WATER-QUALITY DATA-COLLECTION ACTIVITIES IN OREGON:

INVENTORY AND EVALUATION OF 1984 PROGRAMS AND COSTS

By Thomas K. Edwards

U.S. GEOLOGICAL SURVEY

Water-Resources Investigations Report 86-4346

Portland, Oregon
1987

DEPARTMENT OF THE INTERIOR

DONALD PAUL HODEL, Secretary

U.S. GEOLOGICAL SURVEY

Dallas L. Peck, Director

For additional information
write to:

U.S. Geological Survey
847 N.E. 19th Avenue, Suite 300
Portland, Oregon 97232

Copies of this report can
be purchased from:

U.S. Geological Survey
Books and Open-File Reports Section
Federal Center
Box 25425
Denver, CO 80225

CONTENTS

(V follows)

ILLUSTRATIONS

TABLES

WATER-QUALITY DATA COLLECTION ACTIVITIES IN OREGON: INVENTORY AND EVALUATION OF 1984 PROGRAMS AND COSTS

--

By Thomas K. Edwards

--

EXECUTIVE SUMMARY

Recently, National attention has been drawn to environmental monitoring programs by members of Congress asking serious questions about the usefulness of the water-quality data for assessing water-quality issues of a regional or national scope. Interest in the effectiveness of the data for these purposes has been heightened owing to recent economic conditions and large expenditures allocated for environmental monitoring.

Studies have been undertaken in Colorado, Ohio, and Oregon, by the U.S. Geological Survey to: (1) determine the characteristics (purpose, type, frequency, availability, quantity, quality, and cost) of 1984 water-quality data-collection programs of Federal, State and local agencies, and universities; and (2) evaluate whether the data from these programs, collected for various purposes, using various procedures, can be used to enhance our ability to answer the following three major questions:

(1) What were the natural ambient water-quality conditions?

(2) What are the existing ambient water-quality conditions?

(3) Has the ambient water-quality changed over time?

This study has been divided into three phases:

Phase I--Inventory Federal, State, County, and City agencies and universities; identify water-quality data-collection programs and their characteristics and develop criteria useful in selecting those data bases with the potential for addressing water-quality problems of a regional or national scope.

Phase II--Reevaluate the water-quality data-collection programs based on the Phase I criteria and associated quality assurance and quality control to determine the sources of data most useful in addressing water-quality issues of a regional or national scope.

Phase III--Test the usefulness of the data obtained in the phase II screening by using selected data sets to address water-quality test scenarios closely aligned with water-quality issues of regional or national scope.

This report presents the results of Phase I by reporting characteristics of 1984 water-quality data-collection programs in Oregon, including location and frequency of collection, constituents analyzed, annual number of samples, quality of results, and costs.

Ninety-four organizations were interviewed as potential water-quality data collectors. Sixty-one of these organizations, representing Federal, State, and local agencies and universities, were asked to complete an information sheet relative to those water-quality data-collection programs in which they are currently involved. Twenty-seven agencies identified 62 water-quality data-collection programs within Oregon. The remaining 34 agencies indicated that (1) their work was done in conjunction with another responding agency and, therefore, a response would be duplicative, (2) their program represented data collected during a year other than 1984, or that, (3) after receipt of the information sheet, they determined that their work did not fit the definition of a water-quality data-collection program. Surface-water samples constitute 97.0 percent of the total number of samples collected, while ground-water samples constitute the remaining 3.0 percent. Eight percent of samples collected east of the Cascade Mountain Range are ground-water samples, while less than 2 percent of samples collected west of the Cascades are from ground-water sources. Federal, State, and local agencies collected the majority of samples for purposes of characterizing ambient conditions. Twenty-two programs only fulfill National Pollution Discharge Elimination System permit requirements or demonstrate compliance to some other requirement of a regulating agency.

Analytical costs for laboratory processing of samples are reported as given, or estimated from 1984 U.S. Geological Survey Central Laboratory prices, or computed by taking 25.0 percent of the reported program funding when specific constituent analyses were not identified. Based on these actual and estimated analytical costs, 64.0 percent of the total laboratory-analytical expenditure was dedicated to analysis of samples to characterize ambient conditions, 3.0 percent to analysis of permit-required samples, and 33.0 percent to analysis of compliance-and-enforcement samples.

Water-quality data-collection programs were tested against a set of five screening criteria to evaluate their potential usefulness in addressing water-quality issues of a regional or national scope. The five criteria are: (1) ambient conditions (natural conditions at the time of sampling), (2) data availability (data available to the general public), (3) location (sample sites precisely located), (4) quality assurance (documented quality-assurance procedure in place), and (5) machine readability (data in a computer data base accessible by U.S. Geological Survey or some other agency assigned the task of data utilization). Thirty-four percent of all samples met the five criteria. County agencies had the lowest number of samples that met the five criteria, with machine readability the criterion most frequently missed for this group. Overall, machine readability was the most frequently missed criterion.

A total data base for 1984 of nearly 27,000 samples is potentially available for analysis of water-quality issues. This number of samples would be only increased by about 2.0 percent, if all data were put into a machine-readable or computerized format.

INTRODUCTION

Increased awareness and concern relative to water quality in the United States has led to legislative action over the last 15 to 20 years, directed at controlling water contamination and maintaining water quality at standard usable levels. Examples of this legislation are the Clean Water Act (amended 1977), Safe Drinking Water Act (1974), Resource Conservation and Recovery Act (1976), Toxic Substances Control Act (1976), and Comprehensive Environmental Response, Compensation, and Liability Act (1980). As a result of this legislation, Federal, State and local agencies have spent billions of dollars on water-quality data-collection programs for a variety of purposes. However, the effectiveness of these programs for the general purpose of characterizing the quality of the nation's water resources has been questioned by many observers. Some of the reasons that the effectiveness may be questionable have been described by the U.S. House of Representatives Subcommittee on Natural Resources, Agricultural Research, and Environment, as inadequate control on quality-assurance, lack of data, discontinuity of programs, and lack of coordination among agencies (Blodgett, 1983).

Insufficient information is available to adequately validate these criticisms; therefore, a concerted effort is needed to characterize existing water-quality data-collection programs and assess their utility in addressing regional and national water-quality issues. These water-quality issues include acid rain, eutrophication of lakes, salinity of streams, soil erosion and sediment transport, toxic contamination of surface and ground water, and lapses in the sanitary quality of drinking water.

Accordingly the U.S. Geological Survey has undertaken the task of assessing the water-quality data-collection programs in three states, as a sampling of programs conducted nationwide. The three pilot studies have been conducted in Colorado, Ohio, and Oregon, to evaluate the usefulness of 1984 water-quality data-collection program data in addressing regional and national water-quality issues. Results of the Colorado and Ohio studies are presented in the report by Hren and others (1985). The results of the Oregon study are presented here.

Background

The term water-quality data, as used in this study, refers to the measurement of physical, chemical, biological, and sediment constituents in surface or ground water. These water-quality data can be further divided into categories relative to water use. Measurements are usually made to determine the suitability of the water for a particular use such as domestic, industrial, irrigation, recreation, and aquatic habitat. These uses can in turn affect the quality of the receiving waters (following use).

In Oregon, water-quality data have been collected by Federal, State and local agencies, universities, and private concerns for a variety of purposes. However, the number of agencies involved has declined in recent years, because of changes in philosophy and reductions in funding. The most common purpose for collecting water-quality data is to obtain information useful in the control of water pollution.

Therefore, water-quality sampling programs generally focus on areas coincident with the locations of known or suspected elevated pollutant concentrations. These types of water-quality programs are exemplified by: (1) end-of-pipe sampling, as required by National Pollution Discharge Elimination System permits; (2) sampling of effluent, streams, or ground water to verify compliance with criteria and standards mandated by legislation; (3) sampling to define ambient constituent concentrations and to identify trends by means of fixed-station, fixed-interval networks; and (4) interpretive studies to define a specific cause-and-effect water-quality relation.

Emphasis on the use and needs for water-quality data has changed in recent years. Some aspects of water quality have improved in many streams as a result of existing pollution-control programs. Examples of past problems that seem less extensive today are dissolved oxygen depletion and elevated bacteria counts. At present, however, there are concerns about pollution from nonpoint sources, such as agriculture, mining, urban runoff, and contamination by synthetic organic chemicals and toxic metals. As data needs and program emphasis change, agencies involved in water-quality data collection must carefully assess and adjust their programs to meet individual agency priorities and fiscal resources.

Over the past 20 to 25 years, there has been great change in the design and development of water-quality data-collection programs and in methods of sample collection, analysis, and quality assurance. Water-quality data-collection programs are more strategically planned today than in the past; that is, they are designed to maximize the information return relative to current program goals, less data are collected, and the data are for specific purposes. Coincidentally, analytical laboratories and techniques have evolved from small laboratory operations that conduct relatively simple analyses, to multi-million dollar laboratories staffed by teams of specialists that perform analyses of common ions, trace elements, and organics in water, tissue, and sediment.

The changes in water-quality data that have resulted from (1) the change in design and development of water-quality data-collection programs, and (2) the changes in laboratory sophistication are all changes that require careful re-evaluation of the data. In light of this, care must be exercised to ensure that recent data are comparable to historical data, and that these data are useful in addressing water-quality trend issues of national concern.

Project Objectives and Approach

The general objective of this study is to identify and characterize existing hydrologic and water-quality data-collection programs conducted by various Federal, State and local organizations, and to determine how well the collected data address water-quality issues of a regional or national scope. Within the scope of this objective, attention is focused on two specific objectives; (1) to determine the characteristics (purpose, location, type, frequency, availability, quantity, quality, and cost) of data collected by universities and by Federal, State, county, and city agencies that conduct water-quality investigations in Oregon; and (2) to evaluate the usefulness of existing Oregon data for addressing regional and national water-quality issues.

The project approach is divided into three phases:

Phase I--Identify the organizations involved in water-quality data-collection programs during 1984; define the characteristics of the programs (including purpose, cost, size, location of data stations, type and frequency of data collection, availability of the data, and quality assurance procedures); develop criteria to screen the data programs and identify those programs potentially useful for addressing regional or national water-quality issues; and determine the areal distribution of the data.

Phase II--Reevaluate in greater detail the water-quality data-collection programs based on the Phase I criteria and associated quality assurance and quality control, and verify program characteristics in order to determine their degree of usefulness for addressing regional and national water-quality problems.

Phase III--Test the results of Phase II by applying selected data sets to test scenarios that ask specific questions about specific water-quality constituents.

Purpose and Scope

This report addresses phase I of the project. Water-quality data-collection programs in Oregon during 1984 are characterized, and data potentially useful for addressing water-quality issues of a regional or national scope are identified, by using five criteria to screen the water-quality program characteristics.

Geographic Setting

Oregon is a lightly populated western state (approximately 2.6 million; State of Oregon 1983-84). Fifty-seven percent of Oregon's population resides in incorporated areas and 43 percent in unincorporated areas. The State's major industrial and population centers are located west of the Cascade Mountain Range, primarily in the Willamette Valley. Harvesting and processing forest products is the dominant industry in the State; however, recent economic conditions and increases in the high-technology electronics industry have greatly weakened the strong foothold that forest products once had. Agriculture is considered the second leading industry. Approximately 55 percent of the land in Oregon is publicly owned and is primarily controlled and managed by the U.S. Forest Service and the U.S. Bureau of Land Management. Water is abundant, with an estimated annual surface-water supply of over 66 million acre-feet. Despite this great supply, most of the surface-water resource is allocated, and careful management is necessary as peak water use generally occurs during periods of low flow. The total volume of ground water has not been accurately quantified, but the Oregon Department of Water Resources routinely monitors wells throughout the State to determine the rate of water-level declines, and ensure that they do not become excessive. Water-quality issues in Oregon are associated with irrigation, industrial and urban uses and discharges, commercial water transport, fishing, and wildlife and recreational concerns.

INFORMATION COMPILATION METHODS

Description of Information Sheet

The main source of information for this report was an information sheet (Appendix I) developed by project members and completed by individuals that represent those Federal, State, county, and city agencies, universities, and private concerns involved in water-quality data-collection programs within Oregon. The information sheet contains five sections. The purpose of the first section is to compile information concerning the collecting agency, and the purpose, scope, and objectives of that agency's water-quality program. The four remaining sections request information under the categories of physical/field, chemical, biological, and sediment measurements. The information sheet was designed to be as self explanatory as possible, with brief instructional statements included where necessary.

Each of the four general water-quality data-collection categories included in the information sheet are subdivided into groups of specific water-quality constituents. These groups of constituents are physical/field measurements, major inorganics, major metals, trace elements, nutrients, organics, priority pollutants, radiochemistry, tissue chemistry, sediment chemistry, bacteria, surface-water biota, and sediment measurements. The agency representative responding to the information sheet was prompted to identify the specific sample location, sampling frequency, type of sample site (surface or ground water), type of sample (ambient or effluent), numbers of sites sampled and samples taken for each constituent analysis, and technique for data storage (machine readable computer file or file drawer hard copy). Additionally, information on the existence of quality-assurance procedures (yes or no) for each of the four general water-quality data-collection categories and information on annual program costs were requested. Responses were compiled to indicate either a positive or negative response where applicable, to tally numbers of sample sites and numbers of samples for each constituent grouping, and to total statewide water-quality data-collection program costs for 1984. Separate information sheets were requested for each specific water-quality data-collection program conducted by a given agency during 1984. For this purpose, a water-quality data-collection program was defined as a water-quality activity with a separate and identifiable budget and objective(s).

