phase I Dose Reconstruction Feasibility Study, guided by the Oak Ridge Health Agreement Steering Panel, is now complete. This study was a preliminary evaluation to determine the feasibility and direction of future effort. Researchers conducting the study found enough information about past off-site releases of some harmful substances to justify more study. The Panel recommends further investigations of possible adverse health effects in the vicinity of the Oak Ridge Reservation brought into focus by the feasibility study. Specific topics to be examined in the next phase are:

- ***releases of radioactive iodine from X-10 during 1944-1956***
- ***releases of cesium-137 to surface waters from 1943 through the 1960s***
- ***releases of mercury from Y-12 during 1955-1963***
- ***releases of PCBs, primarily from Y-12 and K-25***

The Panel will continue to review other releases from the Reservation to assess their importance and the need for additional detailed evaluations. The scope and focus of future studies may change to reflect new findings.

Summary for Citizens

Background of the Oak Ridge Health Studies

The Oak Ridge Reservation was established in 1942 as part of the federal government's World War II effort to develop and produce the first atomic bombs. Production of plutonium and enrichment of uranium for weapons components were the main objectives in the beginning. For 50 years, many different research and production activities have been performed at the three large complexes, code named X-10, Y-12, and K-25.

The three main complexes used and processed radioactive materials, including iodine, uranium, and cesium, and other hazardous materials including mercury and PCBs (polychlorinated biphenyls). Some contaminants were released to the environment beyond the

plant boundaries as a result of routine emissions to the air and surface water; waste disposal practices, including burial; accidental releases; and events such as the draining of White Oak Lake.

In July 1991, the State of Tennessee initiated the Health Studies Agreement with the United States Department of Energy. The purpose of the project is to carry out independent studies of possible health effects in people living in the vicinity of the Oak Ridge Reservation. The studies will focus on those effects that could result from exposures to chemicals and radioactivity released at the Reservation since 1942.

A group of experts and local citizens — the Oak Ridge Health Agreement Steering Panel — helped plan and monitor Phase I. The Panel has developed this summary report to inform the citizens of the results achieved in Phase I.

Overview of Phase I of the Health Studies

Phase I of the project began in May 1992 and was completed in September 1993. Our main task in Phase I was to find out if enough information could be collected about past chemical and radionuclide releases from the Oak Ridge Reservation to justify a longer and more thorough investigation. This evaluation was the focus of the feasibility study, which is described in more detail below. In Phase I, the Panel also

- developed plans for a statewide registry to record and follow birth defects and for improvement of the quality of the State registry to track cancer
- compared health information describing causes of death and recent cancer cases for the region around Oak Ridge with other areas
- held meetings, distributed newsletters, and undertook other activities to keep the public fully informed about the health studies
- developed and implemented a plan, which involves extensive reviews, to assure the quality of work performed as part of the health studies

The recently completed Dose Reconstruction Feasibility Study answered the question: "Is enough information available to estimate chemical and radioactivity releases from the Oak Ridge Reservation and the exposure of the surrounding population to these contaminants?" ChemRisk, a contractor to the Tennessee Department of Health, identified, collected, and evaluated information for the Dose Reconstruction Feasibility Study. The researchers interviewed past and present Reservation employees and reviewed information from numerous libraries and other state and federal sources.

The feasibility study identified releases that should be studied in detail in Phase II. Priorities set in Phase I will focus future health studies on the most important potential health hazards. The second phase of the work will lead to estimates of the amounts or "doses" of contaminants that people have received. Once doses have been estimated, scientists and doctors will be better able to evaluate whether adverse health effects could have resulted from the releases.

Steps Completed in the Feasibility Study

1. We described Oak Ridge Reservation operations. Our researchers' first step was to find which Oak Ridge Reservation activities might have released harmful substances to the region around the site. Most of the data for this step came from the three major complexes: Y-12, K-25, and X-10. A fourth complex, S-50, operated only during 1944-45. The workers in these complexes performed many activities such as:

- enrichment of the type of uranium required for nuclear weapons (at Y-12, K-25, and S-50)
- production of nuclear weapon components (at Y-12)
- development of the world's first full-scale nuclear reactor (at X-10)
- chemical separations to recover plutonium from irradiated fuel (at X-10)
- separation and shipment of large quantities of radioactive substances for weapons and other research (at X-10)
- research to solve energy and environmental problems (at X-10)
- storage and disposal of chemical and radioactive wastes (at all sites)
- many special projects (at all sites)

