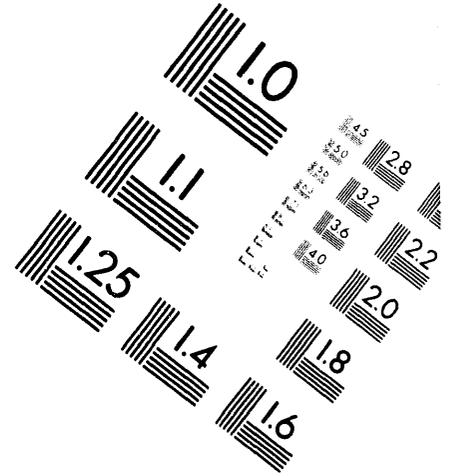
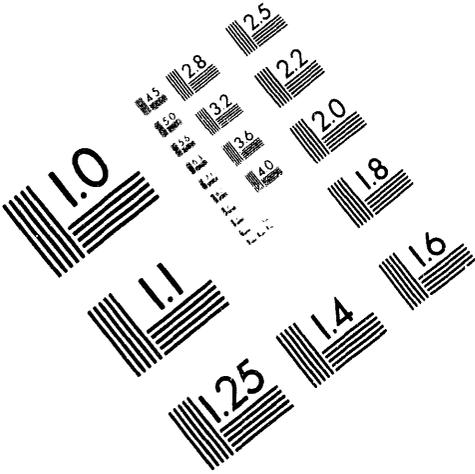




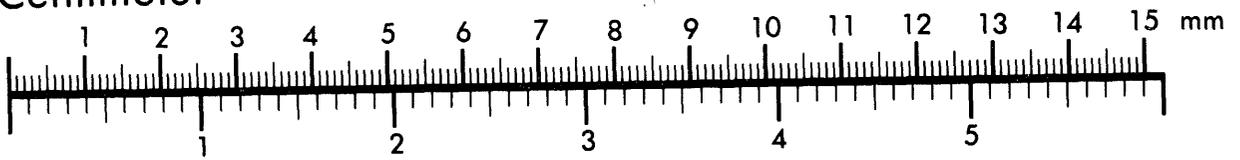
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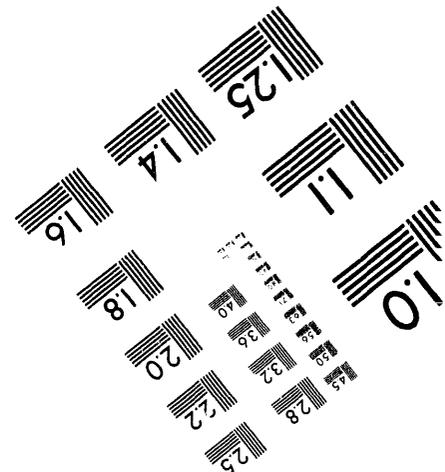
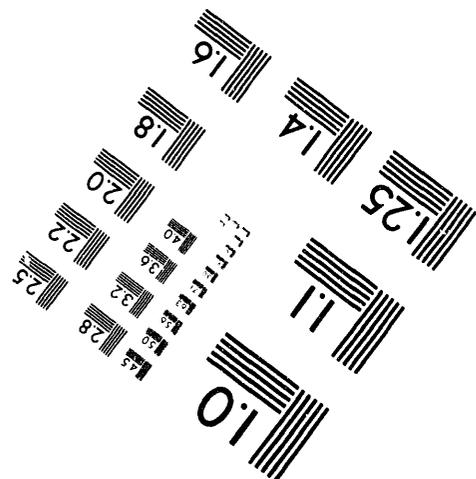
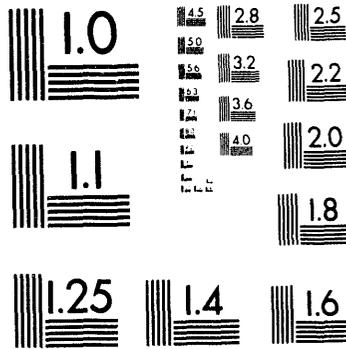
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PUBLIC INVOLVEMENT IN ENVIRONMENTAL SURVEILLANCE
AT HANFORD