Identification of Groups Collecting Water-quality Data

Federal, State and local agencies, universities, and private concerns involved in water-quality related work were contacted by telephone as part of a preliminary inventory to identify those organizations currently (1984) conducting water-quality data-collection programs. Representatives of about 130 agencies or organizations were contacted; 94 of these have been directly involved in water-quality data collection, but only 61 of these 94 agencies or organizations have current water-quality data-collection activities. Information sheets were mailed to these 61 agencies. Local agencies representing cities and municipalities with populations of 10,000 or more were included in the local agency group. All private concerns contacted were excluded from the information sheet procedure, because their work was largely site specific, or proprietary, and their data were difficult or impossible to obtain.

Agencies and organizations contacted during this inventory were identified by telephone listings; membership in Federal, State, county, or city water organizations; participation in the U.S. Geological Survey cooperative program; publication listings; the August 1985 listing of participants in the National Water Data Exchange program; and by referrals from the organizations contacted. Individual program managers were contacted by the Geological Survey project chief. All contacts were made by telephone to explain the purpose of the study and to screen the agencies contacted, in order to determine which agencies should receive information sheets to complete.

The inventory was essentially all inclusive in its coverage of water-quality data-collection activities in Oregon, relative to the Federal, State, county, and local programs. However, as previously stated, information regarding organizations in the private sector is not included here because of the site specific nature of the data and the difficulties in obtaining it for use. Additionally, those cities and municipalities with populations of less than 10,000 were not included in the survey.

Respondents to the information sheet were instructed to separate information regarding ambient monitoring from that obtained for effluent monitoring. Ambient monitoring refers to those data obtained to characterize the current or natural water-quality conditions of a stream or aquifer. Effluent, in this report, refers to those data obtained to meet the requirements of a permit or to determine the degree of compliance. Therefore, effluent sampling may be done either by a discharging agency to monitor their discharge, or by a regulatory agency charged with determining the degree of compliance by law. Information sheet results are tallied by the general categories of sample type (ambient or effluent) and by the water type sampled (surface or ground water). Permit-related programs were incorporated into the effluent-sample tallies.

Determination of Water-quality Data Costs

Two types of cost information are presented here: (1) total water-quality data-collection program costs for 1984, consisting of the sum of all individual program costs as estimated by respondent program managers; and (2) estimated 1984 laboratory-analyses costs. These costs are reported here according to the organization spending the funds and do not reflect the source of funds. Twenty-seven percent of the programs identified did not report any type of cost figures, and the responses that were given varied in detail. Therefore, to provide a more consistent basis for comparisons of data-collection activities among constituent groups and different organizations, estimates of the expenditures for laboratory analyses are presented.

Laboratory analytical cost estimates were developed according to procedures similar to those followed in the Colorado and Ohio pilot studies (Hren, and others, 1985). Analytical charges identified in the 1984 Water Quality Services Catalog (Feltz and others, 1983) for individual constituent analyses done by the U.S. Geological Survey Central Laboratories in Denver, Colorado, and in Atlanta, Georgia, were used as a cost basis. For those constituent analyses not done by the Central Laboratories, analytical costs from the U.S. Geological Survey, Pacific Northwest District Laboratories in Portland, Oregon and Vancouver, Washington, and a competitive current contract laboratory's costs for benthic invertebrate identification were used as a cost basis.

The analyses used for the cost estimates and their associated costs are shown in Appendix II.

Information sheet responses for each constituent group were examined to determine the specific constituents most commonly reported. The constituents most commonly analyzed in each group were used to develop a typical suite of analyses for that constituent group. The cost of the most common analytical procedure was used to eliminate cost variations when different analytical procedures were used to measure a given constituent. The most common analytical procedure was selected by examining the frequency that each analysis for a given constituent was scheduled over the previous 12 months at the U.S. Geological Survey Central Laboratory in Denver. The costs of performing these individual analyses were totaled for each constituent group. This total was then multiplied by the number of constituent analyses per year for that constituent group. The result was an estimated yearly laboratory analytical cost for the total number of analyses in a given constituent group.

Screening Criteria

Data from each information sheet were tested against five screening criteria. The purpose of this screening procedure is to provide a preliminary measure of the usefulness of existing data bases for addressing regional and national water-quality issues. The screening criteria are:

(1) Do the data represent ambient stream or aquifer conditions?

(2) Are the data available for public use?

(3) Can the sample sites be accurately located by latitude and longitude?

(4) Are quality-assurance procedures documented?

(5) Are the data in a machine-readable data base?

Criterion 1 was used to determine the portion of the water-quality data that was collected to characterize ambient surface- or ground-water conditions. If the information sheet response for a program's sampled constituent group indicated that the site type is an ambient surface- or ground-water sampling site, the program sites passed this criterion. Samples taken at the point of effluent discharge or in close proximity to a solid waste disposal area do not provide data for characterizing ambient stream or aquifer conditions. These analyses were, therefore, excluded to avoid bias in interpreting water-quality conditions.

Criterion 2 was met if the program data are available to other agencies. The primary purpose of this project is to assess the usefulness of existing water-quality data. Therefore, if for some reason those data are not available for use, they do not fulfill the purpose. Access to data can be restricted for reasons such as legal concerns, questionable sampling techniques, or unconfirmed analytical results.

Criterion 3 deals with accurate sample-site location, which is of utmost importance when utilizing the data. If the latitude and longitude were known or could be obtained after plotting a site location on a map using either a river mile or land line (township/range) description, the data base passed this criterion. Accurate sample site location is necessary to determine the part of a stream or aquifer represented by a given sample or to determine the areal coverage of the data. This location information can also be used to identify data base overlaps when data from different sources are combined.

Criterion 4, documented quality-assurance procedures, was met by a positive response to any of the quality-assurance questions at the end of each constituent-group list. A documented quality-assurance procedure in the collection and analysis of water-quality data is essential to ensure the accuracy and precision of the data and to help determine the comparability of data from various sources.

Criterion 5 deals with the machine readability of data bases. Failure to meet this criterion does not indicate a lack of reliability in a given data base, as many useful data exist in hard-copy files which have not been computerized. However, manual gathering of large quantities of data from various sources throughout the nation, and entering those data into a computerized data base is regarded as impossible, and virtually eliminates the use of non-machine-readable data.

ORGANIZATIONS COLLECTING WATER-QUALITY DATA

Water-quality data are collected by a variety of organizations representing all levels of government. Individual organizations conduct differing types of water-quality data-collection programs designed to meet various responsibilities or mandates. These programs may include water-quality regulation, pollution control, planning, research, policy making, or assessing water-quality conditions. The level of effort associated with any given program depends on the number of data-collection sites, the frequency of sampling and number of samples taken at each site, and the number and types of analytical tests run on the samples collected. This section summarizes the number of organizations involved in water-quality data-collection programs, and their current 1984 level of effort in Oregon.

All municipalities in Oregon with a population of 10,000 or greater were contacted. All respondent municipalities are included in the city category. The remaining organizations answering the information sheet are categorized as Federal, State, county, or others. The category of "others" consists of those organizations which cannot be strictly classified as belonging to any of the other four governmental categories.

Oregon is on the verge of becoming a "primacy" state whereas Colorado and Ohio already have this distinction. Primacy means that the U.S. Environmental Protection Agency oversees water-quality data-collection activities in these States and is responsible for reviewing and approving State water-quality management activities. In Oregon, the U.S. Environmental Protection Agency works closely with the Oregon Department of Environmental Quality in design and maintenance of water-quality monitoring programs, but does not take an active part in the actual collection and interpretation of these data. Therefore, in Oregon, the Department of Environmental Quality has the responsibility for water-quality management within the State.

Sixty-one organizations, representing Federal, State, county, and city agencies, and universities, were asked to participate in the statewide survey. Sixty-two individual programs were identified by 27 of these organizations, while the remaining 34 organizations surveyed indicated that (1) their work was done in conjunction with another responding agency and, therefore, a response would be duplicative, (2) their program represented data collected during a year other than 1984, or that, (3) after receipt of the information sheet, they determined that their work did not fit the definition of a water-quality data-collection program. A listing of agencies that completed information sheets, and the constituent groups for which they sample are contained in Appendix III. Six federal agencies were responsible for 39 percent of all water-quality data-collection programs identified. City governments were responsible for 28 percent of the total, county agencies for 17 percent, two State agencies for 11 percent, and three organizations comprising the "other" category accounted for 5 percent.

The U.S. Geological Survey accounted for 21 percent, with 13 programs, for the largest number of current programs of any single agency. The Oregon Department of Environmental Quality reported five programs, or 8 percent, of the programs identified.

The percentage of constituent analyses, for both surface- and ground-water samples, collected by each organizational category is summarized in figure 1.

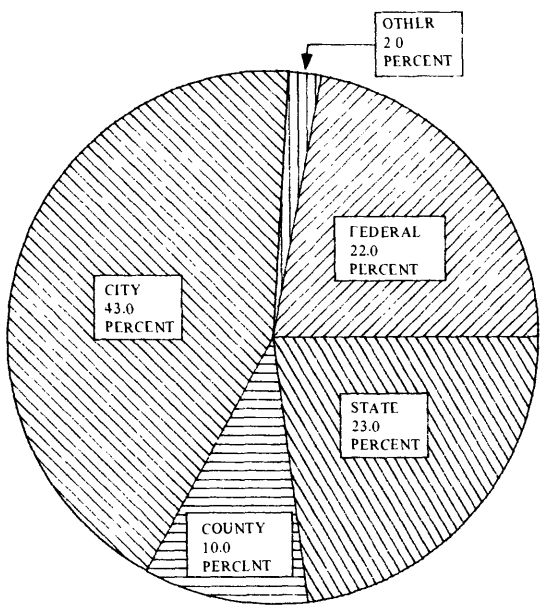


Figure 1.--Percentages of water-quality constituent analyses performed by organizational unit, Oregon, 1984.

Readings from continuously recording monitors, such as those used for temperature or specific conductance were averaged to reflect daily means, rather than using hourly, semi-hourly, or quarter-hourly readings, to obtain the total number of constituent analyses and percentages. City agencies conducted the greatest number of constituent analyses (43 percent). This number reflects information from cities west of the Cascade Range as no cities or municipalities to the east reported water-quality data-collection programs. The extensive work in the Bull Run Watershed by the City of Portland, Bureau of Water Works alone accounts for 10 percent, and frequent sampling of intake water for the City of Lake Oswego water supply accounts for 8.0 percent to further bias the number of constituent analyses conducted by City agencies. State agencies account for 23 percent of the constituent analyses, with the Oregon Department of Environmental Quality conducting 14 percent of the total number of analyses. Federal agencies perform 22 percent of the constituent analyses, with the U.S. Geological Survey conducting the largest percentage of analyses overall, accounting for 16 percent of the total. The remaining analyses are conducted by county agencies and those organizations comprising the "others" category.

These percentages of constituent analyses are somewhat misleading, as the cities of Portland and Lake Oswego focus on very localized areas rather than providing statewide information as in the case of State and Federal agencies. Oregon Department of Environmental Quality and the U.S. Geological Survey provide the most diverse data bases of the organizations surveyed, with water-quality data-collection programs throughout Oregon.

PURPOSES OF WATER-QUALITY DATA COLLECTION

Water-quality data are collected for a variety of reasons. For this report, sample collection is summarized into three general purposes:

(1) Samples collected from effluent or treated water, as mandated by law, to ensure that discharging organizations meet permit or regulatory requirements.

(2) Samples collected by regulatory agencies to ensure that permit holders are in compliance with discharge permit criteria and water-quality standards (includes samples required for enforcement actions).

(3) Samples collected from surface- and ground-water sources by data collection and interpretive organizations, to determine ambient or prevailing water-quality conditions.

According to the results of this survey, nearly 85,000 samples were collected in Oregon during 1984. This total does not include compliance monitoring and special studies conducted by Oregon Department of Environmental Quality because these data were not provided at the time of this study. The total includes samples from all constituent groups.

The percentage of samples collected for each of the three general purposes (ambient, permit-required, and compliance and enforcement) is shown in table 1. Ambient sampling accounted for 69 percent of the total. The permit-required samples reported were collected by city and county agencies discharging wastewater, and mandated to meet National Pollution Discharge Elimination System requirements under the Clean Water Act of 1983, and by drinking water suppliers to meet the requirements of the Safe Drinking Water Act of 1974, and represent 30 percent of all samples collected. Reported compliance-and-enforcement programs accounted for 1.0 percent of the total number of samples.

Surface-water samples represented the majority (98 percent)of all samples collected. Of the ground-water samples, the permit-required and ambient categories accounted for 1.0 and 0.5 percent. Compliance-and-enforcement samples collected from ground-water sources also accounted for 0.5 percent of the total number of samples collected. These percentages are shown in table 1, and may be compared to the surface-water sample percentages for the respective collection purpose.

