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BONNEVILLE POWER ADMINISTRATION
OPERATIONS, MAINTENANCE, AND REPLACEMENT
10-YEAR PLAN
1990-1999

ENVIRONMENTAL STRATEGY

FINAL Report
September, 1990

APPROVED

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1. INTRODUCTION

In operating and maintaining its regional power transmission system, Bonneville Power Administration must address environmental concerns. Pollution sources and pathways for pollution migration, including potential contamination from hazardous or toxic materials, are present. BPA must develop and follow precautionary measures, respond to emergencies, minimize wastes, redress past problems, alert and train employees to problems and safety needs, constantly evaluate this effort and update the program for improvements and changes in regulations and technology.

Part of BPA's mission is to conduct its operation, maintenance, and replacement programs in an environmentally sound manner. BPA recognizes its responsibility to be good stewards of the environment. BPA will meet its environmental obligations as set forth in environmental laws and regulations. BPA intends to make consistent and measurable progress toward meeting these responsibilities.

The target for the 10-Year Plan is to achieve environmental compliance and meet the following goals: (1) protect human health and the environment; (2) avoid or limit liability; (3) set up an effective internal management structure to maintain compliance; and (4) achieve cost-effective compliance.

2. SCOPE

This report addresses the following topics:

<u>TOPIC</u>	<u>CONCERN</u>
Waste Management	Reduction or elimination of hazardous/toxic substances
PCB equipment	Managing and reducing inventory; replacement of PCB equipment, spill cleanup, disposal of excavated material
Oil-filled equipment	Soil or water pollution from leaks, spills, or catastrophic failure
Underground storage tanks	Potential for pollution of groundwater; systems need safeguards and monitoring
Drainage systems	Ground and surface water pollution potential
Water systems	Monitoring for drinking water quality; address possible pollution pathways.
Containment systems for oil-filled equipment	Prevention of water pollution

Asbestos	Human health; addresses both buildings and equipment
Herbicides	Directions for use, management, and compliance
Equipment with other toxic/hazardous substances	Potential toxicity to people and environment
Transmission poles	Wood preservatives require management until poles treated with them are no longer in the system.

Each topic will cover the state of present practices and facilities, define issues, present findings, list actions and tasks, and estimate resource needs.

Some issues, such as waste minimization, spill cleanup, environmental monitoring, audits and appraisals, and training, are common to several topics and may overlap. General environmental monitoring and accountability issues are also explored.

3. BACKGROUND

Protection of the environment while operating and maintaining the BPA power system in the past was oriented toward special precautions for handling individual pieces of equipment and the monitoring of certain work practices. Relatively few regulations governed either equipment or maintenance processes.

Two important factors have contributed to change this picture. First, Federal, state, and local concerns with environmental contamination and the use and disposal of hazardous and/or toxic substances have produced a rapidly growing body of legislation and regulation during the last two decades. Enactment of these laws and rules was often spurred by disastrous incidents or examples of environmental pollution across the country. The requirements cut across commercial, manufacturing, and industrial activities in both private and governmental sectors. Compliance with regulations is not a matter of choice.

Second, much of the transmission system equipment has passed or is quickly approaching the end of reasonable life expectancy. Much of the Transmission System was built in the 1940's and 1950's, and requires more intensive maintenance as years pass. In addition, an increasing amount of equipment can no longer be repaired; it must be replaced. Replacement opportunities must simultaneously address environmental responsibilities and regulations.

4. MAJOR FINDINGS

Areas of concern are briefly described below.

- Some electrical equipment (notably capacitors) contain oil or insulating fluid with high concentrations of polychlorinated biphenyls (PCB's).

Because PCB's have potential adverse long-term human health and environmental effects, PCB exposure concentration limits have been set in parts-per-million (ppm). New oil-filled equipment (after 1979) must be certified as non-PCB. Also, regulations require that equipment containing PCB oil be labeled as to the ppm content.

- Oil-filled electrical equipment can leak or rupture. Provisions must be in place to contain the oil and prevent it from contaminating surface water and/or adjacent areas and groundwater. Spill Prevention Control and Countermeasure (SPCC) plans and secondary containment systems are options to avoid contamination.
- Underground tanks for fuel storage present the possibility of leaking petroleum products into the groundwater. Unneeded underground tanks need to be eliminated. Leaks and spills need to be identified and remedied. Use of monitoring systems and installation of above-ground tanks needs to be investigated.
- Specialized electrical equipment may also contain chemical compounds, fluids, or gasses that are toxic if exposure to the substance or a by-product occurs.
- Asbestos has been widely used in many facilities for insulation, siding, plaster, and ceiling and floor tiles. It becomes dangerous to human health only when the fibers work free. It is then a potential carcinogen. Asbestos-containing materials must be identified and monitored to protect worker safety.
- Wood poles have traditionally been treated with creosote or pentachlorophenol to help prevent rotting and insect damage. When removed/replaced, they still retain much of these toxic substances, and must be disposed of properly in order to minimize harm to people or the environment. The construction/storage site must also be restored. New wood poles must be treated with a fungicide or pesticide, using less toxic substances.
- Vegetation must be controlled in substation yards and on and adjacent to transmission line rights-of-way. Care must be taken that the control method (manual, biological, mechanical or chemical) is appropriate for the site. Herbicides can harm the environment if they enter waterways or groundwater. Training and proper procedures must be followed in order to ensure safety to workers and the environment.
- Drainage systems are constructed to carry storm runoff from substations. Care must be taken to ensure that potential pollutants do not enter surface waterways through outfalls or groundwater through drywells.
- Wells (dry and water) may also pose pollutant problems because they can draw water from contaminated sources. Or they may serve as a pathway for pollutants to enter groundwater. Wells need to be tested periodically and well systems that are no longer needed should be sealed. Problems identified which have the potential to affect groundwater must be remedied rapidly.

- An absence of regulations in the past and the lack of scientific knowledge about the effects of hazardous substances, resulted in handling of discarded equipment in ways which could represent a threat to the environment today. Past spills may have been cleaned up according to standards at the time, but new knowledge has led to additional measures that must be taken. Both of these problems must be addressed in the near term.
- Finally, programs to specify responses to emergency situations, to manage and minimize waste, to monitor environmental practices, and to foster environmental training and awareness are important components of the mission of Operations and Maintenance.

5. ASSUMPTIONS AND METHODOLOGY

The Environmental Work Group, a team of technical subject matter specialists, was formed to address environmental concerns. Goals and scope of work were determined by group review and consensus. Specialists then prepared individual issue papers. The team then prioritized issues and actions to develop the overall strategy.

During this process, the team made the following assumptions:

- BPA will comply with all applicable Federal environmental regulations and will meet or exceed State and local standards.
- Regulatory standards will continue to change, creating a moving target for compliance, and are likely to become more stringent and less flexible over time.
- All resource projections are based on estimates, some in the absence of historical data, and will need to be revised as actual projects are completed.
- In some instances, options are identified under individual topics, but many environmental issues are affected by mandatory external constraints (e.g., environmental regulatory compliance).
- The cost of environmental compliance is likely to rise during the term of the plan (next 10 years) as BPA eliminates sources of potential pollution such as PCB equipment and contaminated well water and cleans up past spills. However, the costs of compliance may level out or decline in the long term, as problems and sources of pollution are eliminated and cleanup technology improves.
- Much of the electrical equipment on the power system has been in service a long time. Reliability, environmental impacts, and long-term maintenance costs are undergoing reassessment periodically as equipment ages.
- Competing demands for design and construction resources may limit accomplishments. For example, the logistics and design for 10 small actions may exceed staff resources, even though the cost in dollars is small.

- Staffing will remain relatively stable/steady in numbers. Significant increases are not anticipated.
- The issue of biological effects of electric and magnetic fields (E/MF) is an emerging concern throughout the utility and regulatory communities. The topic is currently the subject of extensive review and study. The issue may have significant future implications. Conclusive information will likely not be available in the short term (1-3 years) and should be addressed through agency policy guidance and in subsequent plan revisions.
- Some issues will not lend themselves to a levelized program but will require peak efforts to meet specific regulatory compliance deadlines.
- If a relatively level program is to be accomplished, tradeoffs among less pressing action items would take place.

6. ENVIRONMENTAL PLAN

In order to meet environmental obligations and act as responsible stewards of the environment, the plan centers around seven directive principles. The principles are: waste reduction, environmental awareness, systematic inventory of environmental data, proactive cleanup strategy, clear procedures and guidelines, preventative measures, as well as environmental monitoring and appraisal.

- (1) Reduce or eliminate the use of hazardous or toxic materials wherever possible. This includes:
 - instituting a system-wide waste minimization strategy,
 - removing PCB equipment,
 - minimizing the number of Underground Storage Tank systems,
 - maintaining an integrated pest management program,
 - using less hazardous wood treatment products, and
 - identifying other potential sources of pollution.
- (2) Increase employee awareness and preparedness through environmental training, information, and incentive programs. This consists of:
 - conducting annual training for herbicide handling and application, asbestos abatement, and hazardous waste/toxic substance storage, handling, packaging, labeling, manifesting, and cleanup;
 - developing educational materials that would be specific to BPA activities and to specific craft audiences;
 - increasing incentive programs to reward employees for actions and/or suggestions that have reduced negative impacts on the environment.
- (3) Develop and maintain accurate inventory information on hazardous/toxic materials, equipment, and potential pollution sources, including the procurement, intended use, handling, safety hazards, environmental hazards, ultimate disposal, and the costs associated with disposal of the materials.

Develop an inventory of PCB equipment to aid in the recordkeeping required by the Toxic Substances Control Act.

Inventory and maintain records, drawings, diagrams of facilities on the BPA system that may become pollution sources and/or pathways; i.e., wells, drainage systems, pole storage yards.

- (4) Aggressively pursue cleanup of past spills or contamination found on the system by:
- identifying past spill locations through personnel interviews,
 - reviewing historical data/records,
 - environmental sampling or other means,
 - developing work plans for accomplishing the cleanups, and
 - initiating cleanups of identified sites.

In addition, review sites that are on EPA's CERCLA docket and complete the preliminary assessments, site inspections, remedial investigations, and feasibility studies, as appropriate. If a cleanup is warranted, undertake cleanup promptly.

- (5) Provide timely, concise, understandable, pertinent environmental guidance to field personnel by reviewing, updating, and developing standards, procedures, instructions, and information.