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PUBLIC INVOLVEMENT IN ENVIRONMENTAL SURVEILLANCE AT HANFORD

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ABSTRACT

Environmental surveillance at the Hanford Site began during the mid-1940s following the construction and start-up of the nation's first plutonium production reactor. Over the past approximately 45 years, surveillance operations on and off the Site have continued, with virtually all sampling being conducted by Hanford Site workers. Recently, the U.S. Department of Energy Richland Operations Office directed that public involvement in Hanford environmental surveillance operations be initiated. Accordingly, three special radiological air monitoring stations were constructed offsite, near Hanford's perimeter. Each station is managed and operated by two local school teachers. These three stations are the beginning of a community-operated environmental surveillance program that will ultimately involve the public in most surveillance operations around the Site. The program was designed to stimulate interest in Hanford environmental surveillance operations, and to help the public better understand surveillance results. The program has also been used to enhance educational opportunities at local schools.

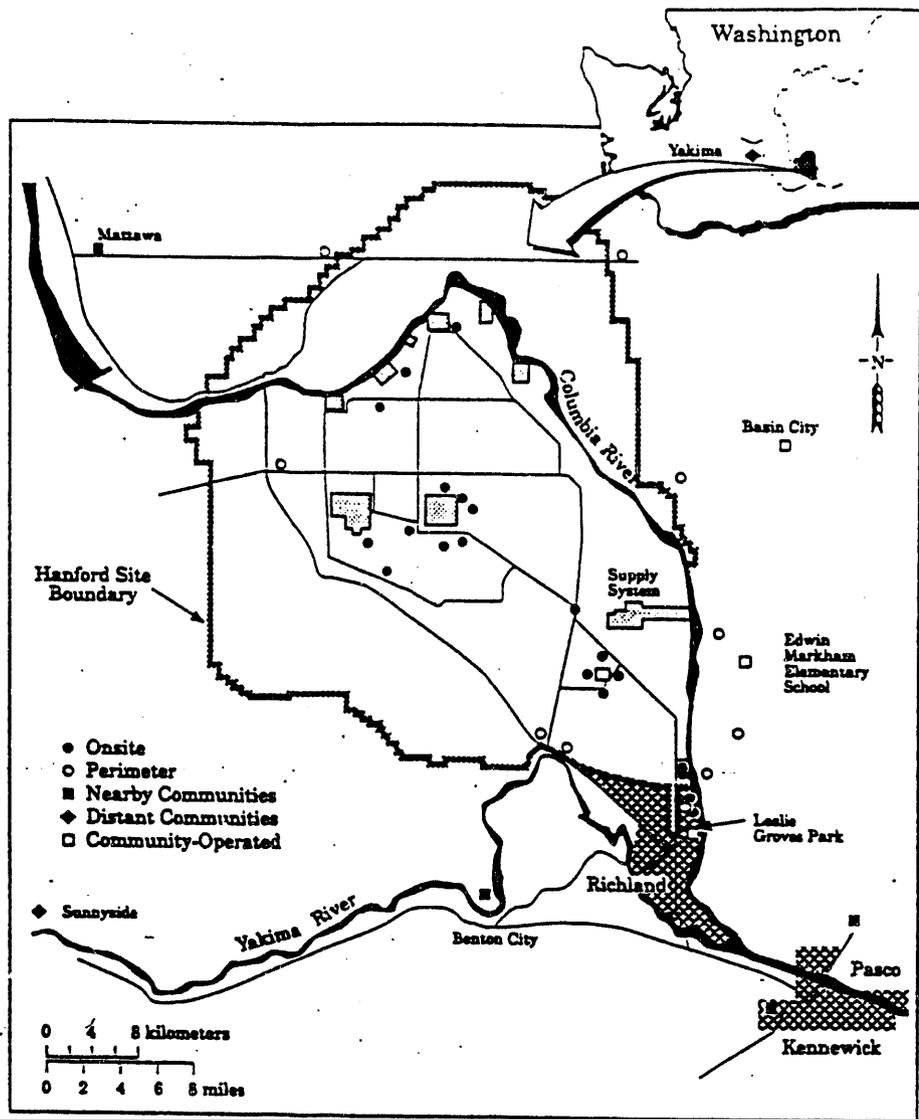
I. INTRODUCTION

The Hanford Site, in southeastern Washington State (Figure 1), was acquired by the federal government in 1943 and was dedicated for more than 40 years primarily to the production of plutonium for national defense purposes. In recent years, the mission for the Site has changed, and now the focus is on restoration of the Hanford environment and management of stored wastes. Many federal, state, and local regulatory and resource agencies, environmental groups, regional communities, Native American tribes, and individual citizens have a role in the new mission. Agreements with these organizations and individuals have been established to support their roles. One such agreement is the Hanford Federal Facility Agreement and Consent Order, also known as the Tri-Party Agreement.¹ This is a legal agreement, as well as an action