Table 1.--Summary of percentage of total samples collected, by sample collection purpose, Oregon, 1984

Sample collection purpose	Percent of total		
	Surface water	Ground water	Total
Ambient conditions	68.5	0.5	69.0
Permit requirements	29.0	1.0	30.0
Compliance-and-enforcement	0.5	0.5	1.0

HISTORICAL WATER-QUALITY DATA

Some water-quality data were collected as early as 1900 by the U.S. Bureau of Reclamation, but the U.S. Geological Survey and Oregon Department of Environmental Quality appear to have the largest historical water-quality data bases, with some data collected as early as 1901. A number of Federal, State, county, and city agencies indicated that their water-quality data programs had been severely curtailed or eliminated in recent years due to funding cuts resulting from recent changes in administration policies. Therefore, this 1984 inventory information represents a much narrower scope than would be expected from an inventory of information representing a year between 1972, when the Clean Water Act (P.L. 92-500) was passed by the United States Congress, and about 1980, after which many long-term programs were no longer funded.

As stated in the Colorado and Ohio report (Hren, Chaney, Norris, and Childress, 1985), the enactment of the Clean Water Act of 1972 initiated a variety of water-quality management programs, all of which required water-quality data to support them. The 303(e) plans mandated by the Act required waste-load allocation studies. These were followed by the 208 planning process, which required a different data set.

Concurrently, several national data-collection programs also were underway: the Clean Lakes program, the Urban Hydrology program, U.S. Environmental Protection Agency's National Water-Quality Surveillance System network, and the U.S. Geological Survey's National Stream Quality Accounting Network. The years 1979-81 marked a major effort by the U.S. Geological Survey to collect water-quality data related to energy production activities. As each of these programs met their mandated requirements or as water-quality initiatives changed, the level of data-collection activity also changed. Because many of these programs were not renewed after their initial funding, there was a decrease in the number of samples collected.

TYPES OF WATER-QUALITY DATA COLLECTED

Water-quality samples are analyzed for a variety of specific constituents and physical properties. These constituents and properties are categorized into 13 major groups as presented in the information sheet (Appendix I). Included in these constituent groups are chemical analyses of sediment and chemical analyses of fish tissue. Data representative of these two groups are important as measures of water quality, even though the number of samples collected for these constituent groups was low compared to the total number of samples. The U.S. Geological Survey and Oregon Department of Environmental Quality identified one program each, in which they collected sediment and fish-tissue samples respectively, for chemical analyses.

The analyses discussed here were for compliance-and-enforcement activities and characterizing ambient conditions. Analyses performed to meet permit requirements were excluded because they generally characterize effluent conditions and are not considered to be public information in many cases.

The number of determinations on surface- and ground-water samples collected in Oregon in 1984 for each constituent group is presented in table 2. The physical/field measurements group had the largest number of measurements (66 percent) of any constituent group, due to the number of programs continuously collecting temperature, pH, specific conductance, dissolved oxygen, or turbidity values. The biologic constituent group was second, with 12 percent of all constituent determinations.

For ground-water analyses (table 2), the physical/field and major inorganic constituent groups are the two largest groups, each comprising 2.0 percent of all constituent determinations. Less than 0.1 percent of all surface-water analyses included determination of specific organic compounds from the priority-pollutants and pesticides constituent groups. However, these two constituent groups represent 2.0 percent of all ground-water constituent determinations.

Table 2.--Summary of number of surface- and ground-water constituent determinations, and estimated analytical costs by analytical constituent group, Oregon, 1984

Analytical constituent group	Number of determinations		Estimated analytical costs	
	Surface water	Ground water	Surface water	Ground water
Physical/field	143,900	4,750	$211,620	$11,800
Major inorganics	20,160	5,970	92,200	23,940
Trace elements	1,890	1,350	16,760	14,260
Major metals	600	1,850	5,870	17,280
Nutrients	9,380	2,100	64,530	15,970
Organics	5,850	890	54,640	15,460
Priority pollutants	4	370	890	4,300
Pesticides	10	70	1,120	300
Radiochemical	10	--	190	20
Tissue chemistry	30	--	10,120	--
Sediment chemistry	50	--	170	--
Biological	26,010	1,860	125,260	18,780
Sediment	26,010	--	790	--

COSTS OF WATER-QUALITY DATA

This section presents total program costs, as compiled from the information sheet and estimated laboratory-analyses costs.

Estimates of laboratory-analytical costs were developed for the three purpose categories: permit required, compliance and enforcement, and ambient conditions (previously described in the Determination of Water-Quality Data Costs section of this report). Estimates of analytical costs for permit-required samples are included in the discussions of the three purpose categories. The cost figures presented here were compiled by organization expending the funds and do not necessarily reflect the actual source of funding.

The analytical cost for different constituents can vary greatly; for example, a small number of pesticide or radiochemical determinations may cost substantially more than a larger number of inorganic determinations. The estimated analytical costs reflect these cost differentials.

The 1984 total program costs are summarized in table 3. Total program costs were provided by respondents for 73 percent of all programs identified. Estimates of total program costs were made for the remaining programs based on similar programs and percent of total costs represented by known or estimated analytical costs. The total reported and estimated water-quality program costs for Oregon exceeded $2.7 million in 1984. Federal programs accounted for 29 percent.

The U.S. Geological Survey was responsible for 16 percent of the total. However, funds spent by an organization do not necessarily originate with that organization. In the case of the U.S. Geological Survey, an active cooperator program in which funds are received from local, or State organizations and matched with Federal funds accounted for partial funding of the 1984 water-quality programs. Most of the Geological Survey programs, however, were entirely funded with Federal funds either by direct allocation or in cooperation with another Federal agency.

Percentage of estimated analytical costs for various sampling purposes are shown in figure 2. The estimated costs of all constituent determinations, including those for reported permit-required sampling, were approximately $0.7 million.

Analytical expenditures by organizational group are summarized in table 4. Costs were highest for analyses of surface-water samples collected by Federal agencies, while State agencies spent the most on ground-water sample analyses. This is reflected in the fact that these two organizational groups collected the largest number of samples from surface- and ground-water sources.

Table 3.--Summary of total program costs by organizational group, Oregon, 1984

Organizational group	Estimated cost		
	Total	Surface water	Ground water
Federal	$790,000	$789,000	$1,000
State	368,000	259,000	109,000
County	444,000	350,000	94,000
City	1,017,000	937,000	80,000
Other	82,000	82,000	--
Total	2,701,000	2,417,000	284,000

Estimated analytical costs for each constituent group are presented in table 2. Physical/field constituent determinations on surface-water had the highest costs, reflecting the fact that this constituent group has greater than five times more analyses than the next largest constituent group.

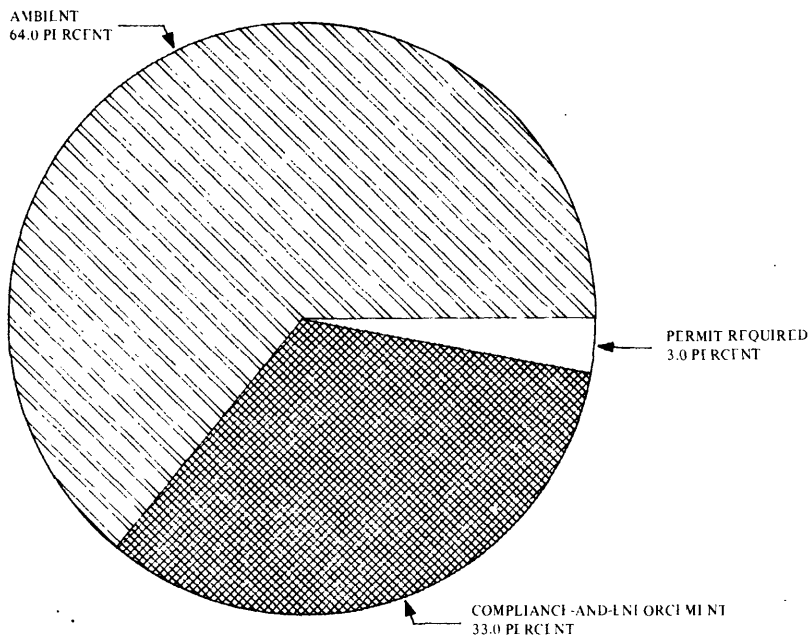


Figure 2.--Percentages of estimated analytical cost by collection purpose, Oregon, 1984.

Table 4.--Summary of estimated laboratory costs by organizational group, Oregon, 1984

Organizational group	Estimated cost		
	Total	Surface water	Ground water
Federal	$233,700	233,190	$510
State	190,710	120,950	69,750
County	90,610	63,700	26,920
City	189,760	164,830	24,930
Other	1,490	1,490	--
Total	706,270	584,160	122,110

The relatively small number of determinations performed to identify priority pollutants, pesticides, organic compounds, or radiochemical constituents is reflected in the low cost estimates for these constituent groups. Determinations of these constituents are expensive, and can result in large expenditures for few analyses. Thus, the low costs reflect a very low number of determinations.

For ground-water samples, determinations of major inorganic constituents incurred the highest costs. These costs are attributed primarily to sampling by the Oregon Department of Environmental Quality to monitor solid waste disposal sites and ambient aquifer conditions. This constituent group accounts for about 12 percent of all ground-water determinations and represents over 18 percent of the analytical cost.

Analytical costs for ambient, compliance-and-enforcement, and permit-required programs for each major constituent group are summarized in table 5. For surface water, the highest costs (21 percent) were incurred for determinations of biologic constituents, primarily for bacteria determinations. The highest analytical costs for ground-water samples were for major inorganics, which accounted for 20 percent of the total for ground water.

Table 5.--Summary of estimated analytical costs by constituent group and, sample collection purpose, Oregon, 1984

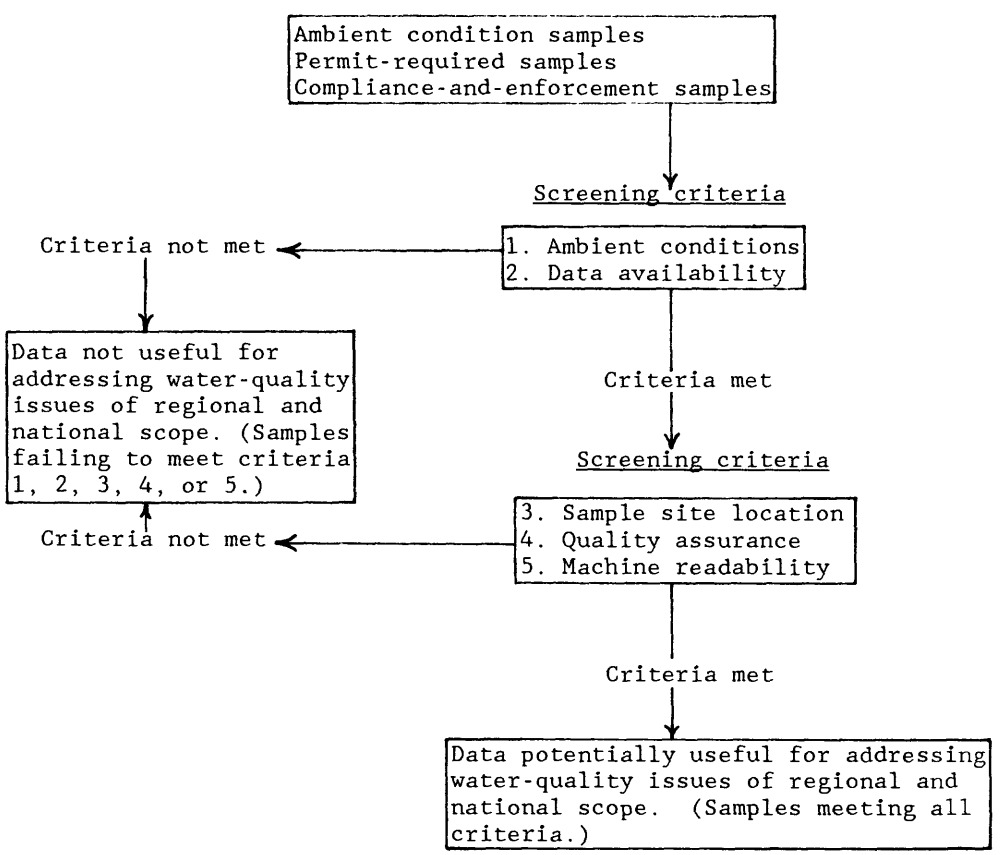
Analytical constituent group	Sample collection purpose: Ambient conditions, Surface water	Ambient conditions, Ground water	Compliance-and-enforcement, Surface water	Compliance-and-enforcement, Ground water	Permit required, Surface water	Permit required, Ground water
Physical/field	$91,400	$10,040	$140	$1,720	$120,080	$40
Major inorganics	29,910	23,070	1,160	100	61,130	770
Trace elements	13,240	12,970	2,640	510	880	780
Major metals	5,270	17,240	480	40	120	--
Nutrients	53,700	15,550	680	50	10,150	370
Organics	31,200	15,100	1,190	--	22,250	360
Priority pollutants	890	4,110	--	--	--	190
Pesticides	670	150	150	150	300	--
Radiochemical	190	--	--	20	--	--
Tissue chemistry	10,120	--	--	--	--	--
Sediment chemistry	170	--	--	--	--	--
Biological	106,710	10,750	240	7,500	18,310	530
Sediment	790	--	--	--	--	--
Total	344,260	108,980	6,680	10,090	233,220	3,040
Grand Total	706,270					

ANALYSIS OF WATER-QUALITY DATA

The primary objective of this study is to identify and characterize existing hydrologic and water-quality data-collection programs conducted by various Federal, State and local organizations and to determine how well the collected data address water-quality issues of a regional or national scope. The screening process discussed here uses five criteria to select data programs that will provide a common basis for further analysis. Failure to meet these criteria does not imply that the data are not useful and do not meet the intended needs or fulfill the mandated requirements of the collecting agency.