Develop an environmental procedures manual that deals specifically with environmental problems, suggested actions, and compliance requirements for the power system. Integrate this information with training at every opportunity.

- (6) Emphasize preventive measures to reduce or eliminate future environmental contamination. These measures consist of system-wide programs such as waste minimization, PCB equipment removal/replacement, and review of work practices that may have a direct effect on the environment such as the use, storage, handling, packaging, transporting, and disposal of hazardous/toxic materials.

Proper design, maintenance, and closure of pollution pathways such as wells, oil/water separators, drainage systems will be an integral part of any preventive measures strategy.

- (7) Audit, appraise, and monitor environmental compliance on a scheduled basis to document the adequacy of such actions and to define the actual costs associated with environmental compliance actions; this will include a recordkeeping system to track action items identified during environmental appraisals. Advise management on the progress in completing identified actions.

Overall resource requirements for the plan are summarized in Exhibits 1 and 2. The estimates are divided into two program categories. The first outlines ongoing system maintenance expense activities (Exhibit 1). The second is an overview of anticipated capital projects for environmental protection and remediation (Exhibit 2).

EXHIBIT I
POLLUTION CONTROL & ABATEMENT
(System Maintenance Expense)

EXHIBIT 2

ENVIRONMENTAL ACTIVITIES

(Capital Maint. Program - 10 Year Plan)

All costs are estimated in 1990 dollars, adjustments for inflation are not reflected in the projections.

Uncertainties: For several of the environmental issues in the plan, notably cleanup/remediation actions, there is considerable uncertainty. The number of projects, extent of contamination, specific cleanup standards and methods are unknown or speculative over a 10-year planning horizon. Therefore, changes in resource requirements can be expected. Periodic revisions are planned.

7. MAJOR ELEMENTS

This part of the plan focuses on individual topics of concern and actions to be accomplished. Since primary "umbrella" issues are the management and minimization of waste and the proper training of those who deal with hazardous substances or situations, these are discussed first. Topics which follow range from PCB equipment to environmental training concerns. Last is a discussion of evaluation and quality control: environmental appraisal, audit, and monitoring needs as part of the oversight of all issues discussed.

A. WASTE MANAGEMENT AND MINIMIZATION

1. GOALS

- Reduce the volume, quantity, and/or toxicity of hazardous wastes.
- Find suitable safe substitutes for hazardous and/or toxic substances.
- Reduce the costs, liability risks, and administrative burdens associated with managing, transporting, storing, and disposing of hazardous wastes.

2. PRESENT PRACTICES AND FACILITIES

Practices in procuring and using chemicals evolved during an era of much less stringent regulation. The situation has dramatically changed. PCB's are strictly regulated under the Toxic Substances Control Act (TSCA), from their creation, through use, to ultimate disposal. Similarly, the Resource Conservation and Recovery Act (RCRA) intensively regulates all other hazardous wastes, from generation to disposal.

Currently, field organizations may procure chemicals from local vendors. With the exception of herbicides, there are very few written internal directives in place governing the procurement and use of chemicals by field organizations.

Regulatory Context

Waste minimization is specified in RCRA, which requires that all manifests for hazardous waste shipments contain a new waste minimization certification from the generator (effective September 1, 1985). The generator must certify that he or she has a program in place to reduce the volume or quantity and toxicity of hazardous waste, to a degree determined by the generator to be economically practicable. The generator must certify the proposed method of treatment,

storage, or disposal minimizes the present and future threat to the environment. BPA's Uniform Hazardous Waste Manifest Form was revised (July 15, 1985) to include this certification (50 FR 28745).

The Department of Energy also requires a Waste Minimization Program (DOE Order 5400.1).

3. ISSUES

- The vast majority of BPA's hazardous non-PCB wastes are associated with the use of industrial solvents (primarily 1,1,1-Trichloroethane). Reliance on 1,1,1-Trichloroethane (Trichlor) must be reduced.
- Work practices for all hazardous materials from shop, garage, and equipment maintenance functions need to reflect a systematic waste reduction approach.

4. FINDINGS

BPA currently relies on an informal waste minimization program. BPA needs to take advantage of minimization opportunities for cost savings, reduced regulatory burden, and reduced liability. Less hazardous materials may be available as alternatives. In some circumstances, it may be desirable to use slightly less effective substitutes if the entire life cycle cost is considered.

In 1987, the BPA Puget Sound Area began to evaluate potential for reducing waste streams, by reviewing the amounts and types of hazardous wastes generated in each maintenance district. In four of BPA's districts, Trichlor-contaminated wastes accounted for about two-thirds of all hazardous wastes. Work practices which relied less on Trichlor could reduce hazardous waste stream volumes.

In 1988, an examination of BPA's hazardous waste generation and hazardous substance procurement was completed. The study aimed to gather information on the types and amounts of chemicals procured, and the amount of waste generated from the use of those chemicals. Preliminary results of this study were distributed for review in January 1989. The study found that procurement (and use) of Trichlor has declined between 1983 and 1988.

In 1989 the BPA Lower Columbia Area initiated a pilot project to test and use non-hazardous solvent substitutes in lieu of Trichlor. The study is now underway. Results may be available near the end of 1990.

Any reduction or restriction of Trichlor use would reduce both the amount of Trichlor-contaminated hazardous wastes and BPA's overall hazardous waste generation. Other substances contributing measurably to the total hazardous waste volume are kerosene, diesel, acetone, Chevron 325 and 350, and methyl alcohol. Reductions in, or changes in the use of, these substances offer similar, though lesser, opportunities for reduced hazardous waste generation.

5. ACTIONS/TASKS

- (1) Establish a formal, system-wide Waste Minimization Program.

- (2) Continue analysis of hazardous waste generation and hazardous material procurement. The final product of this analysis will profile the uses of hazardous materials and associated work practices, and determine those that need modification.
- (3) The Division of System Maintenance will establish a work group composed of maintenance personnel and environmental personnel to investigate and make recommendations with respect to the following:
 - Non-hazardous or less hazardous substitutes for hazardous substances now being used;
 - Maintenance procedures that do not require the use of hazardous substances;
 - Segregation of chlorinated from non-chlorinated wastes and hazardous from non-hazardous wastes;
 - Work toward restriction and ultimately replacement of Trichlor, in view of the likelihood that EPA may eventually ban the substance;
 - Solvent recovery, focusing on off-site and on-site treatment or recycling,
 - Restricting requisition of specific hazardous substances to a small number of authorized personnel, and only from a pre-approved BPA list.
 - Restricting procurement of specific hazardous substances to the BPA warehouse.

6. RESOURCE SUMMARY

Resource requirements are estimated to be fairly constant, following an initial 2-year period during which the waste minimization program is developed and implemented. During the development and implementation phase, the expense level of \$110,000 per year is expected. This will capture the cost of review of procurement practices, evaluation of alternative products, development and implementation of program, and issuance of guidance documents. The remaining 8-year's resource expense is anticipated to be \$60,000 per year for monitoring the program and responding to problem areas. Over the long run, successful efforts at waste minimization will save money and resources through effective reductions in the volume and toxicity of hazardous wastes.

B. ENVIRONMENTAL TRAINING AND AWARENESS

1. GOALS

- Promote employee awareness of environmental issues and pollution prevention practices.
- Provide and/or coordinate annual training for herbicides, asbestos, and hazardous waste/toxic substances.
- Develop, monitor, or provide materials specific to BPA activities and the specific craft audience.
- Develop, provide, or coordinate recordkeeping systems and training plans; generate/report/submit documents as necessary during EPA site inspections or as required by regulation, including the pesticide applicator certification.

2. PRESENT PRACTICES AND FACILITIES

Regulatory Context

Four separate pieces of legislation require environmental training at BPA: the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA); Resource Conservation and Recovery Act (RCRA); Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); and the Occupational Safety and Health Act (OSHA). In addition to legislative requirements, DOE Executive Order 5400.1 requires Employee Awareness and Pollution Prevention Training. FIFRA requires that applicators of herbicides secure training and be certified to apply herbicides. RCRA and CERCLA both require hazardous/toxic substances training for workers involved in these activities. OSHA ("Worker Right-to-Know") requires training for all workers involved with any aspect of or exposure to chemicals. Requirements for hazardous waste training are similar and complementary. In many instances, these statutes require up to 40 hours of initial training (which may include, in part, on-the-job training or experience) and 8 hours of annual update training.

Current Training

Herbicide Training is presently provided in cooperation with Area Transmission Line Maintenance and Substation Operations Organizations. The Environmental Protection Section maintains oversight for the responsible official (Director, Division of System Maintenance); administers testing and maintains test security; develops training materials; maintains records; and provides for annual reporting to EPA.

The Safety Office currently provides OSHA training. The best established training program is conducted through a contractor for asbestos training. Both initial and update training are provided, and workers are certified. Hazardous waste training is provided on a more informal basis and through on-the-job training. Additional Hazardous/Toxics training has been developed both as annual update training and, as practical, activity-specific training.

The Human Resources Development (HRD) Training Staff is also an available resource and will provide training on toxics/hazardous waste. This has been

limited to date to regulatory training, and does not include practical guidance in hands-on activities. HRD also maintains a recordkeeping system for courses coordinated through their organization.

In addition to the training discussed above for regulatory compliance, informational training is provided. This training is usually developed in response to Area or other organization requests and includes such topics as electric and magnetic field effects, noxious weeds, and recognizing and preserving wetlands.

3. ISSUES

- Requirements for Hazardous/Toxics training must be determined and integrated into traditional Craftsman Training because each piece of legislation has slight variations and overlapping requirements for training.
- Separate recordkeeping systems are maintained by the Human Resources Development Branch, the Safety Office, and the Divisions of Construction and System Maintenance. The recordkeeping systems are not designed to generate lists of employees who will need training on an annual basis, or to generate reports for regulatory agencies in the format that they require.

4. FINDINGS

- Both asbestos and herbicide training are handled efficiently and effectively by existing training systems.
- Specific craft training in environmental protection has not been a regular training topic in recent years, and a backlog has accrued.
- Hazardous Waste Training Requirements should be further defined and implemented both to achieve regulatory compliance and to provide practical and safety training for workers who will be involved in environmental protection actions.
- Established training promotes environmental awareness; however, additional informational and promotional activities aimed at a broader audience need to take place.