plan, between the U.S. Environmental Protection Agency, the Washington State Department of Ecology, and the U.S. Department of Energy for achieving compliance with the remedial action provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the Resource Conservation and Recovery Act (RCRA). Generally speaking, the CERCLA establishes a response program for past waste sites, and the RCRA addresses treatment, storage, and disposal unit regulation and corrective action provisions for active waste sites. The Tri-Party Agreement establishes jurisdictions, authorities, and other legal determinations among parties. The Tri-Party Agreement also includes a plan for community relations and public involvement and allows citizens in Washington and neighboring states to participate in determining how Hanford Site cleanup is conducted. The agreement was written with extensive public comment and provides a foundation for public involvement in community-surveillance operations around the Site.

In response to public concerns about the credibility of Hanford Site environmental data, but independent of Tri-Party Agreement, the Richland Operations Office requested in 1989 that the Pacific Northwest Laboratory* initiate public involvement in the environmental surveillance program at Hanford. Hanford Site surveillance is conducted by the Pacific Northwest Laboratory for the U.S. Department of Energy under the Surface Environmental Surveillance Project. The objectives of the environmental surveillance project are to detect and quantify radiological and nonradiological contaminants both on and off the Site and to assess their environmental and human health significance. The Richland Operations Office wanted to actively involve local citizens in the collection of

*The Pacific Northwest Laboratory is operated for the U.S. Department of Energy by Battelle Memorial Institute under Contract DE-AC06-76RLO 1830.



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Figure 1. Surface Environmental Surveillance Project air sampling locations on and near the Hanford Site

environmental samples at locations off the Hanford Site. Based on the success of a similar program at the Nevada Test Site,² the Richland Operations Office believed that community involvement in the Hanford environmental surveillance program would help to

- 1) increase the public's awareness of, and stimulate interest in, Hanford's environmental surveillance operations,
- 2) increase public understanding of surveillance results,
- 3) provide a means for the public to address Hanford-related environmental issues and, where practical,
- 4) provide an educational resource for local schools.

In response to the Richland Operations Office request, the Pacific Northwest Laboratory, in cooperation with schools and communities near Hanford, developed the Community-Operated Environmental Surveillance Program.

II. ENVIRONMENTAL SURVEILLANCE AT HANFORD

The Community-Operated Environmental Surveillance Program is an integral part of the general Hanford Site environmental surveillance program. Environmental sampling of the Hanford Site and surrounding region, including community-surveillance operations, is conducted to demonstrate compliance with environmental regulations and U.S. Department of Energy environmental protection

policies, to support U.S. Department of Energy environmental management decisions, and to provide information to government decision makers and the general public. Surveillance encompasses sampling and analyzing for potential radiological and chemical contaminants on and off the Site. Emphasis is placed on surveillance of the pathways and materials constituting the greatest potential risk to humans and to the environment; however, past sampling has shown that incremental potential risks from releases from current and past Hanford operations are extremely small.³ The surveillance program focuses on routine releases from U.S. Department of Energy facilities on the Hanford Site, but also monitors for unplanned releases. Samples may also include unavoidable contributions from non-U.S. Department of Energy facilities located on and near the Site.

The primary pathways for the movement of radionuclides and chemicals from the Site to the public are the atmosphere, surface water (including the Columbia River which flows through the northern part of the Site and then turns south forming the eastern Site boundary), and ground water. Air is sampled because air transport is a potential key pathway for the movement of contaminants off the Site. Surface water, including ponds on the Site, and the Columbia River are sampled because they are potentially accessible to wildlife. The river is also a potential transport pathway for human exposure. Contaminated ground water beneath the Site is not generally used by the public; however, it does seep into the Columbia River along the river shoreline, and some contaminants can be detected in river water collected downstream of the Site. Samples of undisturbed soil and native vegetation, wildlife, and drinking water, which could potentially be exposed to Hanford Site effluents, are collected both on and off the Site and analyzed to identify and measure contaminants of concern. Direct radiation dose rates are also measured, as are concentrations of radionuclides in food crops collected near the Site.