In the analysis that follows, the data bases that meet criteria 1 and 2 will be presented separately from those that meet criteria 3, 4, 5. This distinction is made to point out the water-quality program elements that might be modified in the future to increase the usable data base. For instance, those water-quality data-collection programs currently lacking accurate sampling locations, documented quality-assurance procedures, or machine readability could rectify these short comings in the future, thereby increasing the amount of usable data. In the same vein, those programs mandated to sample effluent or otherwise altered waters or those which cannot allow free access to their data cannot change these constraints and, therefore, cannot contribute to the broader data base in the future. The original data base contained all samples, and all constituent groups, from all programs, from all organizational units, to fulfill all purposes. Samples failing either criteria 1 or 2 were excluded first, and of the remaining samples, those failing to meet criteria 3, 4, or 5 were excluded next. Results of the screening process are presented in Appendix IV.

The screening process is summarized here by the following diagram:



The number of surface-water samples meeting the screening criteria and their estimated cost of analysis is summarized in figure 3. Nearly 85,000 samples were identified as available for the screening process. Of the surface-water samples, 35.0 percent met the screening criteria, representing 47.0 percent of the analytical costs. Permit-required and compliance-and-enforcement samples reflecting effluent conditions failed criteria 1 and account for a loss of 31.0 percent of the available surface-water samples. Criteria 1 and 2 did not reduce the number of samples further, while criteria 3, 4, and 5 eliminated an additional 31.0 percent. The analytical dollars associated with permit-required and compliance-and-enforcement surface-water samples not meeting the criteria is 25 percent of the total estimated analytical expenditure.

The screening results and associated analytical costs for the ground-water samples are summarized in figure 4. Approximately 2,500 ground-water samples were available for screening. Of these samples 10 percent met the five criteria, representing 12 percent of the analytical costs. Permit-required and compliance-and-enforcement sampling of ground-water account for 9 percent. No further reduction was realized in the number of samples due to criteria 1 or 2. Criteria 3, 4, and 5 reduced the number of samples by 81 percent, which corresponded to 86 percent of the analytical costs. This large reduction is primarily due to the majority of these samples not meeting either criterion 4 or 5.

The screening results for surface-water samples are summarized by organizational unit in figure 5. Federal organizations had the most samples meet the five screening criteria: 79 percent. City organizations were next with 13 percent meeting the criteria. State organizations had 2 percent of their samples meet the screening criteria. County organizations and those in the "other" group had no samples meet the screening criteria.

For all organizations, criteria 1 and 2 had little influence on the amount of data available after the permit-required and compliance-and-enforcement samples were excluded. Criteria 3, 4, and 5 provided the greatest barrier to the various organizational groups. The "other" group organizations were influenced most, with 100 percent of their sample data not meeting one or more of these criteria. For this organizational group this was primarily due to a lack of documented quality-assurance plans or to sample data not being part of a machine readable data base.

The ground-water screening results are summarized and presented in figure 6. In contrast to the surface-water screening, city agencies (d) had the greatest percentage of their sample data meet the five screening criteria (28 percent). The remaining organizational groups had no ground-water data meet the criteria screening. The reasons why a given organizational group's data did not meet the screening criteria varied from group to group. However, none of the ground-water data was lost to criteria 1 and 2. Samples not meeting criteria 3, 4, and 5, reduced the ground-water data base by nearly 72.0 percent.

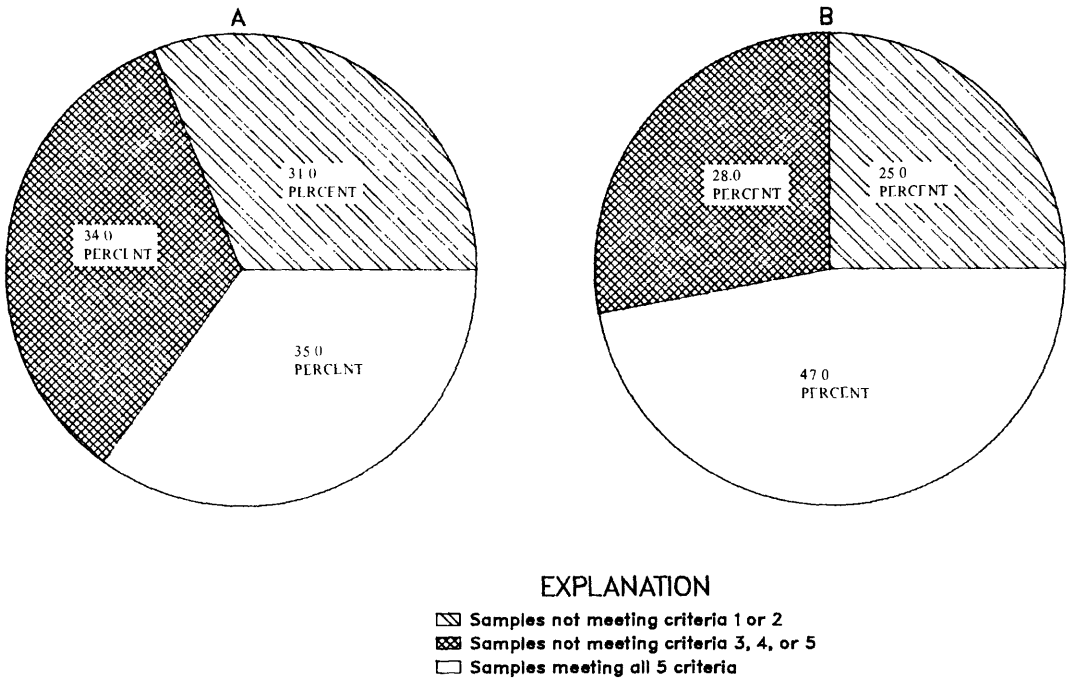


Figure 3.--Summary of screening results for (A) surface-water samples and (B) estimated analytical costs, Oregon, 1984.

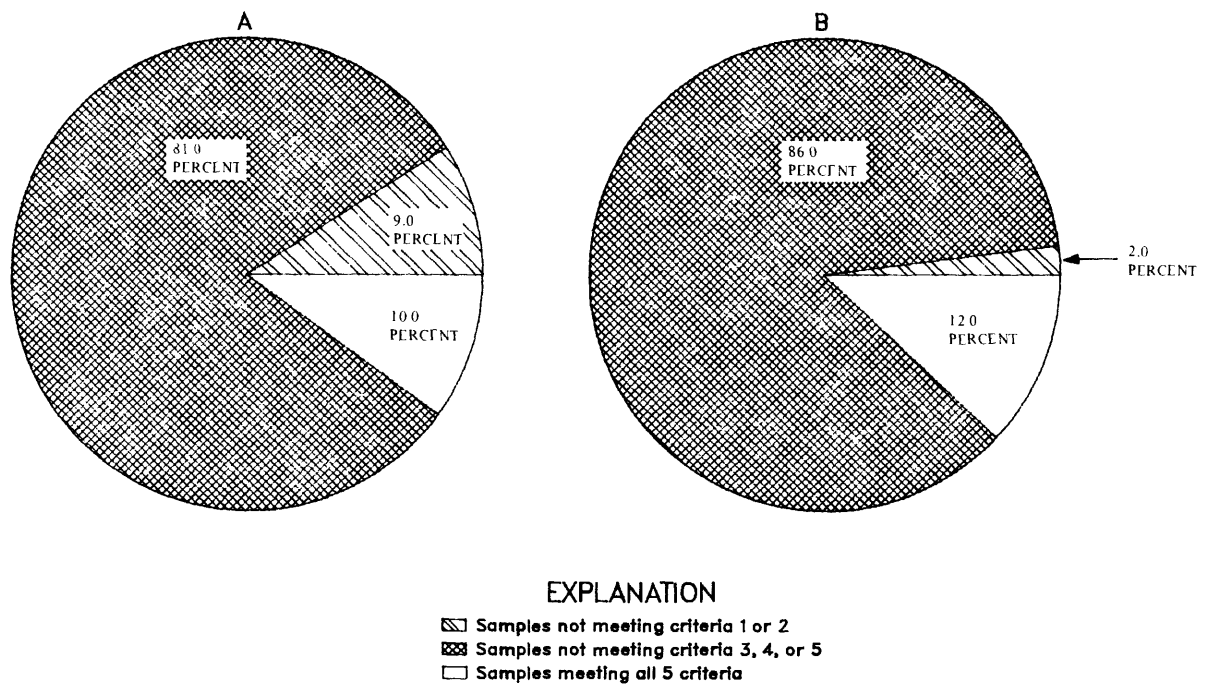


Figure 4.--Summary of screening results for (A) ground-water samples and (B) estimated analytical costs, Oregon, 1984.

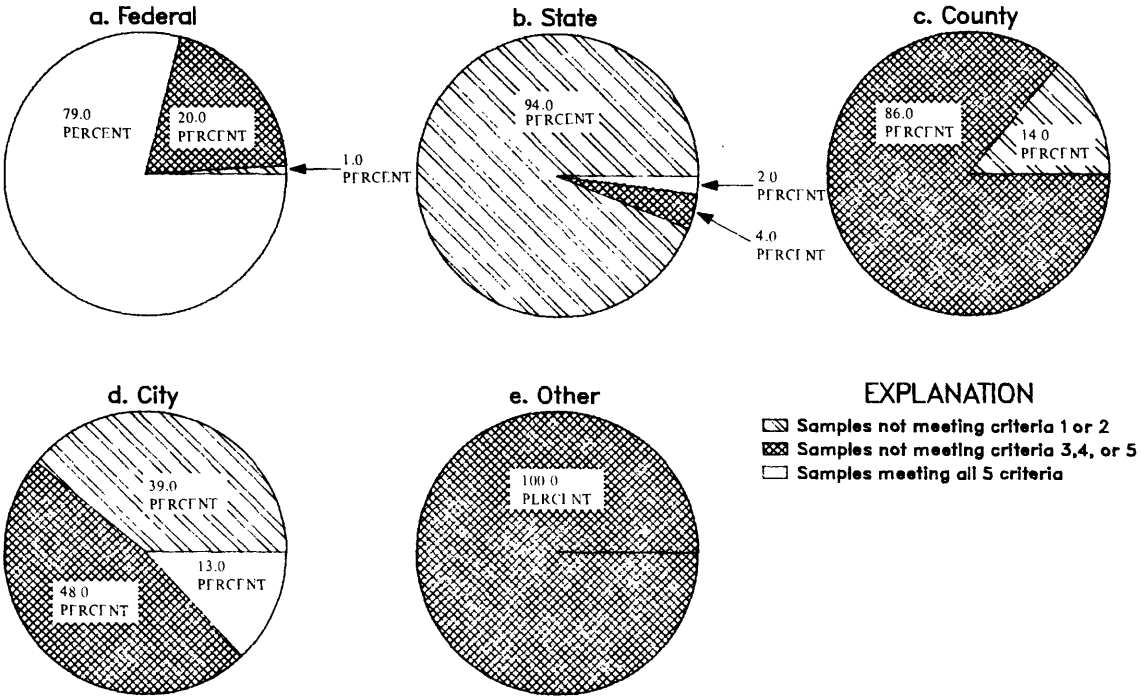


Figure 5.--Summary of screening results for surface-water samples for (a) Federal, (b) State, (c) County, (d) City, and (e) Other agency groups, Oregon, 1984.

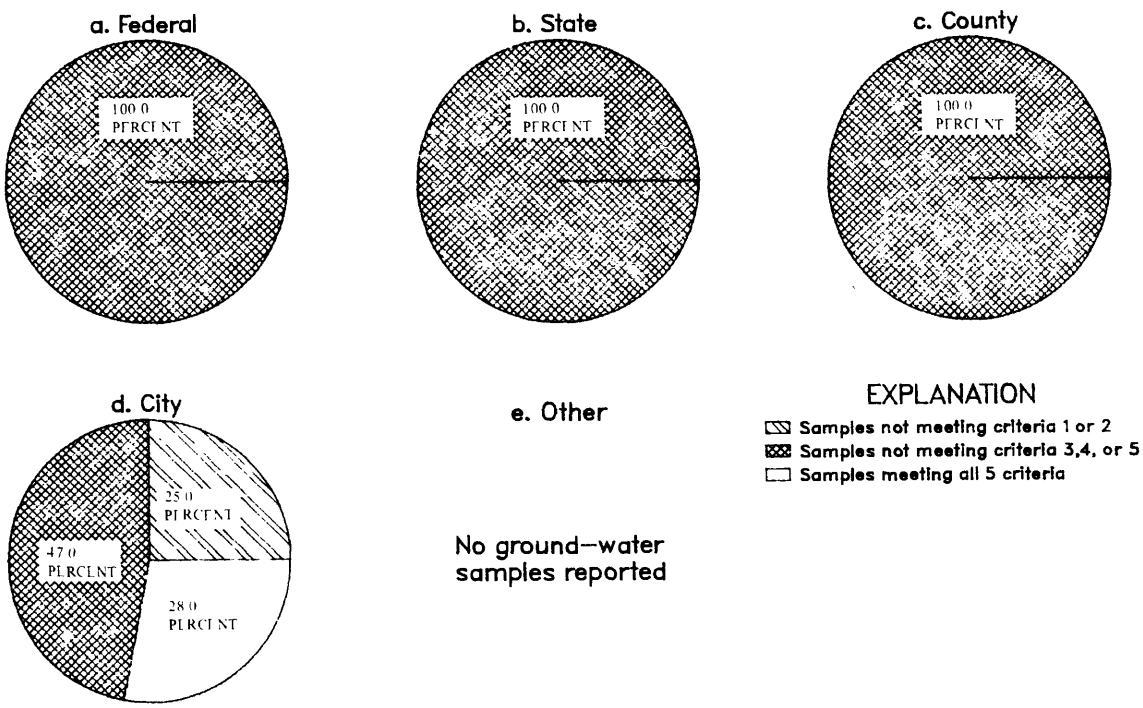


Figure 6.--Summary of screening results for ground-water samples for (a) Federal, (b) State, (c) County, (d) City, and (e) Other agency groups, Oregon, 1984.