2. We examined information about past water, air, and soil sampling. The second important step in the feasibility study was to find records of samples of air, rivers and streams, soil, food items, and well water in the region around the Reservation. Many samples have been taken by different agencies over the past 50 years to look for chemicals and radionuclides. Researchers summarized about 100 sampling and research projects, which are presented in tables in the Phase I report. Those tables indicate the following:

- the time period during which samples were taken
- the locations where the samples were taken
- the chemicals and radionuclides that were measured
- the Oak Ridge complex that was most likely the source of the contaminants
- the amount of sampling data available in the study

The first two steps of the Dose Reconstruction Feasibility Study produced a large amount of information. In the remaining steps of the study, our researchers looked at this information to

find out which activities and substances presented the greatest potential for causing harm. They used data that has not been as thoroughly examined as it will be in a more lengthy and detailed study planned for Phase II. The steps described below were not a final evaluation but a way to focus the more detailed study.

3. We summarized current information on harmful substances. Our researchers collected a variety of articles that describe the known health effects of many of the contaminants known to have been released from the Reservation. These articles include estimates of the amounts of each substance that can cause adverse health effects.

4. We looked at who would most likely have been affected. Another important step in this study was to understand the kind of contact people around the Oak Ridge Reservation could have had with harmful substances. Therefore, we studied the locations of these people, their activities, and the ways they used their land. We also looked at how the people used:

- locally produced foods — crops, beef, dairy products, fish, and game
- water in streams and rivers for drinking, irrigation, and recreation
- water from wells for drinking and irrigation
- sediment dredged from the rivers and streams

5. We explored which pathways had the greatest potential for affecting people living downwind or downstream from the Oak Ridge Reservation. An exposure pathway connects the release of a substance from a facility with those persons exposed to it. To find the pathways of greatest interest, our researchers studied the types of releases and the possible exposures due to the food, water, and land uses defined above. They also looked at the movements of contaminants from one medium (air, water, vegetation, or soil) to another because such movements often lead to human exposure. They did find a variety of pathways for human exposure to substances released to the air, rivers and streams, and soil. However, exposure pathways for substances that reached groundwater were probably not important in the past because there is presently no evidence that anyone drank contaminated well water or used it to irrigate crops.

6. We evaluated human exposure pathways for harmful substances to find the most important ones. More contaminants reach people via some pathways than by others. The researchers have tried to guide future studies in two ways: (1) they looked for the most important pathways of exposure and (2) they ranked the chemicals and radionuclides that posed the greatest potential health hazard. When adequate information could be located, our researchers screened each chemical or radionuclide to estimate its potential health hazard. This was done by estimating the highest amount of the substance that might have been present. They also identified contaminants for which information was not found, so that these could be evaluated in the future.

For each harmful substance to which people were exposed, our researchers identified where the substance came from, where it went, and the possible hazard levels for the various pathways. The most important pathways for releases to air, water, and soil were identified using this information. Our researchers compared the hazards from each of the contaminants for all the important pathways in each medium to rank them from the ones with the greatest potential health hazard to those with the least.

7. We have reached several conclusions. Our researchers have found four types of releases to have the highest potential to have been health hazards to people living around the Oak Ridge Reservation. The Panel concurs with their findings and recommends that Phase II efforts focus on the following topics:

- radioactive iodine releases from Radioactive Lanthanum (RaLa) processing at X-10 during 1944-1956
- cesium-137 releases to streams and lakes from various chemical separation processes from 1943 through the 1960s.
- mercury releases from lithium enrichment operations at Y-12 during 1955-1963
- PCB (polychlorinated biphenyl) releases primarily from electrical transformers at K-25 and from machining operations at Y-12; the largest releases probably occurred more than ten years ago

The Panel will also continue to review other releases from the Reservation to assess their importance. Further investigations may identify needs for other detailed evaluations or shifts in focus. The Panel is committed to continuing its dialog with the public as the work proceeds.

Citizen Contacts

You can get more information, summary reports, or detailed reports of the activities of Phase I from the Tennessee Department of Health. Call 1-800-435-9617 or write to:

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