The surveillance design at Hanford uses a stratified sampling approach. As outlined in *The Hanford Site Environmental Monitoring Plan*,⁴ samples and measurements are obtained in three surveillance Zones that begin near facilities on the Site and extend outward to the offsite environs. Zone 1 includes the area from near the onsite facilities to the Site perimeter. Contamination levels will generally be highest in this zone. Zone 2 consists of perimeter sampling stations that are located near, or just inside, the Site boundary. The Columbia River is included in this zone. Potential exposures at Zone 2 locations are generally considered the highest that any member of the public is likely to receive. The third zone includes nearby and distant community locations within a 50-mile (80-kilometer) radius of the Site. This zone is sampled to provide assurance to local communities and populations that contaminant levels are well below all standards established to protect public health. Potential impacts from Hanford Site

operations can be detected by comparing concentrations from distant, background locations to concentrations measured on, downwind, or downstream of the Site.

Quality assurance and quality control practices encompass all aspects of Hanford Site environmental surveillance operations and are maintained to ensure the quality of data collected through the surveillance program. Samples are collected and analyzed according to documented and approved procedures⁵ and an established quality assurance plan.⁶

III. THE COMMUNITY-OPERATED ENVIRONMENTAL SURVEILLANCE PROGRAM AT HANFORD

The Community-Operated Environmental Surveillance Program was established at Hanford in 1990 as an integral part of the Pacific Northwest Laboratory's Surface Environmental Surveillance Project. Sampling procedures, quality control and quality assurance practices, analytical procedures, and training requirements required by the Project have been applied to the community-surveillance program as well. Data collected at community-operated environmental surveillance stations during 1991 and 1992 were summarized by Pacific Northwest Laboratory staff with other Hanford environmental data and reported in the annual Site environmental reports.^{3,7}

Three "special" air sampling stations for monitoring radiological contaminants were constructed in sampling zones 2 and 3 at two schools north of Pasco, Washington, and at one location in Richland, Washington (Figure 1). The locations north of Pasco were selected because they are in an area that is generally downwind of Hanford facilities. Richland was selected because it is the downwind community closest to the Site. The two stations located north of Pasco were both constructed on property belonging to the school districts; the station in Richland was established in a city park. Each station is similar in design and consists of a concrete pad enclosed by a short, wire-mesh fence, equipment for collecting air samples and monitoring ambient radiation levels, and a large, lighted, and covered informational display containing real-time meteorological and radiological information (Figure 2). All areas of the station are publicly accessible, and stations have been designed to invite public attention.

Two local school teachers were hired to operate each station. One serves as station manager and the other as an alternate, or backup, manager. Teachers were chosen as managers because of their education background, because they have the opportunity to work with and discuss environmental sampling results in their classrooms, and because both the Pacific Northwest Laboratory and the U.S. Department of Energy are committed to enhancing local educational opportunities. The credibility and public acceptance of teachers acting as independent spokespersons for the surveillance

program was also considered. The selection of the station managers was coordinated through local school boards and school administrators; however, the teacher's work at the stations has nothing to do with the schools themselves. The teachers have simply accepted part-time positions with the Pacific Northwest Laboratory. Station managers and alternate managers are responsible for removing exposed sample substrates and installing new substrates, for monitoring and operating the radiation detection instrumentation, and for completing all chain-of-custody paperwork appropriately. They are also required to clean their stations, and to act as

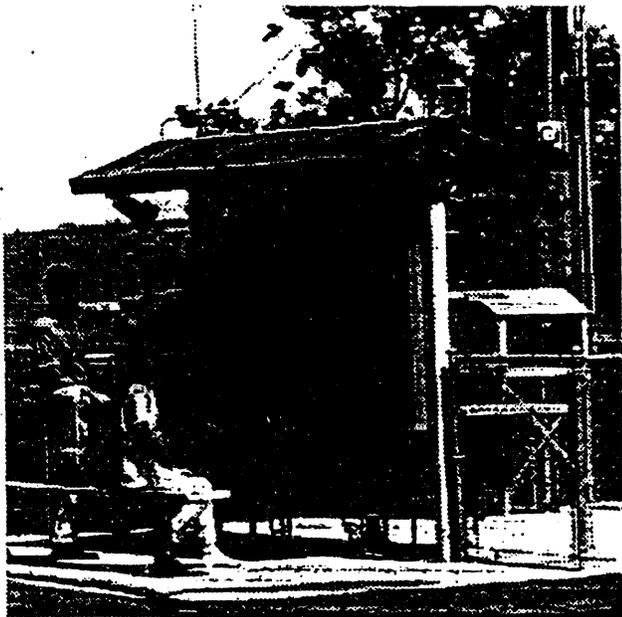


Figure 2. Community-Operated Environmental Surveillance Station at Leslie Groves Park, Richland

spokespersons for the community-surveillance program as needed. Surface Environmental Surveillance Project staff are responsible for training, equipment maintenance, sample pickup, delivery of samples to the analytical laboratory, and general support. The Pacific Northwest Laboratory also offers station managers and alternate managers a number of educational opportunities through various educational outreach programs.