AREAL DISTRIBUTION OF DATA-COLLECTION SITES

The water-quality data attributes for each water-quality data collection program were entered into INFO[1] data files, facilitating data management and allowing the eventual (Phase II and III) use of the ARC/INFO GIS (Geographic Information System) software in presentation and further evaluation of the data. For the purposes of this (Phase I) report, two map plots (figs. 7 and 8), generated by the ARC/INFO GIS software, present the areal distribution of surface- and ground-water-quality data collection sites. Figure 7 is a presentation of site locations in Oregon where water-quality samples were collected from streams, lakes, bays, estuaries, or other surface water. Figure 8 is a similar presentation of ground-water site locations where water-quality data was collected from wells or springs in 1984.

SUMMARY AND CONCLUSIONS

In recent years repeated requests for appropriated funds to collect water-quality data throughout the Nation have prompted Congress to ask serious questions as to the adequacy of these data in terms of dealing with issues of national or regional scope. Because of this concern, the U.S. Geological Survey proposed studies to characterize 1984 water-quality data-collection programs and to evaluate their usefulness in addressing national water-quality issues. Studies were began in Colorado and Ohio, and more recently, the Office of Water-Data Coordination provided funding for the Pacific Northwest District, Oregon Office of the U.S. Geological Survey, to do a similar study for the State of Oregon. This report presents the results of Phase I of the Oregon study--inventory of 1984 water-quality data-collection programs, estimated program and analytical costs, and identification of those programs that meet a broad set of screening criteria.

Information on 1984 water-quality data-collection programs in Oregon was obtained by means of an information sheet provided to all Federal, State, county, and city agencies and universities identified as being involved in water-quality data collection. Twenty-seven agencies and organizations with 62 current water-quality data-collection programs were identified in Oregon. The U.S. Geological Survey had the greatest number of data-collection programs for Federal agencies, with 13 programs identified. The Oregon Department of Environmental Quality had the largest number of programs of the State agencies, with five current programs.

All programs were divided into three categories relative to their main objectives: (1) Permit-required sampling, (2) compliance-and-enforcement sampling, and (3) sampling to describe ambient water-quality conditions. In Oregon, the number of samples reported because of permit requirements accounts for 30 percent of the total samples reported. Compliance-and-enforcement samples account for 1.0 percent of the samples, and samples reported to characterize ambient conditions represent 69 percent of the total water-quality samples reported.

---

[1] Use of trade names in this report is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey.

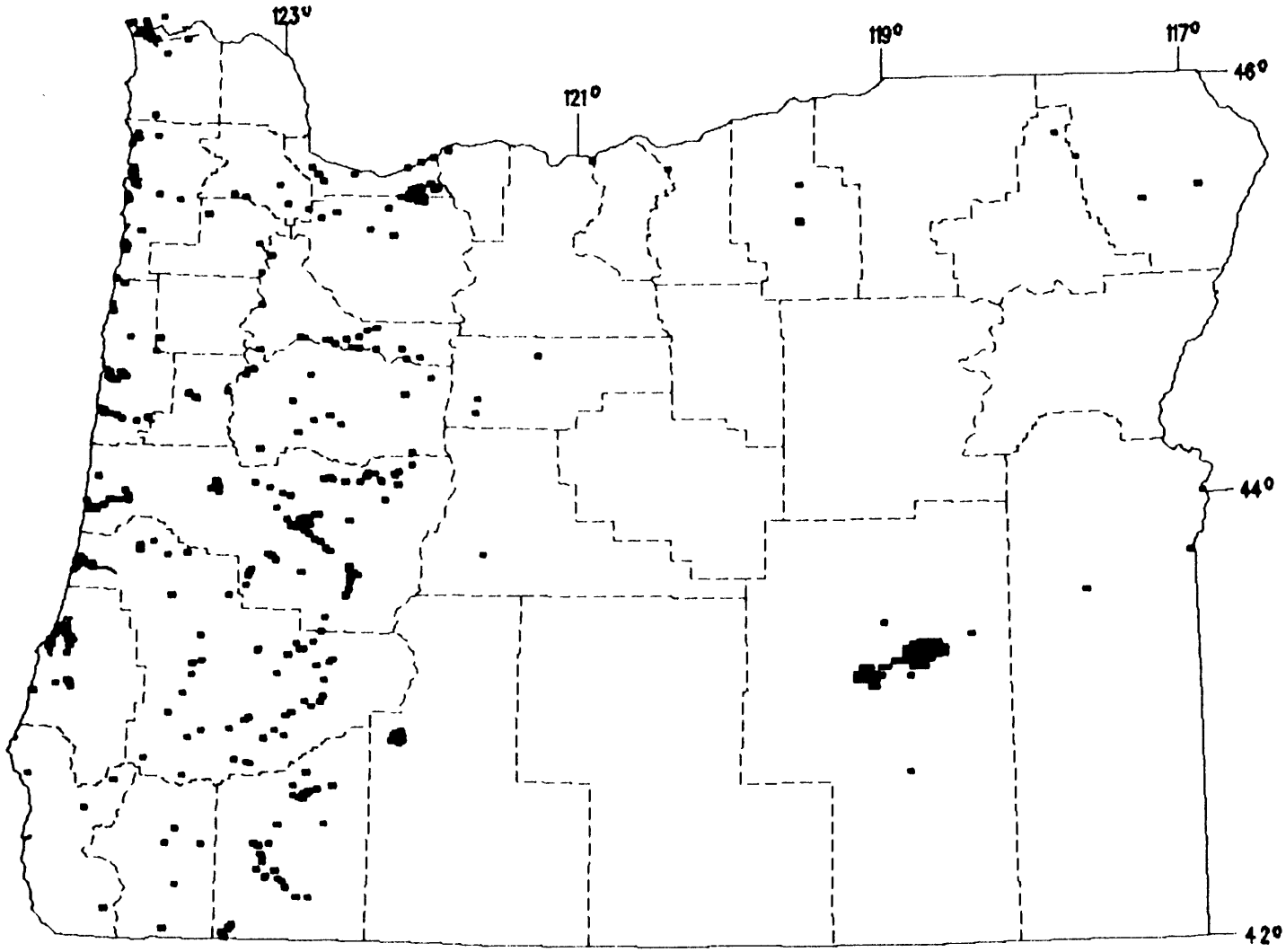


Figure 7.--Surface-water quality data-collection sites in Oregon, 1984.
Plot generated using ARC/INFO GIS.

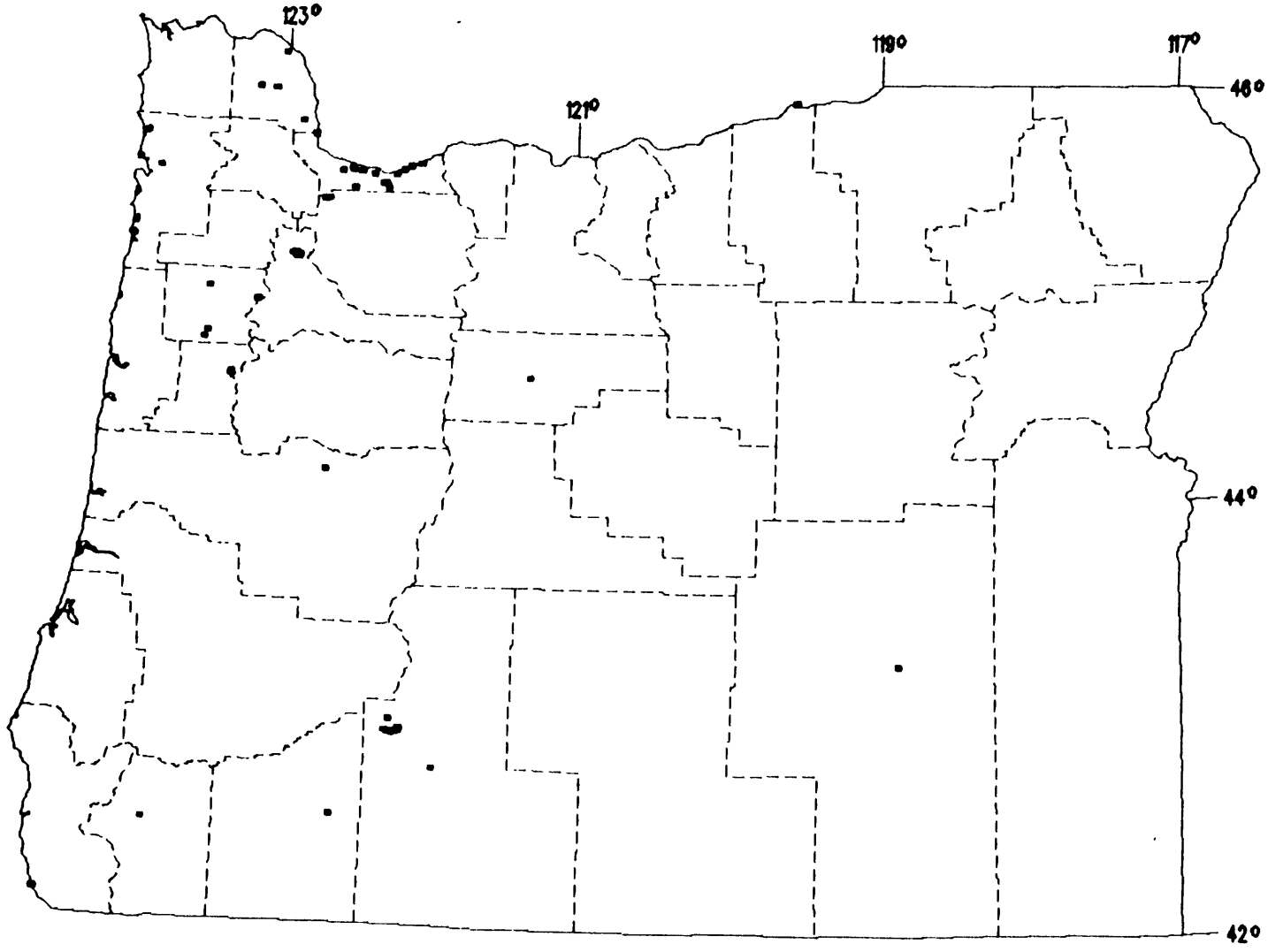


Figure 8.--Ground-water quality data-collection sites in Oregon, 1984.
Plot generated using ARC/INFO GIS.

Surface-water samples represent the majority of all samples reported to characterize ambient conditions. Constituent analyses for these samples account for 89 percent of all constituent analyses for ambient samples. The largest number of constituent analyses for surface-water samples was for the physical/field constituent group. Federal agencies collected the largest number of surface-water samples, about three times greater than any agency group.

Three percent of ground-water samples were collected to characterize ambient conditions. State agencies reported the largest number of the ambient ground-water samples in Oregon.

Each respondent to the information sheet was asked to estimate total program costs. Seventy-three percent of the identified programs included total cost figures, and estimates were made of the remaining programs for a total 1984 water-quality data-collection program expenditure of approximately $2.7 million. Because this total cost information was incomplete or estimates for missing figures were arbitrarily obtained, a more consistant cost evaluation is provided. The use of estimates of constituent-analytical costs based on known laboratory analytical charges results in an estimated analytical expenditure of approximately $0.7 million for all reported samples in Oregon during 1984. Characterization of ambient conditions represented 64 percent of the estimated analytical costs and 69 percent of the samples. Permit-required sampling represented 3 percent of the estimated analytical costs and 30 percent of the samples collected. Compliance-and-enforcement sampling represented 33 percent of the estimated analytical costs and 1 percent of the samples collected in Oregon.

Estimated analytical costs indicate that the greatest expenditures for surface-water analyses were by Federal agencies; these analyses included permit and compliance-and-enforcement sampling. The largest expenditures for analyses of ground-water samples were incurred by State agencies; these analyses did not include any permit or compliance-and-enforcement sampling.

Water-quality data-collection programs identified from the information sheets were tested (after first excluding all permit samples and those compliance-and-enforcement samples that reflect effluent conditions) against a set of five screening criteria to determine their potential usefulness in analysis of national water-quality issues.