5. ACTIONS/TASKS

- (4) Obtain further clarification and legal advice to define regulatory responsibilities in the area of hazardous waste training.
- (5) Develop and implement training programs specific to each craft involved in environmental protection work, including implementation of SPCC plans, to meet annual (8-hour update) training requirements.
- (6) Develop/coordinate/integrate existing data systems to track and document training and certification needs to meet regulatory reporting requirements and to monitor internal training needs.

- (7) Continue ongoing asbestos and herbicide training programs.
- (8) Foster a better understanding and awareness of the basic principles of pollution prevention, particularized to BPA facilities, plans, programs, and actions. Expand "training" concepts to include awards, incentives, brochures, posters, videotapes, and additional educational materials (similar to those in the Safety Program) to promote and increase employee awareness of pollution prevention.

6. RESOURCE SUMMARY

Resource requirements are estimated to be relatively constant for the 10-year period. About \$112,000 would be needed annually. Projections are for oversight and contract support. Specific training requirements are also addressed in the discussion topics. Additional expenses are included in this estimate to capture costs associated with development of an employee awareness program on environmental issues and pollution prevention practices, i.e. awards, incentives, displays, videos, and posters.

C. PCB EQUIPMENT

1. GOALS

- Comply with Federal and State environmental laws and regulations governing PCB's.
- Eliminate the primary sources of PCB contamination.
- Clean up PCB-contaminated sites.

2. PRESENT PRACTICES AND FACILITIES

Polychlorinated biphenyls (PCB's) were used in electrical equipment for years because of their fire-retardant properties. However, long-term exposure to certain concentrations of PCB's is suspected of having detrimental human health effects. Also, PCB's are very persistent in the environment and they bioaccumulate. Limits for PCB concentrations have been set by Federal and State agencies. Since some electrical equipment contains PCB's at regulated levels (greater than 500 ppm), the agency must identify and label such equipment, dispose of it properly, and keep appropriate records.

BPA is committed to replacing regulated PCB equipment in order to reduce potential cost and liability. Both corrective and preventive approaches are used. The corrective approach includes actions such as equipment replacement and cleanup of spill incidents involving equipment with PCB's. The preventive approach includes replacement of: PCB series or shunt capacitors; PCB transformers; current, potential, and airway lighting transformers; and other oil-filled equipment such as high-voltage bushings, before any release of PCB's may occur.

To date, BPA has audited about 90 substations under the TSCA Audit Program, for oil-filled equipment: counting the PCB items and obtaining other pertinent information such as the quantity of oil contained, PCB levels, equipment types, manufacturer name, and the BPA number. Capacitors constitute about 98 percent of BPA's PCB equipment.

About 88 BPA locations have PCB capacitors (see Exhibit 3). Of the 140,000 PCB capacitor cells originally on the system, about 18,500 have been removed and/or replaced with non-PCB capacitors. BPA has accurate information on capacitors as to PCB content. Capacitor replacements will be prioritized by combining the environmental sensitivity information on each site with electrical power system analysis to establish capacitive reactive needs.

Regulatory Context

The Toxic Substances Control Act (TSCA) and EPA's implementing regulations at 40 CFR 761 govern the use, distribution in commerce, management, marking, transportation, storage, and disposal of PCB's.

EXHIBIT 3: PCB CAPACITOR INSTALLATIONS

3. ISSUES

- Sources of PCB contamination are present in some BPA substations and should be reduced in order to limit the administrative, regulatory, and liability burdens associated with maintaining a large inventory of PCB equipment.
- Costs associated with the cleanup of spills from BPA electrical equipment could be greatly reduced if a PCB equipment replacement program were implemented.
- Active and retired BPA capacitor yards have shown evidence of PCB contamination in rock, soil, and footings beneath and adjacent to capacitor racks. Such contamination from historic PCB spills needs to be cleaned up.
- BPA is required to plan, budget for, and undertake remedial actions at those sites found to be contaminated.
- The size and complexity of the power system represents a vulnerability to administrative violations (recordkeeping, reporting, inspections).
- BPA's agencywide PCB guidelines (BPEM Chapter 956, November 18, 1984) need to be updated.
- The facilities for sampling, draining, and flushing PCB equipment at the Ross Untanking Tower should be improved.

4. FINDINGS

- In order to avoid administrative, regulatory, and liability burdens associated with PCB electrical equipment, BPA has initiated a capacitor replacement program.
- In association with the replacement program, BPA should consolidate the materials management and maintenance recordkeeping systems for PCB electrical equipment.
- To be consistent with TSCA provisions, BPA should continue to inspect and sample substation yards to identify areas of contamination. If contamination has occurred, clean up the sites to levels agreeable to regulatory authorities.
- To avoid possible non-compliance with the TSCA provisions dealing with PCB oil and PCB equipment, a facility should be constructed at the Ross Complex to facilitate the handling of that equipment and oil.

5. ACTIONS/TASKS

- (9) Complete an average replacement of 600 MVAR of PCB capacitors per year; this equals about five substations per year.

- (10) Develop and maintain an accurate and up-to-date inventory of all PCB equipment.
- (11) Remove and do not replace PCB capacitors in stations where electrical reactive requirements allow.
- (12) Conduct a soil testing program in capacitor yards where removal and/or replacement is planned, in order to establish the level of PCB contamination.
- (13) In conjunction with removal and/or replacement, clean up contaminated material to required levels and restore the site.
- (14) Provide timely and current guidance on work practices and environmental precautions.
- (15) Construct a sampling, draining, and flushing facility at the Ross Complex to ensure efficient handling of PCB oil and equipment.

6. RESOURCE SUMMARY

Anticipated costs involve both expense maintenance actions and capital replacement projects. Maintenance expenses are typically to provide inventory management, recordkeeping, reporting, and environmental guidance. The capital projects are primarily removal and replacement of PCB capacitor installations and associated cleanups. The table below illustrates cost estimates.

Resource Overview (\$\$ in 000's)

<u>Year</u>	<u>Maintenance Expense</u>	<u>Replacement Projects</u>
1990	\$87.5	\$ 400.0
1991	75.0	6,800.0
1992	55.0	1,800.0
1993	55.0	8,200.0
1994	55.0	6,100.0
1995	55.0	10,300.0
1996	55.0	8,300.0
1997	55.0	9,800.0
1998	55.0	10,700.0
1999	55.0	7,500.0
Total	\$602.5	\$69,900.0

D. OIL-FILLED EQUIPMENT:

- EMERGENCY RESPONSE
- OIL SPILL SECONDARY CONTAINMENT
- SPILL PREVENTION CONTROL COUNTERMEASURE PLANS (SPCC)

1. GOALS

- Comply with provisions of the Clean Water Act, including the development of system-wide and site-specific Spill Prevention Control and Countermeasure Plans.
- Review Emergency Spill Response Procedures and develop/maintain training programs.
- For environmentally sensitive locations, use oil spill containment systems.

2. BACKGROUND

A highly refined mineral oil is often used to insulate transformers, oil circuit breakers, and some bushings. The amount of oil in a breaker or transformer, and its PCB content, are generally listed on the nameplate and/or a brass tag, as well as in BPA's System Maintenance Information System (SMIS). Many guidelines have been written on the testing, handling, and environmental concerns associated with insulating oil.

Environmental concerns are related both to the PCB content of the oil and to its volume: the more oil contained in a given piece of equipment, the greater the potential consequences should it leak or rupture. Amount of transformer equipment and oil content are listed below.

<u>TRANSFORMER EQUIPMENT</u>	<u>NUMBERS IN SYSTEM</u>	<u>OIL CONTENT IN GALLONS</u>	
		<u>Average</u>	<u>Range</u>
Power transformers	1075	12,500	1,000 - 30,000
Station service transformers	1537	75	25 - 1,000
Voltage regulators	116	700	25 - 12,700
Reactors	115	6,700	30 - 9,000
Converter transformers	27	23,000	20,000 - 23,000

Current transformers (3,158 total) and potential transformers (3,422) are almost all oil-filled at 115-kV and above.

Mineral oil continues to be the preferred insulating media for large power transformers, power reactors, converter transformers, and so on. Research is being done on SF₆-gas-filled transformers. However, commercial availability is limited for the next 10 years.

Oil circuit breakers also contain volumes of oil, ranging from 50 (15-kV breaker) to 15,000 (230-kV) gallons of oil. Over 1200 bulk circuit breakers and about 35 minimum oil circuit breakers (less than 50 gallons) are on the system.

Bushings manufactured before 1977 tend to have high PCB content (greater than 500 ppm); newer bushings tend to be filled with insulating oil only.

The primary environmental concern with transformers and breakers is oil spills. Ruptures are rare; however, slow leakage of oil from transformers, caused by constant vibration of the energized transformer, is a common occurrence.

3. PRESENT PRACTICES AND FACILITIES

In 1986, a "Mineral Insulating Oil System-wide Spill Prevention Control and Countermeasure Plan (SPCC)" [(M4102) P64076-SPCC-02 Procedure] was developed in response to EPA Regulation 40 CFR 112, pursuant to the Clean Water Act. That Act specifies that an SPCC Plan must be prepared by the "owner or operator" of that facility where (1) a reasonable potential exists of discharging oil into or upon navigable waters of the United States; and (2) equipment contains either in excess of 660 gallons of oil per piece or a total of 1,320 gallons; and/or the underground buried storage capacity of the facility meets or exceeds 42,000 gallons of oil.

This Procedure was written as a system-wide response to these regulations, and was certified by a Professional Engineer, as specified by the regulations. It was to be a procedural guideline and informational tool for field personnel.

According to the EPA Regulation, each plan should include a prediction of the direction, rate of flow, and total quantity of oil which could be discharged from the facility as a result of each major type of failure. In addition, site information such as the locations of drainage outfalls; of dry, drinking water, and monitoring wells; of containment materials; and retrofit status of equipment is needed. This level of detail is not possible in a system-wide plan. Field personnel need this information in order to respond to spills. In addition, whenever there is a change in facility design, construction, operation, or maintenance which materially affects the facility's potential for the discharge of oil into or upon the navigable waters of the United States, the SPCC Plan should be amended.

In response to this need for more site-specific information, site-specific SPCC plans have been developed for 154 substations system-wide, with plans to develop an additional 91. Of the 154 plans already in existence, a total of 86 are at substations that meet regulatory criteria and need updating every 3 years. Other plans may be updated at the discretion of the Area Offices.