Station managers have been hired on subcontracts using federally accepted hiring practices. Alternate managers have been hired on purchase requisitions. Each station manager and alternate manager is paid a monthly salary for performing the duties outlined in a statement of work. Station managers are also paid hourly when attending training sessions or other nonroutine program functions. Alternate managers are paid at a rate equal to about 35% of the station managers' salary and payments include compensation for training, which cannot be billed as an extra cost.

For most managers, sample collections and station visitations currently require less than 10 hours per month. In addition to routine biweekly sampling, managers are required to visit their stations three times per week to ensure that equipment is working properly and that the station is clean and presentable. Alternate managers are required to participate in sample collection operations at least once every other month, and this participation must be documented in a monthly report to the Pacific Northwest Laboratory. Short monthly reports on standardized forms are required of both managers and alternate managers before issuance of monthly payments.

Training for both managers and alternate managers takes place periodically during the year and usually lasts from 2 to 4 hours. Because of the rigorous quality assurance and quality control policies associated with the Hanford Site surveillance program, attendance at training meetings is required. Failure of a station manager or alternate manager to attend two consecutive training sessions can result in the cancellation of the managers' or alternate managers' contracts. Periodic quality assurance audits are conducted in the field by Pacific Northwest Laboratory quality assurance specialists to ensure that procedures are understood and that sampling is conducted properly. Staff from the Surface Environmental Surveillance Project are required to conduct quarterly field performance reviews for similar reasons. Training meetings are held quarterly and include informational presentations on Hanford Site environmental operations, or other environmental topics of interest.

A. Station Design

Air sampling equipment has been installed at each station to continuously collect samples of radioactive particulates, tritium, and radioiodine. Thermoluminescent dosimeters and pressurized ionization chambers are used to measure levels of gamma radiation. Weather instrumentation is located at each station for the benefit of the teachers and students, and to attract the attention of citizens living nearby. Real-time weather information and gamma radiation measurements are displayed at each station. Colorful posterboard displays have also been installed to provide the public with general information on station equipment, sample types, and analyses performed. Automatic exterior lighting is used at each station to deter vandalism. Light fixtures and display windows have been broken several times over a 3-year period, but there has never been any serious damage to the sampling or display equipment. The glass windows at one station have been replaced with break-resistant plastic, but one weakness of the plastic is that its soft surface can be easily scratched, which makes viewing difficult.

A computer, modem, and printer have been provided to each station manager for communication and data analysis purposes. These computers are located in the managers' classrooms and allow the station managers and alternate

managers to contact Pacific Northwest Laboratory and U.S. Department of Energy staff, and other community-surveillance station managers, via computer mail, if they have problems or questions. Station managers also receive analytical data directly from Surface Environmental Surveillance Project staff. Monthly electronic summaries of the pressurized ionization chamber data, and photocopies of preliminary community station sampling results, are regularly forwarded to the station managers. The station managers are encouraged to review the data and use them in classroom studies or projects. Eventually, they may also be asked to participate in the data summary process for the annual Hanford Site environmental report.

B. Crop Sampling

An additional community surveillance outreach program has been started at Hanford that involves the acquisition of selected crop samples from students involved in farm club activities. In past years, it has often been difficult to obtain sufficient quantities of leafy vegetables from farmers in the sampling areas downwind of the Site because these types of crops were not grown on a commercial scale, and most home gardeners could not, or would not, supply the quantity of materials needed for analyses. In 1993, a number of middle school farm club members were approached by staff from the Surface Environmental Surveillance Project about growing small plots of crops for the Hanford surveillance program. Quantities of these crops were purchased from the students on a per pound basis and submitted to an analytical laboratory for analysis. Pacific Northwest Laboratory staff revisited the students following analysis of the samples to discuss and interpret the analytical results and answer questions.