Approximately 35 percent of the surface-water samples, representing 47 percent of the analytical costs, met the five criteria. Federal agencies had the greatest number of samples that met the five criteria (79 percent). City organizations were next, with 13 percent, and State agencies had only 2 percent of the samples that met the criteria. Neither the county agencies nor those organizations contained in the "others" group had samples that met all of the screening criteria.

Ten percent of the ground-water samples, representing 12 percent of the analytical costs, met the five criteria. City organizations had the greatest number of samples that met the five criteria (28 percent). Federal, State, and county agencies had no ground-water samples that met the five criteria. Ground-water samples were not reported by organizations in the "others" category.

Federal, State, county, and city agencies and organizations spent approximately $0.7 million on constituent analyses of water-quality samples in Oregon during 1984; less than $0.2 million was spent on data that met the screening criteria and thus classified as potentially useful for addressing water-quality issues of regional and national scope. The amount of usable water-quality data can be increased by modifying some existing program data, such as by entering these data into a computer data base and by obtaining accurate data-collection site locations. Federal and State agencies in Oregon typically use computer systems to store their program data because of the large amounts of data they handle, but county, city, and other agencies and organizations do not always follow this procedure.

The ARC/INFO GIS plots illustrate the areal distribution of water-quality data-collection sites in Oregon during 1984. Referring to these plots, it is obvious that most data were taken from surface- and ground-water sites in western Oregon.

SELECTED REFERENCES

Blackwell, C. D., 1982, National Water Data Exchange (NAWDEX), Explanation of codes used in the Master Water Data Index: U.S. Geological Survey National Water Data Exchange Pamphlet, 19 p.

Blodgett, J. E., 1983, Summary of hearing of "National Environmental Monitoring": Washington, D.C., Congressional Research Service, 20 p.

Edwards, M. D., 1980, NAWDEX--A key to finding water data: U.S. Geological Survey National Water Data Exchange Pamphlet, 15 p.

Feltz, H. R., Anthony, E. R., and Sadler, Pamela, eds., 1983, Water-Quality laboratory services catalog: U.S. Geological Survey Open-File Report 83-758, 130 p.

Hren, J., Chaney, T. H., Norris, M. J., and Childress (Oblinger), C. J., 1985, Water-quality data-collection activities in Colorado and Ohio: Phase I--Inventory and evaluation of 1984 programs and costs: U.S. Geological Survey Open-File Report 85-574, 89 p.

Lyon, W. A., 1983, in Blodgett, John E., August 16, 1983, Summary of hearings of "National Environmental Monitoring": Washington, D.C., Congressional Research Service, 20 p.

State of Oregon, 1983-84, Oregon blue book: Secretary of State, Salem, Oregon, 436 p.

United States Congress, 1974, Safe drinking water act, Public Law 93-523, 88 S. 1660.

_____1976, Resource conservation and recovery act, Public Law 94-580, 90 S. 2795.

_____1976, Toxic substances control act, Public Law 94-469, 90 S. 2003.

_____1977, Clean water act, Public Law 95-217, 91 S. 1566.

_____1980, Comprehensive environmental response, compensation, and liability act, Public Law 96-510, 94 S. 2767.

APPENDIX I

INFORMATION SHEET

OREGON WATER-QUALITY DATA COLLECTION ACTIVITIES INFORMATION, 1984/1985

Please complete a separate information sheet for each program in operation or initiated during or after 1984.

INSTRUCTIONS: Please check the appropriate space or enter the information requested in the space provided. (If more space is needed for a given item use the back of the computer printout and refer to the item by number, eg., program objectives for the other category would be refered to as 7.6.4 with the necessary additional information following.)

I. Agency and Program Information

1. Agency Name:_____

   1.1 Agency type: .1 Federal ___ .2 State ___ .3 County___ .4 City_____
   .5 Academic___ .6 Private___ .7 Other_____

2. Division:_____
3. Business Address:_____
   _____
   _____
4. Business Phone:_____
5. Name and Title:_____
6. Area of responsibility: .1 Statewide___ .2 County___
   .3 Regional (multi-state)___
   .4 Regional (within state)___
   .5 City___ .6 Site___
7. Program:
   7.1 Program name:_____
   7.2 Type: .1 Surface water only___ .2 Ground water only___
   .3 Surface water and ground water___
   7.3 Number of sites: .1 Stream___ .2 Lakes___ .3 Effluents___ .4 Wells___
   .5 Springs___ .6 Precipitation___
   7.4 Length of Program (years):_____
   7.5 Justification:
   .1 Were sites located to study ambient water-quality conditions? (ie., were not located specifically at sites of known or suspected pollution)
   YES___ NO___
   .2 Were sites located for compliance monitoring (to assure a permitted effluent is in compliance with permit specifications), or to monitor a point source for another purpose?
   YES___ NO___

OREGON WATER-QUALITY DATA COLLECTION ACTIVITIES INFORMATION, 1984/1985

7.6 Program Objectives: .1 Determination of ambient water-quality conditions___
.2 Required by terms of permit___
.3 Determine compliance with criteria and standards___
.4 Other_____

7.7 Flow data: .1 Surface water flow data is available at or near enough to the collection site that constituent loads can be calculated. YES___ NO___
.2 Ground water pumping rate or water level is available for the sample site at the time of collection. YES___ NO___

7.8 Site locations are available as: .1 Lat/Long___ .2 Map___
.3 River Mile___ .4 Township/Range___
.5 Other___

7.9 Data availability: .1 Restricted___ .2 Available to other agencies___

7.10 Funding source for program:_____

_____

7.11 Approximate annual program funding (thousands):_____

7.12 Scope of program: .1 Statewide___ .2 Countywide___
.3 Regional (within state)___ .4 Drainage basin ___
.5 Site specific___ .6 Citywide___ .7 Other_____

8. Program Description (objectives):_____

_____

_____

_____

_____

_____

_____

_____

9. Identification of sampling sites:

Station Name and Identification Number	Station Location (lat/long, etc.)	Year Sampling Initiated

If the station locations cannot be provided by latitude/longitude or land line description, are they located on a map we could borrow or would you be willing to plot the locations on a map provided by the U.S. Geological Survey? CAN PROVIDE MAPS____ WILL PLOT ON USGS MAPS____

_____

INSTRUCTIONS: Please provide the necessary numbers or check the appropriate circle for each of the following categories.
(SW =Surface water; GW = Ground water; Y = Yes; and N = No)

II. Physical/Field Measurements

Parameter	AMBIENT										EFFLUENT									
	Number of Sites				Yearly Number of Samples				Data in Computer				Number of Sites				Yearly Number of Samples				Data in Computer			
	1984		1985		1984		1985		SW		GW		1984		1985		1984		1985		SW		GW	
	SW	GW	SW	GW	SW	GW	SW	GW	Y	N	Y	N	SW	GW	SW	GW	SW	GW	SW	GW	Y	N	Y	N
pH									0	0	0	0									0	0	0	0
Specific Conductance									0	0	0	0									0	0	0	0
Temperature									0	0	0	0									0	0	0	0
Dissolved Oxygen									0	0	0	0									0	0	0	0
Turbidity									0	0	0	0									0	0	0	0
Alkalinity									0	0	0	0									0	0	0	0
Acidity									0	0	0	0									0	0	0	0
Color									0	0	0	0									0	0	0	0
Other									0	0	0	0									0	0	0	0

(Description of other _____)

III. Chemical Measurements

Parameter	AMBIENT: Number of Sites 1984 SW	1984 GW	1985 SW	1985 GW	AMBIENT: Yearly Number of Samples 1984 SW	1984 GW	1985 SW	1985 GW	AMBIENT: Data in Computer SW Y	SW N	GW Y	GW N	EFFLUENT: Number of Sites 1984 SW	1984 GW	1985 SW	1985 GW	EFFLUENT: Yearly Number of Samples 1984 SW	1984 GW	1985 SW	1985 GW	EFFLUENT: Data in Computer SW Y	SW N	GW Y	GW N
MAJOR INORGANICS:																								
Calcium									0	0	0	0									0	0	0	0
Magnesium									0	0	0	0									0	0	0	0
Potassium									0	0	0	0									0	0	0	0
Sodium									0	0	0	0									0	0	0	0
Chloride									0	0	0	0									0	0	0	0
Flouride									0	0	0	0									0	0	0	0
Sulfate									0	0	0	0									0	0	0	0
pH									0	0	0	0									0	0	0	0
Alkalinity									0	0	0	0									0	0	0	0
Total Solids									0	0	0	0									0	0	0	0
Dissolved Solids									0	0	0	0									0	0	0	0
Suspended Solids									0	0	0	0									0	0	0	0
Other									0	0	0	0									0	0	0	0

(Description of other_____)

III. Chemical Measurements

Parameter	AMBIENT: Number of Sites 1984 SW	1984 GW	1985 SW	1985 GW	AMBIENT: Yearly Number of Samples 1984 SW	1984 GW	1985 SW	1985 GW	AMBIENT: Data in Computer SW Y	SW N	GW Y	GW N	EFFLUENT: Number of Sites 1984 SW	1984 GW	1985 SW	1985 GW	EFFLUENT: Yearly Number of Samples 1984 SW	1984 GW	1985 SW	1985 GW	EFFLUENT: Data in Computer SW Y	SW N	GW Y	GW N
MAJOR METALS:																								
Aluminum									0	0	0	0									0	0	0	0
Iron									0	0	0	0									0	0	0	0
Manganese									0	0	0	0									0	0	0	0
TRACE ELEMENTS:																								
Arsenic									0	0	0	0									0	0	0	0
Barium									0	0	0	0									0	0	0	0
Beryllium									0	0	0	0									0	0	0	0
Boron									0	0	0	0									0	0	0	0
Cadmium									0	0	0	0									0	0	0	0
Chromium									0	0	0	0									0	0	0	0
Cobalt									0	0	0	0									0	0	0	0
Copper									0	0	0	0									0	0	0	0
Lead									0	0	0	0									0	0	0	0

III. Chemical measurements

Parameter	AMBIENT: Number of Sites 1984 SW	1984 GW	1985 SW	1985 GW	AMBIENT: Yearly Number of Samples 1984 SW	1984 GW	1985 SW	1985 GW	AMBIENT: Data in Computer SW Y	SW N	GW Y	GW N	EFFLUENT: Number of Sites 1984 SW	1984 GW	1985 SW	1985 GW	EFFLUENT: Yearly Number of Samples 1984 SW	1984 GW	1985 SW	1985 GW	EFFLUENT: Data in Computer SW Y	SW N	GW Y	GW N
TRACE ELEMENTS																								
Mercury									0	0	0	0									0	0	0	0
Selenium									0	0	0	0									0	0	0	0
Strontium									0	0	0	0									0	0	0	0
Zinc									0	0	0	0									0	0	0	0
Other									0	0	0	0									0	0	0	0

(Description of other_____)

III. Chemical measurements

Parameter	AMBIENT: Number of Sites 1984 SW	1984 GW	1985 SW	1985 GW	AMBIENT: Yearly Number of Samples 1984 SW	1984 GW	1985 SW	1985 GW	AMBIENT: Data in Computer SW Y	SW N	GW Y	GW N	EFFLUENT: Number of Sites 1984 SW	1984 GW	1985 SW	1985 GW	EFFLUENT: Yearly Number of Samples 1984 SW	1984 GW	1985 SW	1985 GW	EFFLUENT: Data in Computer SW Y	SW N	GW Y	GW N
NUTRIENTS:																								
Total Nitrogen									0	0	0	0									0	0	0	0
Nitrite									0	0	0	0									0	0	0	0
Nitrate									0	0	0	0									0	0	0	0
Ammonia									0	0	0	0									0	0	0	0
Kjeldahl									0	0	0	0									0	0	0	0
Total Phosphorus									0	0	0	0									0	0	0	0
Ortho-phosphate									0	0	0	0									0	0	0	0
ORGANICS:																								
TOC									0	0	0	0									0	0	0	0
Total Inorganic Carbon									0	0	0	0									0	0	0	0
Volatile Solids									0	0	0	0									0	0	0	0
BOD 5									0	0	0	0									0	0	0	0

III. Chemical measurements

Parameter	AMBIENT: Number of Sites 1984 SW	AMBIENT: Number of Sites 1984 GW	AMBIENT: Number of Sites 1985 SW	AMBIENT: Number of Sites 1985 GW	AMBIENT: Yearly Number of Samples 1984 SW	AMBIENT: Yearly Number of Samples 1984 GW	AMBIENT: Yearly Number of Samples 1985 SW	AMBIENT: Yearly Number of Samples 1985 GW	AMBIENT: Data in Computer SW Y	AMBIENT: Data in Computer SW N	AMBIENT: Data in Computer GW Y	AMBIENT: Data in Computer GW N	EFFLUENT: Number of Sites 1984 SW	EFFLUENT: Number of Sites 1984 GW	EFFLUENT: Number of Sites 1985 SW	EFFLUENT: Number of Sites 1985 GW	EFFLUENT: Yearly Number of Samples 1984 SW	EFFLUENT: Yearly Number of Samples 1984 GW	EFFLUENT: Yearly Number of Samples 1985 SW	EFFLUENT: Yearly Number of Samples 1985 GW	EFFLUENT: Data in Computer SW Y	EFFLUENT: Data in Computer SW N	EFFLUENT: Data in Computer GW Y	EFFLUENT: Data in Computer GW N
ORGANICS:																								
COD					0	0	0	0									0	0	0	0				
Detergent					0	0	0	0									0	0	0	0				
Oil & Grease					0	0	0	0									0	0	0	0				
Phenols					0	0	0	0									0	0	0	0				
Other					0	0	0	0									0	0	0	0				