In addition, over \$2 million has been spent since 1986 to install secondary oil spill containment systems at 70 facilities. These secondary containment systems have ranged in cost from \$35,000 to \$750,000 per project.

4. ISSUES

- Substations need to be investigated in detail to determine environmental sensitivity. Environmental sensitivity ratings need to be refined to estimate potential risk.
- Individual plans have not yet been developed for all substations identified by BPA as having potential risk.
- The Clean Water Act requires that SPCC plans be reviewed and certified. This stipulation has been met on a collective system-wide basis, but not for each substation.
- Priority changes, competing workloads, and scheduling conflicts may limit the extent to which goals are reached.
- Plans may not cover all aspects of emergency response.
- Emergency Spill Response information relating to hazardous substance releases such as herbicides or solvents must be included in any SPCC or emergency response plan.
- The oil spill containment retrofit program needs to address the overall environmental sensitivity of BPA's facilities.
- Customer-owned equipment has not traditionally been addressed in either the SPCC plans or the retrofit program.

5. FINDINGS

- The system-wide plan does not fully meet regulatory requirements. Full compliance with the provisions of the Clean Water Act would require Professional Engineer certification of site-specific SPCC plans and development of additional site-specific plans.
- A work effort in 1988 addressed projections for alternative strategies for developing secondary containment systems and risk/liability implications associated with each. The alternative receiving the best overall response was construction of passive secondary containment systems, including customer-owned equipment, at all substations designated to be at risk.*
- The decision as to which facilities would be considered at high risk would be determined by an environmental sensitivity rating, based on hydrologic and other site characteristics.**

* At risk substations are defined as stations that meet the oil storage capacity criteria in the Clean Water Act and have a reasonable potential of discharging oil into or upon waters of the United States.

** 40 CFR 112.1(d)(1)(i) states that "This determination shall be based solely upon a consideration of the geographical, locational aspects of the facility (such as proximity to navigable waters or adjoining shorelines, drainage, etc.) and shall exclude manmade features"

6. ACTIONS/TASKS

- (16) Update and refine Environmental Sensitivity Rating system.
- (17) Establish a process to identify and prioritize high-risk facilities for SPCC plan development or oil spill containment systems on the basis of environmental sensitivity and Area Office input. Institute a review and certification process.
- (18) Develop procedures to coordinate scheduling/development/maintenance of SPCC plans.
- (19) Provide new site-specific SPCC plans for 7-10 substations each year, based upon environmental sensitivity ranking.
- (20) Update existing site-specific plans for high-risk substations every 3 years. This equates to 10 plans/year for the first 3 years, 21 plans/year for the next 3 years, 39 plans/year for the next 3 years, and 56 plans the 10th year and thereafter.
- (21) Develop a standard site-specific SPCC Plan prototype for field use. Provide drainage plans, plot plans, quads, and locational information standards to the field for each site.
- (22) Develop tracking system for updating of SPCC plans on the System Maintenance Information System (SMIS).
- (23) Develop emergency response information for facilities that do not fit SPCC plan criteria.
- (24) Provide Emergency Response training to potential first responders.
- (25) Continue program level for retrofitting substations with secondary containment at 5 high-risk substations per year.
- (26) Address customer equipment in the development and implementation of both SPCC plans and oil spill containment systems.
- (27) Review and update the oil spill containment system program periodically to take advantage of the latest technologies.

7. RESOURCE SUMMARY

The budget for oil spill control revolves around updating existing site specific SPCC and emergency response plans, installing and maintaining containment/spill prevention facilities, and costs associated with ongoing inspection, training, and environmental monitoring. The following table illustrates the requirements for expenses and capital projects.

Resource Overview
 (\$\$ in 000's)

<u>Year</u>	<u>Maintenance Expense</u>	<u>Replacement Projects</u>
1990	415.0	66.0
1991	415.0	865.0
1992	415.0	1,417.0
1993	415.0	800.0
1994	415.0	600.0
1995	415.0	600.0
1996	415.0	600.0
1997	415.0	600.0
1998	415.0	600.0
1999	415.0	600.0
	-----	-----
Total	\$4,150.0	\$6,748.0

E. TANKS

1. GOALS

- Remove from service underground tanks that are no longer needed.
- Prevent leaks and spills from underground tanks.
- Find leaks and spills as provisions of regulations are implemented.
- Correct any problems created by leaks and spills.
- Create, implement, and maintain a record system for underground tanks.
- Ensure that all regulatory requirements are met.

2. PRESENT PRACTICES/FACILITIES/REGULATORY CONTEXT

Underground tanks represent an environmental problem because of the potential for leakage into soil and groundwater. Because regulation of underground storage tanks is a relatively new development, no historical guidance prior to 1986 had been developed.

Underground storage tanks are regulated under the Resource Conservation and Recovery Act (RCRA). Regulations were issued on September 13, 1988, with requirements phased in over a 10-year period.

Since 1987, about 80 underground storage tanks have been removed and properly disposed of. BPA currently has an inventory of 76 underground storage tanks at 48 facilities. Those still in the system will be subject to an increasingly stringent regulatory program.

3. ISSUES

In the 10 years allowed for implementation and phase-in of the regulations, the following issues may be limiting factors:

- Additional State regulations are being developed.
- Competition will continue and increase for construction workforce resources and contract support.
- Progress may be limited by seasonal and weather constraints.
- Because the regulations are recent, and experience in carrying them out limited, information on project costs is limited and/or lacking.
- Increased monitoring and laboratory analysis will be required of soil and water for possible contamination.

4. FINDINGS

Underground Storage Tank (UST) regulations are currently being met, but additional compliance activities will need to be phased in. Where underground tanks are essential, existing tanks may need to be replaced. New tanks must be installed according to regulatory requirements and must have: (1) spill and overfill protection, (2) corrosion protection, and (3) leak detection. Closure of tanks is also closely regulated, and requires monitoring of soil and/or water. Tank contents--liquids, vapors, and accumulated sludges--must be disposed of.

Records and inventories must be kept for all tanks to maintain accountability. Tanks and associated piping systems must also be regularly monitored for leakage. The information must be reconciled monthly.

Old and new spills, leaks, and overfills must be cleaned up. Environmental monitoring and documentation must be completed. As with all spills, reporting and recordkeeping are required.

Technology is not expected to be a limiting factor; increasingly sophisticated storage tanks (fiberglass, alarm systems, etc.) and piping systems are commercially available.

5. ACTIONS/TASKS

- (28) Implement a program to replace 27 tanks in 1990-91, 20 in 1991-92, and 13 in 1992-93.
- (29) Clean up any known fuel leaks promptly.
- (30) Take corrective action if any of the replacement installation sites are found to be contaminated.
- (31) Establish a tank management system that includes current inventory, testing, recordkeeping, and monitoring.
- (32) Develop a key card system to account precisely for all petroleum products.
- (33) Develop guidance for spills, records, monitoring, installation, and worker training/certification.

6. RESOURCE SUMMARY

Costs involve both maintenance expense actions and capital replacement projects. Maintenance expenses are typically for cleanup of sites and include the removal, treatment, storage, transport, and disposal of contaminated materials. In addition, inventory management, recordkeeping, reporting, and environmental guidance are integral parts of the overall tank management program. The capital expenses are for tank replacements. The largest resource commitments are associated with tank replacements and spill cleanups.

Resource Overview
 (\$\$ in 000's)

<u>Year</u>	<u>Maintenance Expense</u>	<u>Replacement Projects</u>
1990	505.0	1,066.0
1991	500.0	1,020.0
1992	300.0	575.0
1993	295.0	--
1994	295.0	--
1995	295.0	--
1996	295.0	--
1997	95.0	--
1998	95.0	--
1999	95.0	--
	-----	-----
	\$2,770.0	\$2,661.0

F. PESTICIDES/HERBICIDES

1. GOALS

- Achieve a fully integrated program of vegetation management.
- Comply with Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and state/local regulations when herbicides are used.
- Meet commitments stated in the Record of Decision for the Transmission Facilities Vegetation Management program.

2. PRESENT PRACTICES AND FACILITIES

Note: The scope of this topic is limited to herbicide use. It does not address other methods of vegetation management. The general topic of vegetation management is covered under the Transmission Line Maintenance report. Other consideration of substation herbicide use and issues is under the Non-Electric Plant report.

The vegetation management program is also covered under the Transmission Facilities Vegetation Management Final Environmental Impact Statement (1983). The Decision Record from this document provides further direction for use of pesticides.

BPA uses pesticides for five principal objectives:

- Ensure reliability of the electrical system.
- Provide a safe workplace, including such uses of herbicides as controlling poisonous or nuisance plants (poison oak or blackberries).
- Maintain facilities. Herbicides are used to maintain access roads; wood preservatives are used to maintain wood poles.
- Control noxious weeds. Weeds designated as "noxious" by the States because of agricultural or medical significance require control--biological (e.g., release of insects), chemical (herbicidal), or manual (removal).
- Fulfill housekeeping and minor landscaping purposes.

Regulatory Context

All pesticides are regulated under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). This legislation requires that all pesticides manufactured and marketed in the United States be registered by the U.S. Environmental Protection Agency (EPA). Other aspects of FIFRA regulate the marketing, distribution, transportation, storage, disposal, application, worker safety, permissible residues, and training and certification of applicators. OSHA also requires that all employees who use chemicals in the workplace be trained.

3. ISSUES

- Technical direction for both right-of-way herbicide uses and substation uses are the responsibility of Transmission Line Maintenance. Substation uses have not achieved the same level of program development and guidance as right-of-way uses.
- The Divisions of System Maintenance and System Operations both use the SPIF (Standards, Procedures, Instructions, and Information) system for environmental guidance. More guidance is indicated for Division of Construction.
- Recordkeeping is done by Area staff and documents herbicide applications. No mechanism exists to review and coordinate herbicide use on a system-wide basis (i.e., evaluation of "cumulative effects").
- The 1983 Vegetation Management EIS is under internal review and scoping for possible revision.
- If herbicides are misused, the potential exists to contaminate surface waters and groundwater. Some concern exists that contamination of groundwater may have occurred from substation herbicide use.

4. FINDINGS

BPA currently meets FIFRA and state requirements regarding use of herbicides.