C. Public Information Activities

Information on Hanford's community surveillance program has been disseminated to the public through newspaper articles, TV and radio news broadcasts, informational brochures, videotapes, and participation in informational exhibits in shopping malls, at county fairs, and at science teacher conventions. Articles on the program have also been published in a local community magazine and in Richland Operations Office and Site contractor newsletters. State science teacher conventions have been especially good forums because teachers from all over the state attend. Pamphlets and video tapes discussing general Hanford surveillance operations, as well as specific information on the community-surveillance program, have been distributed to interested teachers attending these conventions, free of charge. In Washington State, this statewide exposure is especially important because the primary sources of information for many people are newspaper articles, regional television shows, and campaign rhetoric, which can contain erroneous, negative, and/or sensationalized information. Effective distribution of

information on community-surveillance operations and associated analytical results can help provide the public with a more balanced view of the issues.

IV. FUTURE PLANS

Because of the success of the community surveillance program at Hanford, the U.S. Department of Energy Richland Operations Office has directed the Pacific Northwest Laboratory to expand the program to incorporate other locations and other environmental media. A 5-year expansion plan has been developed that outlines future expansion activities. At least 11 more routine radiological air sampling stations located in perimeter, distant, and community locations around the Site are planned to become citizen-operated stations. At least one more "special" air sampling station with concrete pad, colorful displays, and lighting will be constructed on the campus of Heritage College in Toppenish, Washington. Additional "special" stations may be constructed on the campus of a local community college and in a regional shopping mall. The station at Heritage College will be constructed by the college with funds supplied via a U.S. Department of Energy cooperative agreement, and will serve the needs of both the school and the Hanford surveillance program. In addition to routine air, weather, and gamma radiation monitoring equipment, special air and soil monitoring equipment will be installed at this station to enhance the school's fledgling environmental science program.

Current and future "special" stations will benefit from electronic upgrades and the addition of other monitoring equipment to support expanded classroom studies. In the future, station systems will be set up so that electronic data from the weather instruments and pressurized ionization chamber will feed directly into a data logger, and a flat-panel computer system with monochrome monitor, located at the station. The flat-panel computer system will easily fit inside the existing display cases and will eliminate the need for a specialized instrument for displaying gamma radiation measurements. The data logger will be connected via modem to a computer located in the station manager's classroom. This will allow the station manager to continuously display weather data or to access gamma radiation measurements from their own station, or from other community-operated stations that are outfitted with similar equipment. Many of the electronic upgrades were stimulated by recurring seasonal problems with gamma radiation display instruments. Summer temperatures in eastern Washington State can frequently approach or exceed 100 degrees Fahrenheit (38 degrees Celsius). Even though the electronic equipment at the stations has been shielded from direct sunlight, temperatures in the display cases where the instruments are housed have been measured at over 145 degrees Fahrenheit (63 degrees Celsius). This is above the upper temperature threshold for some of the instruments and has resulted in equipment failures. The new

systems are more temperature tolerant and will be installed so that temperatures within the system can be controlled.

It would not be economically practical, or programatically necessary, to construct "special" stations at each routine air sampling location, especially those stations located in remote areas. Therefore, most routine air sampling stations will remain essentially unchanged and will not be modified or moved to promote the attention of the public. However, minor modifications will be necessary at each station to accommodate storage of equipment, samples, and chain-of-custody paperwork. Public participation in soil, vegetation, water (Columbia River water and offsite drinking water), and crop sampling will also be initiated in future years. Additionally, community members may be asked to assist with project support activities (e.g., delivering samples to the analytical laboratory). In most cases, teachers will be selected to participate in the community surveillance program. However, in some instances, it may be more practical to have the work done by farmers, ranchers, or other local community members who are not employed at the Hanford Site.

V. PUBLIC ACCEPTANCE

Public support for the Hanford community surveillance program has been good. Involvement of the public in the sample collection process has not fundamentally changed the way samples are collected and analyzed, or changed the way analytical results are interpreted and reported. However, surveys have shown that the public believes strongly that the Hanford community involvement program is a positive step toward bolstering public confidence in data generated through U.S. Department of Energy programs at Hanford. Acceptance of Hanford Site data by the public is further reinforced when the analytical results from duplicate or split samples, which are analyzed and reported by non-U.S. Department of Energy organizations like the Washington State Department of Health, corroborate and validate the results reported by Hanford Site contractors.

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