(Description of other_____)

III. Chemical measurements

Parameter	AMBIENT										EFFLUENT									
	Number of Sites				Yearly Number of Samples				Data in Computer				Number of Sites				Yearly Number of Samples				Data in Computer			
	1984		1985		1984		1985		SW		GW		1984		1985		1984		1985		SW		GW	
	SW	GW	SW	GW	SW	GW	SW	GW	Y	N	Y	N	SW	GW	SW	GW	SW	GW	SW	GW	Y	N	Y	N
PRIORITY POLLUTANTS:																								
Acid Extractable									0	0	0	0									0	0	0	0
Base/ Neutral Extractable									0	0	0	0									0	0	0	0
Volatiles									0	0	0	0									0	0	0	0
Pesticides																								
RADIOCHEMICAL:																								
Gross Alpha									0	0	0	0									0	0	0	0
Gross Beta									0	0	0	0									0	0	0	0
CHEMICAL ANALYSIS OF TISSUE									0	0	0	0									0	0	0	0

III. Chemical measurements

Parameter	AMBIENT												EFFLUENT											
	Number of Sites				Yearly Number of Samples				Data in Computer				Number of Sites				Yearly Number of Samples				Data in Computer			
	1984		1985		1984		1985		SW		GW		1984		1985		1984		1985		SW		GW	
	SW	GW	SW	GW	SW	GW	SW	GW	Y	N	Y	N	SW	GW	SW	GW	SW	GW	SW	GW	Y	N	Y	N
CHEMICAL/ RADIOCHEMICAL ANALYSIS OF SEDIMENTS:																								
Suspended									0	0	0	0									0	0	0	0
Bedload									0	0	0	0									0	0	0	0
Bottom Material									0	0	0	0									0	0	0	0

Do you have an ongoing, well documented chemical laboratory 'quality assurance' program? YES___ NO___

IV. Biological Measurements

Parameter	AMBIENT: Number of Sites 1984 SW	1984 GW	1985 SW	1985 GW	AMBIENT: Yearly Number of Samples 1984 SW	1984 GW	1985 SW	1985 GW	AMBIENT: Data in Computer SW Y	SW N	GW Y	GW N	EFFLUENT: Number of Sites 1984 SW	1984 GW	1985 SW	1985 GW	EFFLUENT: Yearly Number of Samples 1984 SW	1984 GW	1985 SW	1985 GW	EFFLUENT: Data in Computer SW Y	SW N	GW Y	GW N
BACTERIA:																								
Indicator Bacteria																								
Total Coliform									0	0	0	0									0	0	0	0
Fecal Coliform									0	0	0	0									0	0	0	0
Fecal Streptococcal									0	0	0	0									0	0	0	0
Pathogenic Bacteria																								
Salmonella									0	0	0	0									0	0	0	0
Srigella									0	0	0	0									0	0	0	0
Viruses									0	0	0	0									0	0	0	0
Other (Description of other_____)																								

IV. Biological Measurements

Parameter	AMBIENT: Number of Sites 1984	AMBIENT: Number of Sites 1985	AMBIENT: Yearly Number of Samples 1984	AMBIENT: Yearly Number of Samples 1985	AMBIENT: Data in Computer Y	AMBIENT: Data in Computer N	EFFLUENT: Number of Sites 1984	EFFLUENT: Number of Sites 1985	EFFLUENT: Yearly Number of Samples 1984	EFFLUENT: Yearly Number of Samples 1985	EFFLUENT: Data in Computer Y	EFFLUENT: Data in Computer N
SURFACE WATER BIOTA--												
Phytoplankton					0	0					0	0
Periphyton					0	0					0	0
Zooplankton					0	0					0	0
Benthic Invertebrates					0	0					0	0
Macrophytes					0	0					0	0
Aquatic Vertebrates					0	0					0	0
Bioassay					0	0					0	0
Other					0	0					0	0

(Description of other_____)

Do you have an ongoing, well documented biologic laboratory 'quality assurance' program? YES___ NO___

V. Sediment Measurements

Parameter	AMBIENT: Number of Sites 1984	AMBIENT: Number of Sites 1985	AMBIENT: Yearly Number of Samples 1984	AMBIENT: Yearly Number of Samples 1985	AMBIENT: Data in Computer Y	AMBIENT: Data in Computer N	EFFLUENT: Number of Sites 1984	EFFLUENT: Number of Sites 1985	EFFLUENT: Yearly Number of Samples 1984	EFFLUENT: Yearly Number of Samples 1985	EFFLUENT: Data in Computer Y	EFFLUENT: Data in Computer N
Suspended Sediment	.	.	.	.	0	0	.	.	.	s	0	0
Bedload Sediment	.	.	.	.	0	0	.	.	.	.	0	0
Bottom Material	.	.	.	.	0	0	.	.	.	.	0	0

Do you have an ongoing, well documented sediment laboratory 'quality assurance' program? YES___ NO___

Please indicate any data or collection activities that were specific to your program or a few sites, that we have not asked about.

If you have any questions (eg., clarification of some element on the form) or need more forms please call Tom Edwards or Julie Laenen at 231-2017 (FTS 429-2017).

Thank you for completing the form. Please, indicate below if you would like to receive a copy of the report listing the water-quality programs in Oregon. YES___ NO___

APPENDIX II

U.S. Geological Survey laboratory codes, detection limits, and costs for analyses used to determine estimated laboratory analysis costs. (All costs reported in dollars; --, not applicable; *, varies with organic species, range 5.0-30.0; **, varies with organic species, range 0.01-1.0.)

LABORATORY CODE	CONSTITUENTS	DETECTION LIMIT	COSTS 1984
	PHYSICAL/FIELD MEASUREMENTS		
LC0068	pH, field (standard units) total	1	1.35
--	Temperature	--	1.35
--	Dissolved oxygen (1)	--	1.35
LC0050	Turbidity (nephelometric-turbidity units) total	0.05	4.70
LC0070	Alkalinity (mg/L as CaCO3) dissolved	1	4.80
LC0069	Specific conductance,field (umh/cm at 25 degree C) total	1	1.35
LC0001	Acidity (mg/L as H)	0.1	8.90
	Total		23.80
	MAJOR INORGANICS		
LC0012	Calcium (mg/L as Ca) dissolved	0.1	5.55
LC0040	Magnesium (mg/L as Mg) dissolved	0.1	5.55
LC0059	Sodium (mg/L as Na) dissolved	0.1	4.00
LC0054	Potassium (mg/L as K) dissolved	0.1	4.60
LC1213	Chloride (mg/L as Cl) dissolved	0.1	4.00
LC0031	Flouride (mg/L as F) dissolved	0.1	7.10
LC1200	Sulfate (mg/L as SO4) dissolved	0.2	6.85
LC0056	Silica (mg/L as SiO2) dissolved	0.1	4.60
LC0070	Alkalinity (mg/L as CaCO3) dissolved	1	4.80
LC0068	pH, laboratory (standard units) total	1	1.35
LC0069	Specific conductance, laboratory (umh/cm at 25 degree C) total	1	1.35
LC0165	Solids, residue at 105-110 C (mg/L) total	1	12.10
LC0159	Solids, residue at 105-110 C (mg/L) dissolved	1	12.10
LC0169	Solids, residue at 105-110 C (mg/L) suspended	1	12.10
	Total		86.05

U.S. Geological Survey laboratory codes, detection limits, and costs for analyses used to determine estimated laboratory analysis costs.

LABORATORY CODE	CONSTITUENTS	DETECTION LIMIT	COSTS 1984
	RADIOLOGICAL		
LC0446	Gross alpha radioactivity (ug/g as U natural) suspended	0.4	26.75
LC0447	Gross beta radioactivity (pCi/g as Sr-90/Y-90) suspended	0.4	0.00
LC0453	Uranium (ug/L as U) dissolved	0.4	29.95
	Total		56.70
	TRACE ELEMENTS		
LC0112	Arsenic (ug/L as As) dissolved	1	20.60
LC0007	Barium (ug/L as Ba) dissolved	100	12.10
LC0170	Beryllium (ug/L as Be) dissolved	10	12.10
LC1183	Boron (ug/L as B) dissolved	10	10.50
LC0073	Cadmium (ug/L as Cd) dissolved	1	7.45
LC0017	Chromium (ug/L as Cr) dissolved	10	12.10
LC0018	Cobalt (ug/L as Co) dissolved	1	7.45
LC0022	Copper (ug/L as Cu) dissolved	1	7.45
LC0038	Lead (ug/L as Pb) dissolved	1	7.45
LC0039	Lithium (ug/L as Li) dissolved	10	4.60
LC0226	Mercury (ug/L as Hg) dissolved	0.1	20.60
LC0110	Molybdenum (ug/L as Mo) dissolved	1	18.80
LC0044	Nickel (ug/L as Ni) dissolved	1	7.45
LC0087	Selenium (ug/L as Se) dissolved	1	20.60
LC0166	Silver (ug/L as Ag) dissolved	1	7.45
LC1210	Vanadium (ug/L as U) dissolved	0.1	24.25
LC0067	Zinc (ug/L as Zn) dissolved	10	6.35
	Total		206.95
	MAJOR METALS		
LC0004	Aluminum (ug/L as Al) dissolved	10	19.70
LC0172	Iron (ug/L as Fe) dissolved	10	4.60
LC0042	Manganese (ug/L as Mn) dissolved	10	4.60
	Total		28.90

APPENDIX II--Continued

U.S. Geological Survey laboratory codes, detection limits, and costs for analyses used to determine estimated laboratory analysis costs.

LABORATORY CODE	CONSTITUENTS		DETECTION LIMIT	COSTS 1984
	NUTRIENTS			
LC0301	Nitrogen, ammonia (mg/L as N) dissolved		0.01	4.60
LC0160	Nitrogen, nitrite (mg/L as N) dissolved		0.01	4.60
LC0225	Nitrogen, nitrate (mg/L as N) dissolved		0.05	9.20
LC1208	Nitrogen, nitrite plus nitrate (mg/L as N) dissolved		0.01	4.60
LC0128	Phosporus (mg/L as P) dissolved		0.01	12.95
LC0162	Phosporus, orthophosphate (mg/L as P) dissolved		0.01	4.60
LC0268	Nitrogen, ammonia plus organic (mg/L as N) dissolved		0.1	12.10
		Total		52.65
	ORGANICS, GROSS MEASUREMENTS			
LC0306	Carbon, inorganic (mg/L as C) dissolved		0.1	17.65
LC0114	Carbon, organic (mg/L as C) total		0.1	17.65
LC0127	Oil and grease (mg/L) total recoverable		1	28.25
--	Biochemical oxygen demand (2)		--	10.00
		Total		73.55
	PRIORITY POLLUTANTS			
SH1393	Acid-extractable compounds (ug/L) total recoverable		**	189.40
SH1394	Base-extractable compounds (ug/L) total recoverable		**	221.50
		Total		410.90
	PESTICIDES			
SH1304	Chlorophenoxy acid herbicides (ug/L) total recoverable		0.01	188.30
SH1324	Organochlorine insecticides with gross PCB and PCN		**	114.40
		Total		301.70

APPENDIX II--Continued

U.S. Geological Survey laboratory codes, detection limits, and costs for analyses used to determine estimated laboratory analysis costs.

LABORATORY CODE	CONSTITUENT	DETECTION LIMIT	COSTS 1984
	SEDIMENTS		
--	Suspended individual sample concentration (2)	--	7.00
--	Suspended size analysis (2)	--	75.00
--	Bed load individual sample bag (2)	--	15.00
--	Bed load composite sample (2)	--	30.00
--	Bed material individual sample carton (2)	--	12.00
--	Bed material composite sample (2)	--	25.00
	Total		164.00
	SEDIMENT CHEMISTRY		
--	Bottom material (3)	--	1000.00
	Total		1000.00
	BIOLOGY		
--	Coliforms, fecal (4)	--	7.50
--	Coliforms, streptocial (4)	--	7.50
--	Coliforms, total (4)	--	7.50
	Total		22.50
	SURFACE WATER BIOTA		
SH0666	Phytoplankton (biomass)	--	20.85
SH0671	Periphyton (biomass)	--	20.85
SH1507	Chlorophyll, periphyton	--	24.60
--	Benthic invertebrates (5)	--	20.00
	Total		86.30

(1) Based on charges for similar metered measurements.
(2) Based on charges by U.S. Geological Survey Mount St. Helens Volcano Observatory Laboratory, in Vancouver, Washington.
(3) Based on mean charges for elutriate and bottom material analyses performed by the U.S. Geological Survey, Central Laboratory and Geologic division Laboratory and the U.S. Army Corps of Engineers Laboratory at Troutdale, Oregon.
(4) Based on estimated costs by U.S. Geological Survey Pacific Northwest District Laboratory.
(5) Based on Contracted cost with Sweet and Associate Biologic Laboratory in Portland, Oregon.

APPENDIX III

Constituent groups sampled from surface-water, and ground-water sources, by agency or organization, Oregon, 1984.