Herbicides are the method of choice to manage vegetation on some rights-of-way. However, most right-of-way vegetation management could be accomplished by other methods if herbicides were not available. For both noxious weed control and substation vegetation management, effective alternatives do not exist. However, for substations, herbicide use could be somewhat reduced by evaluating alternative products (e.g. herbicide barriers applied beneath substations). For control of noxious weeds, BPA also maintains a biological control program which involves the release of insects. Although moderately effective, the insects do not provide a sufficient degree of control to warrant sole use.

In summary, the main issues involving herbicides are maintenance of proper work practices, monitoring residues, providing training and certification, and managing/minimizing herbicide use. Moreover, institutionalizing integrated pest management practices need to be pursued.

6. ACTIONS/TASKS

- (34) Further develop an integrated pest management program.
- (35) Continue to evaluate the use of plant growth regulators for potential maintenance use.
- (36) Continue commitment to train/certify applicators, including expansion of training/testing for all applicators and for construction and replacement functions in 1990. Develop recordkeeping systems.

- (37) Extend and update herbicide guidance (SPLF's) to cover all appropriate operations, maintenance, and construction functions and crafts.
- (38) Update and revise Vegetation Management NEPA documents as necessary by 1991.
- (39) Monitor well water from substations where herbicide residues have been found, to confirm presence and level of residues; use guidelines developed in cooperation with Oregon State University.
- (40) Continue to conduct product review toxicology/risk assessment and technology assessment of health and environmental hazards of pesticides.
- (41) Evaluate the use of chemical barrier and pre-emergent herbicide products in substations, beginning with testing for conductivity and corrosivity and progressing to trial installations in parts of existing or new yards, using traditional methods as control comparison.
- (42) Ensure that reporting and recordkeeping systems are adequate and maintained.

7. RESOURCE SUMMARY

Resource requirements are estimated to be relatively constant for the 10-year period. The primary expenses are for staff time to develop compliance programs, provide information to outside interest groups, evaluate technologies, continue applicator training/certification programs, issue guidance (SPLF's), update NEPA documents, provide implementation support to the field, and maintain reporting and recordkeeping systems. Capital expenditures are not anticipated. Maintenance expenses are estimated at \$90,000 in a typical year, and \$140,000 in the 3 years that work on a NEPA document update is in progress.

G. WOOD PRESERVATIVES AND WOOD POLES*

1. GOALS

- Dispose of wood poles treated with pentachlorophenol and/or creosote when their useful life is finished, in accordance with all applicable environmental rules.
- Use environmentally safe preservative products and employ practices and procedures that minimize health and safety risks.
- Replace poles treated with these materials as they deteriorate. Replacement poles will be treated with environmentally acceptable products.
- Clean up and restore pole storage yards as required.

2. PRESENT PRACTICES

The transmission system contains approximately 77,000 poles which have been historically treated with creosote or pentachlorophenol to prevent insect or decay attack. The use of pentachlorophenol was limited in 1986 through replacement with clean creosote, which does not migrate from the wood (thus reducing environmental problems). In 1988, BPA stopped using pentachlorophenol for treatment of existing pole structures and in the procurement of new poles. Over the last 10 years, between 400 and 500 poles per year have been replaced.

Wood Pole Replacement

In 1962, maintenance procedures were developed, with cross-sectional diagrams of decayed poles. They function as a criterion for wood pole replacement, based on pole shell thickness strength loading requirements for both species of wood poles (Douglas Fir and Western Red Cedar). Strength requirements are specified in the National Electrical Safety Code.

New poles are purchased under a specification accepting only copper naphthenate or clean creosote, both environmentally acceptable.

The following environmentally acceptable wood preservative products and pole installation techniques can be used to restore poles.

- Encapsulated Chemicals - Now being researched, these fumigants can be placed in internal decay pockets or insect galleries. They eradicate present problems or prevent future damage to poles, increasing their service life by 10 years.
- In-Service Pole Surface Treatment - Applying copper naphthenate on Western Cedar poles increases pole service life by 15 years.
- Pressure-Injected Polyurethane Foam - Polyurethane foam can be pressure-injected into insect or decay cavities in wood poles.

* The use and replacement of wood poles is discussed in the Transmission Line Maintenance Report. Discussion is limited here to poles treated with the wood preservatives pentachlorophenol or creosote.

These applications prevent further activity of the decay organisms/insects and restore the pole's strength. This can be a cost-effective, viable alternative to pole replacement.

Unserviceable wood poles and crossarms are given to property owners, upon signature of Form No. 6530-05 (formerly 1399), Line Maintenance Agreements/Request (June 1987). The property owner also receives a Consumer Information sheet listing the precautions which must be taken when using this preservative-treated material.

If the property owner does not want the poles, or if the poles are being removed from public lands, they are taken to the nearest pole storage site. Others can then acquire them after completing the appropriate release forms.

As wood poles and crossarms deteriorate and reach the criteria set forth by the National Electric Safety Code (NESC), they will continue to be replaced.

Treatment and Storage

BPA recently removed pentachlorophenol from its specifications for treating Douglas Fir and Western Red Cedar poles. Copper naphthenate is the replacement for pentachlorophenol. Its use should not create any leaching problems in storage areas.

Future Disposal of Wood Products

The use of copper naphthenate should not pose a problem for disposal of wood products in the future. However, EPA regulations for Toxicity Characteristic Leaching Procedure (TCLP) may result in some wood products previously treated with pentachlorophenol being classified as hazardous waste for disposal.

3. ISSUES

- Pentachlorophenol and creosote are now restricted-use pesticides. Pentachlorophenol is also of concern because it contains dioxin, believed to be a human health hazard, and is subject to stringent regulation.
- Although pentachlorophenol is no longer used and has been replaced with copper naphthenate, wood poles treated with penta and creosote still remain in the system. These poles are performing a useful function and are not an environmental problem unless storage (following removal), disposal, or historic storage sites (pole yards) become the subject of further restrictions.
- In some locations, people have complained about the odor given off by poles in storage yards. If problems persist, the poles may have to be covered or relocated to other storage yards.
- About 272 barrels of pentachlorophenol contaminated soil from previous spills are stored at the Ross Complex. There is no known EPA-approved disposal site for this contaminated soil.

4. FINDINGS

Current procedures and disposal practices meet environmental requirements.

5. ACTIONS/TASKS

- (43) Continue the present disposal methods; monitor environmental regulations for changes.
- (44) Continue to evaluate human and environmental health hazards of wood preservatives and closely track applicable State and Federal regulations.
- (45) Develop and implement design/location criteria for storage of wood poles.
- (46) Continually evaluate and revise policies and procedures to reflect any changes in EPA standards. Train personnel on handling and disposal of wood preservative waste and wood treated with these products.
- (47) Monitor pole storage yards as potential cleanup sites.
- (48) Investigate biological breakdown of penta as a treatment method. A project could be initiated to break down the penta-contaminated soil now stored in 272 barrels on BPA property.
- (49) Investigate air quality (odor) concerns caused by pole storage yards in urban areas. Develop mitigation strategy for any problems.

6. RESOURCE SUMMARY

Resource requirements are estimated to be constant for the 10-year period at \$90,000 per year. The primary expenses are staff time to evaluate human health and environmental hazards of wood preservatives, to train personnel on handling and disposal of wood preservative waste and wood treated with these products, and to issue written guidance to affected personnel. Capital expenses will not be made under this program. Should a treatment project for penta-contaminated soil prove feasible, its costs would raise the resource requirements for the duration of the project. Similarly, should a disposal effort become available, costs would be reflected here or in the environmental cleanup figures.

H. DRAINAGE SYSTEMS

1. GOALS

- Meet national, state, and local requirements for protection of ground and surface water from pollutant discharge.
- Minimize long-term liability.
- Protect human health and the environment.

2. PRESENT PRACTICES AND FACILITIES

A variety of drainage systems are used at substations and maintenance complexes, from the very simple to the very complex. These systems may become pathways for pollutants (insulating oil, PCB's, pesticides, solvents and degreasers, fuel, etc.), to enter both groundwater and surface water.

Regulatory Context

The Safe Drinking Water Act (SDWA) has provisions requiring registration of drywells. Since a drywell may enable other hazardous substances to enter the environment, additional regulatory burdens and/or liabilities may be imposed under the Resource Conservation and Recovery Act (RCRA) or the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

In addition, the Department of Energy has recently issued an Order that addresses groundwater protection, specifically:

- identifying potential sources of groundwater pollution;
- preventing groundwater pollution from occurring; and
- remediating groundwater pollution when it does occur.

Also, under provisions of the Clean Water Act, certain kinds of facilities may need to have National Pollution Discharge Elimination System (NPDES) Permits for stormwater outfalls.

3. ISSUES

- BPA does not have enough current information about its drywells and other pathways to determine the extent of compliance action necessary.
- Information is also lacking on the number and location of station outfalls discharging directly to surface waters.
- A systematic inventory and assessment of water pollutant sources is needed in order to develop a compliance plan.

4. FINDINGS

A cohesive management plan to deal with water pollution issues is not presently in place; present efforts are fragmented. Inventory information needs to be updated and actively managed.

5. ACTIONS/TASKS

- (50) Develop a cohesive groundwater protection and management plan.
- (51) Identify and locate station drywells and other pathways to groundwater. (1990-1992).
- (52) Identify the type of material/effluent entering these drywells and other pathways to groundwater.
- (53) Determine whether any of these drywells or other pathways are within wellhead protection zones of and/or might endanger any public water systems.
- (54) Correct and remedy drainage system problems through closure of the system, cleanup of contamination, provision for an alternative system.
- (55) Register drywells and other pathways.
- (56) Determine whether any drywells or other pathways are within the boundaries of an existing or proposed sole source aquifer.
- (57) Determine whether any drywells or other pathways present an unacceptable risk to any drinking water supply wells.
- (58) Identify and locate station outfalls or discharge points into surface waters. Identify the type of material/effluent entering these outfalls into surface water.
- (59) Assemble the necessary information needed for an NPDES Permit application for those stations where outfalls are likely to require a permit.

6. RESOURCE SUMMARY

The environmental budget associated with drainage systems primarily covers the expense of inventorying and updating the information base. The data would be used for risk assessment, pollution prevention, and reporting/registration requirements. Initial costs would be about \$170,000 per year for several years, eventually leveling off at about \$25,000 per year. Water-related issues have increased in importance in recent years. If this trend continues (i.e. groundwater contamination, pollution runoff and off-site source contamination, and wetland protection), budget requirements may increase again in the future rather than levelize. Costs associated with cleanup and corrective actions are addressed under the cleanup actions topic.

I. WATER SYSTEMS

1. GOALS

- Identify and precisely locate all BPA production water wells (potable and non-potable).
- Identify and locate other pathways that are a potential threat to groundwater.
- Develop and maintain adequate baseline water quality information.
- Ensure that the drinking water being purveyed through BPA's water wells is safe for human consumption.
- Ensure that wells are correctly designed, constructed, and maintained.
- Ensure that wells taken out of service are correctly abandoned.

2. PRESENT PRACTICES AND FACILITIES

BPA has a number of water wells in its system (Exhibit 4). A baseline study of drinking water wells identified a total of 53 drinking water wells at sub-stations. Other abandoned wells are found on the system, and may add 30 or more wells to the inventory.

Wells can function as pollutant pathways in two directions:

- (1) by drawing water from a contaminated aquifer, the well could be carrying pollutants in addition to drinking water (assuming that the water remains untreated);
- (2) by creating a potential pathway for pollutants from the surface to the groundwater, thereby contaminating the aquifer (especially if the upper part of the well casing is not properly sealed and extended several feet above the ground surface).

This problem of surface contamination entering the aquifer is especially of concern for improperly abandoned water wells. Also, pollutants may migrate down a deteriorated well casing to contaminate deeper aquifers.

BPA is also responsible for monitoring for pollutants which may have been released into the environment (including groundwater) as a result of current and/or past practices.

Regulatory Context

The Safe Drinking Water Act (SDWA) requires monitoring the quality of drinking water. The frequency of monitoring, and the pollutants that are specifically monitored for, depend upon the number of service connections and the number of people using the system as a source of drinking water.

In addition, the Department of Energy (DOE) issued an Order in November 1988 that addresses groundwater protection specifically.

EXHIBIT 4: WATER WELLS

3. ISSUES

By law and Department directives, BPA is expected to design and take proactive steps in:

- monitoring drinking water quality;
- identifying potential sources of groundwater pollution;
- preventing groundwater pollution from occurring; and
- remediating groundwater pollution when it does occur.

4. FINDINGS

BPA needs to undertake a complete and accurate inventory of the number and location of all wells and shafts, whether pre- or post-BPA ownership.

Although BPA already has a substantial amount of baseline information on its potable water systems (from the CH₂MHill Baseline Study), that contract did not include a number of the herbicides used at substations. The pollutants tested for by CH₂MHill have been carried forward into the new draft SPLF on Well Abandonment. However, that list needs to be supplemented. BPA should test for residues of products that it uses which have the potential to reach the groundwater and possibly endanger public health and the environment.

The Water SPLF specifies periodic water monitoring requirements for existing BPA drinking water systems. It summarizes the monitoring requirements for water systems in Idaho, Montana, Oregon, and Washington. It also identifies the Maximum Contaminant Levels (MCL's) for each of these four states, plus the EPA.

The baseline study detected the presence of solvents in small quantities in 10 of 53 BPA wells sampled. Additional follow-up measurements are in order. Specifically, the presence of volatile organic compounds (VOC's) were found in water samples for Santiam, Bellingham, Kalispell, Olympia, Lane, St. Johns, Ross, Allston, Buckley, and Hot Springs. Currently, the wells at Bellingham, Olympia, St. Johns, Ross, and Hot Springs are not being used for drinking water.

The baseline study did not look for a spectrum of specific herbicides, but for three herbicides from EPA's list of priority pollutants (2,4-D; 2,4,5-TP Silvex, and 2,4,5-1).

5. ACTIONS/TASKS:

- (60) Undertake a comprehensive inventory to locate wells and determine their contamination status.
- (61) Establish an ongoing water quality monitoring program expanding on the baseline study, and provide for routine potable water testing.
- (62) Investigate any presence of volatile organic solvents. In particular:

- the 10 station wells showing detectable levels of VOC's.
- concurrent with the resampling/retesting effort, determine possible sources and pathways of pollution, and undertake appropriate action;
- where MCL's have been exceeded, provide an alternative drinking water source.

(63) Undertake further analysis to remedy the absence of data on historically used herbicides.

(64) Prepare Maintenance standards and procedures in the area of wellhead protection.

(65) Revise design criteria for wellhead protection to respond to increased need for precautions.

6. RESOURCE SUMMARY

The budget covers ongoing and supplemental monitoring and water quality protection measures. Staffing and costs are expected to be relatively stable at about \$88,000 per year. The concerns over groundwater pollution are escalating in the Federal, state, and public sectors. Higher future budget levels and stricter compliance standards and monitoring levels are ultimately anticipated. A systematic effort to reduce the number of wells and eliminate possible pollution pathways to groundwater would limit liability and compliance involvements.

J. OTHER HAZARDOUS/TOXIC SUBSTANCES

J.1. ASBESTOS

1. GOALS

- Systematically develop an inventory of asbestos throughout the BPA system.
- Systematically remove asbestos from buildings as renovation occurs and from equipment as it is replaced.
- Identify and label each location properly.
- Undertake proper abatement procedures.

2. PRESENT PRACTICES AND FACILITIES

Asbestos is a group of naturally occurring minerals which separate into fibers. It is a known human carcinogen, primarily through inhalation. Asbestos fibers, which are very strong and highly resistant to chemicals and heat, are usually mixed with a binding agent such as asphalt, cellulose, or plaster. Asbestos becomes dangerous only when the fibers are released from the binding agent and become friable, and thus inhalable.

Asbestos was widely used in many buildings and equipment, ranging from floor and ceiling tiles to insulation of all types. Applications include insulation of pipes, wires, and heating, ventilating, and air conditioning (HVAC) equipment, as well as in asbestos siding, shingles, and floor tiles. New projects most likely to encounter asbestos are HVAC replacement and retrofit projects, building remodel projects, building additions, and equipment replacements.

BPA policy is to discontinue the use of asbestos in either its friable or non-friable state. Asbestos products will not be specified in new designs, and equipment or materials containing asbestos will be replaced when obsolete or when substitutes are available. For building modifications, existing station drawings will be reviewed to locate potential asbestos-containing material. All such material which could possibly be encountered during the project will be sampled and tested under the oversight of the Area Safety Manager. Annual facility inspections are also conducted by Safety representatives to refine inventory data and identify potential problems.

The central Safety Office has assumed overall responsibility for BPA's asbestos monitoring and control. Specific work procedures and control guidelines exist for all asbestos control projects and for all projects where asbestos-containing materials will be disturbed. A general information SPIF on asbestos has been written, and a work procedure is in draft. Electricians are trained and fit-tested for respirator use, and most maintenance districts have an electrician trained and certified for asbestos removal. Construction has several electricians and all carpenters trained and certified for asbestos removal. All Construction crews and Maintenance districts have high-efficiency particulate air filtration (HEPA) vacuum cleaners. Appropriate

protective apparel is provided and worn. Asbestos disposal is done according to regulations for packaging, labeling, and disposal.

The use of asbestos in electrical equipment has been minimal. Presently, BPA has only six 15-kV General Electric magna-blast air circuit breakers with asbestos. Maintenance work is seldom required in the interrupter and the breakers are signed for asbestos.

3. ISSUES

- The major asbestos issue for the agency is worker safety. Asbestos is not hazardous to workers unless it is disturbed and becomes friable. Since the most common locations are well known, a thorough investigation is conducted before construction or other work to determine the level and location of asbestos contamination. This standard practice, coupled with the proper precautionary and protective measures, minimizes the chance of accidental exposure to asbestos fibers.
- Existing policy is to investigate during the design process (for any project with the potential of encountering asbestos). It is generally agreed that this policy provides adequate safeguards against inadvertent release of asbestos fibers. However, the continued accumulation and compilation of such data is a necessity. Annual facility inspections also add to the information base.
- All workers must receive training in the proper precautions and procedures to be followed when working near asbestos.

4. FINDINGS

Asbestos is prevalent throughout BPA facilities. However, the systematic testing and labeling of contaminated areas which is now performed before any remodel/retrofit work should afford adequate protection. This investigatory practice must be coupled with worker training in order to be effective. However, future regulatory changes are likely, and would increase the level of controls now in place. An accurate estimate of the number of abatement projects is not known or easily predictable. Consequently, resource projections would be speculative.

5. ACTIONS/TASKS

- (66) Continue the systematic documentation of asbestos locations throughout the BPA system.
- (67) Provide training in asbestos handling for all workers likely to come into contact with asbestos fibers.
- (68) Develop a waste stream for asbestos materials.

J.2. MERCURY AND OTHER SUBSTANCES

1. GOALS

- Continue to monitor and maintain workplace, handling, and disposal precautions for equipment containing mercury, other chemicals, and any wastes resulting from maintenance actions.

2. PRESENT PRACTICES AND FACILITIES

Precautions are necessary when working with mercury because, if it is uncontrolled, it becomes a health hazard. It can enter the body through the lungs, skin, and digestive system from exposure to metallic mercury, mercury vapors, and from organic mercury compounds. There, it can cause both long- and short-term health effects.

Some electrical equipment uses mercury. This includes some General Electric transformers load-type tap changer (with mercury shaft seals); and GE type FG-25 breakers with mercury dashpots. There is one GE type FG-25 breaker left on the system. The dashpot seldom requires maintenance. The tap changer is normally maintained with a complete service every 4 years, but the mercury seals seldom require maintenance. The exposure is very low in both these cases.

ASEA mercury arc valves are used at the Celilo HVDC converter station. Potential exposure is higher, here, during the valve reconditioning process. To control exposure and protect workers, the maintenance of these valves follows strict procedures. Respiratory protection, protective clothing, and special mercury trap-type vacuum cleaners are used. All personnel are required to have a yearly medical examination and a monthly urinalysis.

Mercury is also used on several different types of BPA system instruments such as thermometers, manometer-type pressure gauges or switches, Stokes vacuum gauges, and gas-in-oil analyzers. A SPIF has been issued informing crews what protective clothing to wear, how to retrieve spilled mercury, and how to store it safely for eventual recycling.

Other chemicals and substances associated with maintenance and operation of equipment require similar precautions. Acids, alkalines, solvents, and degreasers have proper work procedures to follow.

3. ISSUES

- Equipment with mercury must be monitored to determine whether any leaks or potential problems may exist.
- Worker safety in handling mercury-filled equipment is an issue.
- Accurate training in proper work procedures is very important for Celilo workers.

4. FINDINGS

Measures currently in place adequately address the issue of mercury.

5. ACTIONS/TASKS

(69) Continue to follow precautionary measures in place; update them as needed.

(70) Conduct a system-wide housecleaning effort to find and dispose of chemical products stored at facilities but no longer used.

6. RESOURCE SUMMARY

The budget level is estimated at a relatively uniform \$25,000 per year to continue ongoing training, to conduct an inventory of substances, and to update guidance. The cost of Safety Office surveys, inspection, and other OSHA related activities are not included within the estimate. Capital expenditures for asbestos abatement projects are not addressed. Such projects would normally be associated with and incidental to (though possibly a substantial part of the cost of) other remodeling or renovation projects. The likely trend would be for evaluation and abatement activities to continue at the same level of effort as in recent years.

K. CLEANUP ACTIONS

K.1. PAST SPILLS

1. GOALS

- Clean up past spills of hazardous/toxic chemicals in accordance with Federal/state/local environmental standards.
- Ensure regulatory compliance with Federal/state/local environmental standards.
- Protect human health and the environment.

2. PAST AND PRESENT PRACTICES AND FACILITIES

Chronically leaking equipment, extensive use of solvents on external surfaces of equipment, violent ruptures of PCB capacitors, leaking underground storage tanks, and transformer failures have resulted in spills to the environment. Before Federal regulation, these spills were not always promptly cleaned up to prevent soil, ground, or surface water contamination.

Current practice is to clean up "new" spills in accordance with Federal/State/local environmental requirements. However, the issue of dealing with past spills exists. BPA is currently contracting for cleanup of past spills at specific facilities and also conducting cleanups using BPA personnel.

3. ISSUES

- Not all past spill sites throughout the BPA system have been identified.
- Conflicts and overlap may exist between Federal, state, and local governments over who has jurisdiction and what the cleanup level should be at a spill site.
- As regulations become more stringent, the issue of "how clean is clean" will become increasingly important.
- Competition will continue and increase for construction workforce personnel, contract support, and other agency resources.
- Climatic conditions may limit cleanup activities to the summer months when cleanup contractors and BPA crews are in greatest demand.

4. ACTIONS/TASKS

- (71) Continue to plan for and carry out cleanups using contract and other sources and adhere to current cleanup schedule.
- (72) Identify other localized contamination needing cleanup.

- (73) Investigate sites where capacitors have been removed (retired yards) to determine level of contamination.
- (74) Clean up retired sites, as required.
- (75) Explore new treatment technologies. Program and conduct technology demonstration project(s).
- (76) Ensure sufficient funding for future cleanup work, including allocation of needed resources to the Areas.
- (77) Coordinate with all parties involved to ensure a smooth, rapid and cost-effective cleanup effort.

K.2. CERCLA PROCESS

1. GOALS

- Evaluate sites where known or suspected environmental contamination has occurred.
- Apply state and Federal guidelines in assessment, investigation, and remedial action stages of environmental cleanup.
- Work cooperatively with state and Federal regulatory agencies and the public throughout the process.
- Correct and remedy site contamination.
- Monitor affected sites.

2. PRESENT PRACTICES AND FACILITIES

BPA has several sites where past disposal practices (specifically, localized landfilling of construction or spill debris) may have resulted in a release of a hazardous substance. Bonneville is examining how to meet its responsibilities under the Superfund Program to clean up these sites.

CERCLA and the Superfund Amendments and Reauthorization Act (SARA) of 1986 set up a process for identifying and remedying sites where releases of hazardous substances may have occurred. The sequence of events moves from site discovery to closure. Known or suspected waste sites that may contain hazardous substances were reported to EPA in June 1981.

Bonneville has reported 10 possible sites to the EPA as part of the initial CERCLA inventory. These sites have been listed on a Federal Facilities Docket and will go through assessment and inspection steps of the Superfund process. Some of these sites may move into the remedial planning and action phase. CERCLA also provides for periodic update and expansion of the Docket. The States of Oregon and Washington have recently enacted environmental cleanup laws, which could expand the inventory of sites needing cleanup evaluation and action.

Facilities currently being assessed in the CERCLA process (see Exhibit 5) are:

Bell Substation
Columbia Substation
Midway Substation
Ross Complex
Troutdale Substation

Alvey Substation
Olympia Substation
Snohomish Substation
Covington Substation
Custer Substation

3. ISSUES

- The CERCLA process is complicated and lengthy, requiring much consultation and coordination with regulatory agencies and the public. Rules and guidelines often change.
- It is difficult to plan and budget for compliance under CERCLA. Since the EPA and the States may identify more sites for review, there is an element of uncertainty about the size of the potential undertaking.
- Applicable cleanup standards come from a number of sources; many are developed on a case-by-case basis.

4. FINDINGS

Program workload and resource requirements are an emerging issue. Commitments are likely to be extended over a period of several years. Many of the actions and tasks are likely to be prescribed or negotiated with the regulatory community.

5. ACTIONS/TASKS

- (78) Complete Preliminary Assessments/Site Inspections for listed Federal Docket sites.
- (79) Conduct subsequent site evaluations (RI/FS), by contract, for the Federal Docket sites, if required.
- (80) Complete Remedial Investigation/Feasibility Study RI/FS for the Ross Complex, by contract, within the next 18-36 months.
- (81) Conduct Environmental Impact Statement and public/community involvement activities associated with the process and DOE guidelines.
- (82) Develop administrative and decision record for each RI/FS CERCLA site review.
- (83) Clean up environmental contamination that has resulted from past site practices and/or events.
- (84) Monitor results of environmental cleanups.

EXHIBIT 5: CERCLA SITES

6. RESOURCE SUMMARY

Past Spills

Anticipated costs involve maintenance expense for planning, initiating contract procurement, (including pre-award support, technical review, post-award support), conducting, coordinating, and monitoring cleanups of past spills are estimated to be \$1,510,000 per year for a levelized program. In addition, the site screening investigation costs to evaluate sites for level and type of contamination (including sampling and analysis costs) have been projected to be \$50,000 per year.

CERCLA

The budget for CERCLA cleanup/corrective actions through the short-term (3 years) consists primarily of site studies and evaluations. It is anticipated that this will extend through the entire 10-year period. Capital remediation projects are not likely to start until about 1993. The following table summarizes the anticipated budget. It is not possible to predict accurately the impact of the CERCLA schedule on the budget; Adjustments are anticipated.

Resource Overview (\$\$ in 000's)

<u>Year</u>	<u>Maintenance Expense</u>	<u>Replacement Projects</u>
1990	1,327.0	100.0
1991	1,327.0	100.0
1992	2,760.0	500.0
1993	2,775.0	2,000.0
1994	2,525.0	2,000.0
1995	2,525.0	2,000.0
1996	2,525.0	2,000.0
1997	2,525.0	2,000.0
1998	2,525.0	2,000.0
1999	2,525.0	2,000.0
Totals	\$23,339.0	\$14,700.0

I. ENVIRONMENTAL APPRAISALS, AUDITS, AND MONITORING

1. GOALS

- Carry out Appraisal Program as established by BPA Manual.
- Use self-audits and environmental appraisals to monitor environmental compliance of BPA's facilities and progress of 10-Year Plan environmental actions.
- Develop OM&C guidelines for environmental audits of existing facilities.
- Prioritize audits and appraisals based on environmental sensitivity.
- Complete appraisals or audits on all environmentally sensitive facilities and subject matter issues during next 10 years.
- Ensure that appraisal action items are corrected within a reasonable time frame.
- Ensure that environmentally sensitive equipment or activities are monitored in accordance with regulations, requirements, or good practices.
- Ensure that facilities or activities are monitored and maintained to avoid problems.

2. PRESENT PRACTICES AND FACILITIES

The important components of the existing appraisal program are:

a. Appraisal Directives/Guidelines:

- BPA Manual Chapter 902, May 30, 1984. Establishes BPA's Environmental Appraisal Program.
- Environmental Appraisal/Audit Guidelines, August 1986. Provides the procedures, sample checklists and guidelines for conducting environmental appraisals, and internal audits.
- Office of Engineering Annual Appraisal Program. Annually outlines the procedures, projects, teams and schedules for appraising newly constructed projects.

b. Environmental Field Appraisals: Of 121 facilities on the OM&C appraisal list, 21 (or 17%) have been subject to field appraisal during the 4 years the appraisal program has been in effect.

c. Internal Environmental Audits: Fifty-seven facilities have had internal audits. Facilities subject to internal audit are identified by the Area Environmental Coordinator. Internal audits are normally conducted by Area Environmental personnel.

d. TSCA Inspections: By agreement with EPA, TSCA inspections are to be conducted of BPA facilities that presently have PCB capacitors or have had them in the past. Each of the 88 facilities originally scheduled have been audited.

e. Audit, Inspection and Appraisal Follow-up: The benefits of the audit and appraisal program are measured by how effectively action items are corrected. Appraisal and inspection follow-up are centrally coordinated by the staff of the Assistant to the Administrator for Environment. Action items not completed will be turned over to BPA's Internal Audit Staff for follow-up.

Facilities are monitored in two major groups: Maintenance District Headquarters and substations. At District Headquarters, fuel tanks, oil/water separators, secondary containment for oil-filled equipment, warehousing, storage, and handling areas for oil-filled electrical equipment and hazardous waste are monitored on a daily, weekly, or monthly basis. Water quality is tested, and the air is monitored where asbestos is known or suspected to be present.

At substations, oil stop valves, secondary containment for in-service electrical equipment, and oil/water separators (large drainage system containment) are monitored as above. PCB levels are tested for all in-service, oil-filled electrical equipment. Air is monitored where asbestos is known or suspected to be present, and fuel tanks are monitored.

The methods and standards for monitoring and auditing facilities are found in operating bulletins, Maintenance SPIF's, and pertinent regulations. Monitoring of these facilities is performed by various staff, depending on which of the four Areas is involved.

3. ISSUES

Currently only 32% of existing facilities have been appraised or internally audited. The OM&R 10-Year Plan will work to ensure that these facilities are in compliance with environmental regulations. In implementing an effective program, the following issues may be limiting factors:

- Increased Environmental Assessment Workload for Office of Assistant to the Administrator for Environment, Environmental Protection Section, and Area Environmental Coordinators. To help meet this workload, the use of contractors for conducting appraisals needs to be considered.
- Appraisal Program Responsibility - These responsibilities need to be documented for the Operations, Maintenance, and Construction Program Office.
- Appraisal Program Guidelines - Program-specific guidelines for maintenance and operation of existing facilities do not exist.

- Appraisal Program Follow-up Action - For the appraisal program to be effective, a commitment needs to be made to complete action items.
- Maintenance District Headquarters and substations must be routinely given documented inspections and periodic audits to maintain quality assurance for worker and public safety and to meet the the legal and statutory requirements of RCRA, TSCA, CWA, and the Clean Air Act.

4. FINDINGS

- The BPA Environmental Appraisal Program provides an established and accepted way to monitor facilities and conformance with environmental regulations. With minor revision, it could also be adapted to monitor progress in carrying out environmental provisions of the OM&R 10-Year Plan.
- Guidelines need to be developed for: (1) appraisal and internal audit responsibilities, (2) list of facilities to be appraised and/or subject to internal audit prioritized by environmental sensitivity, and (3) list of 10-Year Plan functional areas to be appraised.
- Methods of day-to-day monitoring and auditing will continue to evolve, subject to changes in regulations, equipment, technology, and available staff and funding. A substantial amount of monitoring and recordkeeping is accomplished by formal inspections conducted by Warehouse and Utilization and Disposal (U&D) personnel, substation operators, and BPA plumbers.
- Laboratory expenditures will continue to increase, since test data is critical to monitoring efforts.
- Fuel tank monitoring is very new to BPA, with only a few installations that provide for in-ground monitoring. In the past, monitoring of fuel tanks has been limited to recordkeeping and inaccurate stick measurements on the tanks. Future requirements will be automated. The trend is to eliminate as many fuel sites as practical.

5. ACTIONS/TASKS

- (85) Develop OM&R Environmental Audit Program Guidelines.
- (86) Develop a long-term Appraisal Program which identifies: (1) appraisal facility list prioritized by environmental sensitivity, (2) functional issue list based on environmental actions identified by 10-Year Plan, and (3) schedule for program or functional area and facility appraisals, based on 10-year completion cycle.
- (87) Conduct appraisals as identified. (Estimated 10 facility appraisals/ audits and 1.5 functional and program area appraisals/audits per year.)
- (88) Establish a program to track environmental action items.

- (89) Evaluate monitoring activities to determine whether they are adequate to detect potential pollution sources and meet regulatory requirements.
- (90) Establish a cohesive strategy for long-term monitoring of soil, air, and water pollution sources.
- (91) Integrate monitoring activities with routine inspections of facilities and a uniform recordkeeping system.
- (92) Provide guidance for environmental monitoring efforts.
- (93) Establish necessary support contracts.

6. RESOURCE SUMMARY

Resource requirements are estimated to be fairly constant after the first year. The primary expenses are for staff time to establish and oversee a monitoring program, including contract support. This is estimated to be \$120,000 per year. In addition, the development of a long-term Environmental Audit Program Guidelines, along with conducting the appraisals, contracting, laboratory test costs, and establishing a tracking system for environmental action items, will require about \$70,000 per year.

8. RESOURCE SUMMARY

The expenditures required to address environmental concerns vary considerably from issue to issue. A number of the issues can be adequately covered for a fairly nominal expense, year in and year out. Several other key issues have major expenses and a large number of capital projects. There are also issues, specifically cleanup/remediation actions, where the scope of the effort and therefore the ultimate costs are largely unknown or speculative. Exhibit 6 details cost requirements issue by issue. The costs correspond to implementing the actions listed for each major area of discussion. Estimates are for both maintenance (expensed) and replacement (capital) projects.

Expensed environmental actions show an average of approximately \$5.4 million per year, with the most significant costs associated with past spills and the CERCLA process. The capital projects show expenditures per year, ranging from \$4.3 million to \$13.3 million. Most costs are attributed to PCB equipment replacement, oil spill containment projects, and underground storage tank replacement. Replacement of PCB capacitors alone accounts for approximately \$70 million over the 10-year period.

EXHIBIT 6 - TEN YEAR ENVIRONMENTAL MAINTENANCE EXPENSE AND CAPITAL REPLACEMENT COSTS.

Pollution Control and Abatement - System Maintenance Expense (\$000'S)

ITEM	90	91	92	93	94	95	96	97	98	99	TOTAL
Waste Mgmt & Minimization	\$110.0	\$110.0	\$60.0	\$60.0	\$60.0	\$60.0	\$60.0	\$60.0	\$60.0	\$60.0	\$700.0
Employee Training & Awareness	\$112.5	\$112.5	\$112.5	\$112.5	\$112.5	\$112.5	\$112.5	\$112.5	\$112.5	\$112.5	\$1,125.0
PCB Equipment	\$87.5	\$75.0	\$55.0	\$55.0	\$55.0	\$55.0	\$55.0	\$55.0	\$55.0	\$55.0	\$602.5
Oil Filled Equipment	\$415.0	\$415.0	\$415.0	\$415.0	\$415.0	\$415.0	\$415.0	\$415.0	\$415.0	\$415.0	\$4,150.0
Tanks	\$505.0	\$500.0	\$300.0	\$295.0	\$295.0	\$295.0	\$295.0	\$295.0	\$295.0	\$295.0	\$2,770.0
Pesticides/Herbicides	\$140.0	\$140.0	\$140.0	\$90.0	\$90.0	\$90.0	\$90.0	\$90.0	\$90.0	\$90.0	\$1,050.0
Wood Preservative & Wood Poles	\$90.0	\$90.0	\$90.0	\$90.0	\$90.0	\$90.0	\$90.0	\$90.0	\$90.0	\$90.0	\$900.0
Drainage Systems	\$170.0	\$170.0	\$170.0	\$55.0	\$25.0	\$25.0	\$25.0	\$25.0	\$25.0	\$25.0	\$715.0
Water Systems	\$88.0	\$88.0	\$88.0	\$88.0	\$88.0	\$88.0	\$88.0	\$88.0	\$88.0	\$88.0	\$880.0
Equip w/Haz. Toxic Substances	\$25.0	\$25.0	\$25.0	\$25.0	\$25.0	\$25.0	\$25.0	\$25.0	\$25.0	\$25.0	\$250.0
CLEANUP ACTIONS - CERCLA	\$1,327.0	\$1,327.0	\$2,760.0	\$2,775.0	\$2,525.0	\$2,525.0	\$2,525.0	\$2,525.0	\$2,525.0	\$2,525.0	\$23,339.0
CLEANUP ACTIONS - Past Spills	\$1,560.0	\$1,560.0	\$1,560.0	\$1,560.0	\$1,560.0	\$1,560.0	\$1,560.0	\$1,560.0	\$1,560.0	\$1,560.0	\$15,600.0
Env. App Audits & Monitoring	\$190.0	\$190.0	\$190.0	\$190.0	\$190.0	\$190.0	\$190.0	\$190.0	\$190.0	\$190.0	\$1,900.0
** TOTALS **	\$4,820.0	\$4,802.5	\$5,965.5	\$5,810.5	\$5,530.5	\$5,530.5	\$5,530.5	\$5,330.5	\$5,330.5	\$5,330.5	\$53,981.5

Environmental Activities - Capital Replacement Program (\$000'S)

ITEM	90	91	92	93	94	95	96	97	98	99	TOTAL
PCB Contaminated Equipment	\$400.0	\$6,800.0	\$1,800.0	\$8,200.0	\$6,100.0	\$10,300.0	\$8,300.0	\$9,800.0	\$10,700.0	\$7,500.0	\$69,900.0
Tanks	\$1,066.0	\$1,020.0	\$575.0	\$575.0	\$575.0	\$575.0	\$575.0	\$575.0	\$575.0	\$575.0	\$2,661.0
CERCLA Remediation	\$100.0	\$100.0	\$500.0	\$2,000.0	\$2,000.0	\$2,000.0	\$2,000.0	\$2,000.0	\$2,000.0	\$2,000.0	\$14,700.0
Spill Containment	\$66.0	\$865.0	\$1,417.0	\$800.0	\$600.0	\$600.0	\$600.0	\$600.0	\$600.0	\$600.0	\$6,748.0
** TOTALS **	\$1,632.0	\$8,785.0	\$4,292.0	\$11,000.0	\$8,700.0	\$12,900.0	\$10,900.0	\$12,400.0	\$13,300.0	\$10,100.0	\$94,009.0

9. APPENDIX A: ACRONYMS

BPA	Bonneville Power Administration
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CWA	Clean Water Act
CFR	Code of Federal Regulations
DOE	Department of Energy
EHV	Extra High Voltage
EPA	Environmental Protection Agency
EIS	Environmental Impact Statement
E/MF	Electric and Magnetic Field
FCRPS	Federal Columbia River Power System
FY	Fiscal Year
FIFRA	Federal Insecticide Fungicide Rodenticide Act
HVAC	Heating, Ventilating, and Air Conditioning
HEPA	High Efficiency Particulate Air Filtration
HVDC	High Voltage Direct Current
kV	Kilovolts
MCL	Maximum Contaminant Level
MVAR	Megavolt Ampere Reactive
NPDES	National Pollutant Discharge Elimination System
NEPA	National Environmental Policy Act
NESC	National Electric Safety Code
OM&C	Office of Operation, Maintenance, and Construction
OM&R	Operations, Maintenance, and Replacement
OSHA	Occupational Safety and Health Act
PCB's	Polychlorinated Biphenyls
ppm	parts per million
RI/FS	Remedial Investigation/Feasibility Study
RCRA	Resource Conservation and Recovery Act
SMIS	System Maintenance Information System
SARA	Superfund Amendments and Reauthorization Act
SPCC	Spill Prevention Control and Countermeasure (Plan)
SPII	Standard Procedures Instruction/Information
SDWA	Safe Drinking Water Act
SF ₆	Sulphur Hexafluoride
TSCA	Toxic Substances Control Act
TCLP	Toxicity Characteristic Leaching Procedure
TRICHLOR	1,1,1-Trichloroethane
UHF	Ultra High Frequency (radio)
UST	Underground Storage Tank
VOC	Volatile Organic Compound

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