[S Indicates surface-water samples analyzed for some constituents in the corresponding constituent group.
G Indicates ground-water samples analyzed for some constituents in the corresponding constituent group.
- Indicates no samples analyzed for constituents in the cooresponding constituent group]

	CONSTITUENT GROUPS																			
	PHYSICAL/ FIELD MEASUREMENTS		INORGANICS		TRACE ELEMENTS		MAJOR METALS		NUTRIENTS		ORGANICS		PRIORITY POLLUTANTS		PESTICIDES		RADIOCHEMICAL		TISSUE CHEMISTRY		SEDIMENT CHEMISTRY		BIOLOGICAL		SEDIMENT	
AGENCY TYPE AGENCY NAME	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW
FEDERAL AGENCIES																										
BUREAU OF MINES	S	-	S	-	S	-	S	-	S	-	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NATIONAL PARK SERVICE	S	-	S	-	S	-	S	-	S	-	-	-	-	-	-	-	-	-	-	-	S	-	S	-	S	-
U.S. ARMY CORP OF ENGINEERS	S	-	S	-	S	G	-	-	S	G	-	G	-	G	S	-	-	-	-	-	-	-	S	G	S	-
U.S. FISH & WILDLIFE SERVICE	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U.S. FOREST SERVICE	S	G	-	G	-	G	-	G	-	G	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-
U.S. GEOLOGICAL SURVEY	S	-	S	-	S	-	S	-	S	-	S	-	S	-	S	-	S	-	-	-	S	-	S	-	S	-
STATE AGENCIES																										
DEPARTMENT OF ENVIRONMENTAL QUALITY	S	G	S	G	-	-	S	G	S	G	S	G	S	-	-	-	-	-	S	-	-	-	S	G	-	-
DEPARTMENT OF FISH AND WILDLIFE	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

APPENDIX III--Continued

Constituent groups sampled from surface-water, and ground-water sources, by agency or organization, Oregon, 1984

AGENCY TYPE / AGENCY NAME	CONSTITUENT GROUPS																			
	PHYSICAL/ FIELD MEASUREMENTS		INORGANICS		TRACE ELEMENTS		MAJOR METALS		NUTRIENTS		ORGANICS		PRIORITY POLLUTANTS		PESTICIDES		RADIOCHEMICAL		TISSUE CHEMISTRY		SEDIMENT CHEMISTRY		BIOLOGICAL		SEDIMENT	
	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW
COUNTY AGENCIES																										
BENTON COUNTY ENVIRONMENTAL HEALTH	-	-	-	G	-	G	-	G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-
COLUMBIA COUNTY LAND DEVELOPMENT SERVICES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S	G	-	-
DOUGLAS COUNTY WATER RESERVOIR	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MULTNOMAH COUNTY ENVIRONMENTAL HEALTH	-	G	-	G	-	G	-	G	-	G	-	-	-	-	-	-	-	-	-	-	-	-	S	G	-	-
POLK COUNTY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S	G	-	-
TILLAMOOK COUNTY HEALTH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-
UNIFIED SEWERAGE AGENCY	S	-	S	-	S	-	S	-	S	-	S	-	-	-	-	-	-	-	-	-	-	-	S	-	-	-

APPENDIX III--Continued

Constituent groups sampled from surface-water, and ground-water sources, by agency or organization, Oregon, 1984

AGENCY TYPE / AGENCY NAME	CONSTITUENT GROUPS																			
	PHYSICAL/FIELD MEASUREMENTS		INORGANICS		TRACE ELEMENTS		MAJOR METALS		NUTRIENTS		ORGANICS		PRIORITY POLLUTANTS		PESTICIDES		RADIOCHEMICAL		TISSUE CHEMISTRY		SEDIMENT CHEMISTRY		BIOLOGICAL		SEDIMENT	
	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW
CITY AGENCIES																										
CITY OF ALBANY	S	-	S	-	-	-	-	-	-	-	S	-	-	-	-	-	-	-	-	-	-	-	S	-	-	-
CITY OF CORVALLIS	S	-	S	-	S	-	-	-	S	-	-	-	-	-	S	-	-	-	-	-	-	-	S	-	-	-
CITY OF GRESHAM	S	-	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S	-	-	-
CITY OF MEDFORD WATER COMMISSION	-	G	S	G	S	G	-	G	S	G	-	-	-	-	S	G	-	G	-	-	-	-	-	-	-	-
CITY OF OREGON CITY	S	-	S	-	S	-	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S	-	-	-
CITY PORTLAND, BUREAU OF WATER WORKS	S	G	S	G	S	G	S	G	S	G	S	G	-	G	S	G	S	-	-	-	-	-	S	G	-	-
CITY OF ROSEBURG	S	-	S	-	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S	-	-	-
CITY OF SALEM	S	-	-	-	S	-	S	-	S	-	S	-	-	-	-	-	-	-	-	-	-	-	S	-	-	-
CITY OF WOODBURN MUNICIPAL SYSTEM	-	G	-	G	-	G	-	G	-	G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EUGENE-SPRINGFIELD WATER POLLUTION CONTROL	S	G	S	G	-	G	-	-	S	G	S	G	-	-	-	-	-	-	-	-	-	-	S	G	-	-
OTHER AGENCIES																										
CONFEDERATED TRIBES OF WARM SPRINGS INDIANS	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PORT OF PORTLAND	-	-	-	-	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S	-	-	-	-	-
ROGUE VALLEY COUNCIL OF GOVERNMENTS	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S	-	S	-

APPENDIX IV

SCREENING CRITERIA FOR AGENCIES COLLECTING WATER QUALITY DATA DURING 1984.

AGENCY TYPE / AGENCY NAME / PROGRAM NAME	SCREENING CRITERIA *1* AMBIENT SITES SW	*1* AMBIENT SITES GW	*1* EFFLUENTS SITES SW	*1* EFFLUENTS SITES GW	*2* DATA ACCESSIBLE TO PUBLIC Y	*2* DATA ACCESSIBLE TO PUBLIC N	*3* SITE LOCATIONS AVAILABLE Y	*3* SITE LOCATIONS AVAILABLE N	*4* QUALITY ASSURANCE PROGRAM Y	*4* QUALITY ASSURANCE PROGRAM N	*5* DATA IN COMPUTER Y	*5* DATA IN COMPUTER N
FEDERAL AGENCIES												
BUREAU OF MINES												
COMPOSITE SEWER SAMPLING			X		X		X			X	X	
NATIONAL PARK SERVICE												
CRATER LAKE LIMNOLOGY AND WATER QUALITY	X				X		X		X		X	
U.S. ARMY CORP OF ENGINEERS												
APPLEGATE RESERVOIR, ROGUE RIVER BASIN	X				X		X		X		X	
LOST CR. RESERVOIR, ROGUE RIVER BASIN	X				X		X		X		X	
NO NAME			X	X	X		X		X		X	
WILLAMETTE RESERVOIRS	X				X		X		X		X	
WILLAMETTE RESERVOIRS SEDIMENT QUALITY SURVEY	X				X		X		X		X	
WILLOW CR. RESERVOIR, HEPPNER	X				X		X		X		X	
U.S. FISH & WILDLIFE SERVICE												
EAGLE CREEK NFH			X		X		X			X		X
U.S. FOREST SERVICE												
SISKIYOU NATIONAL FOREST, BIG PINE CAMPGROUND WATER SUPPLY		X			X		X			X		X
SISKIYOU NATIONAL FOREST, NON-POINT MONITORING	X				X		X			X		X
UMPQUA NATIONAL FOREST, NON-POINT MONITORING	X				X		X			X		X
U.S. GEOLOGICAL SURVEY												
BULL RUN BENTHIC INVERTEBRATE STUDY	X				X		X		X		X	
BULL RUN MONITORING	X				X		X		X		X	
COLUMBIA DEEPENING	X				X		X		X		X	
EWEB	X				X		X		X		X	
HYDROLOGIC BENCH CREEK	X				X		X		X		X	
NATIONAL STREAM-QUALITY ACCOUNTING NETWORK	X				X		X		X		X	
SOUTH UMPQUA WATER QUALITY	X				X		X		X		X	
TEMPERATURE MONITORING	X				X		X		X		X	
TEMPERATURE MONITORING	X				X		X		X		X	
TEMPERATURE MONITORING	X				X		X		X		X	
TEMPERATURE MONITORING	X				X		X		X		X	
WATER QUALITY OF MALHEUR LAKE	X				X		X		X		X	
WATER TEMPERATURE REGIME OF THE MCKENZIE RIVER	X				X		X		X		X	

APPENDIX IV--Continued

SCREENING CRITERIA FOR AGENCIES COLLECTING WATER QUALITY DATA DURING 1984

AGENCY TYPE / AGENCY NAME / PROGRAM NAME	SCREENING CRITERIA *1* AMBIENT SITES SW	*1* AMBIENT SITES GW	*1* EFFLUENTS SITES SW	*1* EFFLUENTS SITES GW	*2* DATA ACCESSIBLE TO PUBLIC Y	*2* DATA ACCESSIBLE TO PUBLIC N	*3* SITE LOCATIONS AVAILABLE Y	*3* SITE LOCATIONS AVAILABLE N	*4* QUALITY ASSURANCE PROGRAM Y	*4* QUALITY ASSURANCE PROGRAM N	*5* DATA IN COMPUTER Y	*5* DATA IN COMPUTER N
STATE AGENCIES												
DEPARTMENT OF ENVIRONMENTAL QUALITY												
AMBIENT ESTUARY MONITORING NETWORK	X				X		X		X		X	
AMBIENT GROUND WATER		X			X			X	X		X	
AMBIENT RIVER MONITORING NETWORK	X				X			X	X		X	
FISH TISSUE NETWORK	X				X		X		X		X	
SOLID WASTE SITE MONITOIRNG	X	X			X			X	X		X	
DEPARTMENT OF FISH AND WILDLIFE												
FISH CULTURE, REGIONAL OPERATIONS, RESEARCH			X		X		X			X		X
COUNTY AGENCIES												
BENTON COUNTY ENVIRONMENTAL HEALTH												
LAND AND WATER	X				X			X	X			X
COLUMBIA COUNTY LAND DEVELOPMNT SERVICES												
NO NAME		X			X		X			X		X
DOUGLAS COUNTY WATER RESERVOIR												
NO NAME	X				X		X			X		X
MULTNOMAH COUNTY ENVIRONMENTAL HEALTH												
DRINKING WATER QUALITY		X			X		X		X			X
POLK COUNTY												
DRINKING WATER QUALITY	X	X			X		X			X	X	
TILLAMOOK COUNTY HEALTH DEPARTMENT												
NO NAME		X			X		X			X		X
UNIFIED SEWERAGE AGENCY												
NPDES PERMIT			X		X		X		X		X	
NPDES PERMIT			X		X		X		X		X	
NPDES PERMIT			X		X		X		X		X	
NPDES - WASTE DISCHARGE MONITORING			X		X		X		X		X	
WATER QUALITY			X		X		X		X		X	

APPENDIX IV--Continued

SCREENING CRITERIA FOR AGENCIES COLLECTING WATER QUALITY DATA DURING 1984

AGENCY TYPE / AGENCY NAME / PROGRAM NAME	SCREENING CRITERIA *1* AMBIENT SITES SW	*1* AMBIENT SITES GW	*1* EFFLUENTS SITES SW	*1* EFFLUENTS SITES GW	*2* DATA ACCESSIBLE TO PUBLIC Y	*2* DATA ACCESSIBLE TO PUBLIC N	*3* SITE LOCATIONS AVAILABLE Y	*3* SITE LOCATIONS AVAILABLE N	*4* QUALITY ASSURANCE PROGRAM Y	*4* QUALITY ASSURANCE PROGRAM N	*5* DATA IN COMPUTER Y	*5* DATA IN COMPUTER N
CITY AGENCIES												
CITY OF ALBANY												
ALBANY WASTEWATER TREATMENT PLANT			X		X		X		X			X
CITY OF CORVALLIS												
CORVALLIS WATERSHED STREAM SURVEY	X				X		X			X	X	
NPDES MONITORING AND SLUDGE HANDLING PROGRAM			X	X	X		X			X	X	
WILLAMETTE RIVER SURVEY	X				X		X			X		X
CITY OF GRESHAM												
MONITORING FOR NPDES PERMIT			X		X		X			X		X
CITY OF MEDFORD WATER COMMISSION												
NO NAME		X	X		X		X			X		X
CITY OF OREGON CITY												
SOUTH FORK WATER			X		X		X			X		X
CITY OF PORTLAND, BUREAU OF WATER WORKS												
BULL RUN WATER SHED MONITORING	X				X		X		X		X	
DISTRIBUTION SYSTEM MONITORING	X				X		X		X			X
WELL FIELD MONITORING PROGRAM		X			X		X		X		X	
CITY OF ROSEBURG												
SURFACE WATER SUPPLY FROM N.UMPQUA RIVE	R		X		X		X			X		X
CITY OF SALEM												
WATERSHED MONITORING	X				X		X		X			X
CITY OF WOODBURN MUNICIPAL SYSTEM												
POTABLE WATER QUALITY ASSURANCE				X	X		X			X		X
EUGENE-SPRINGFIELD WATER POLLUTION CONTROL												
AGRIPAC LAGOON			X	X	X		X			X	X	
SLUDGE DISPOSAL PROGRAM		X			X		X			X		X
SLUDGE SITE C		X			X		X			X		X
WASTEWATER TREATMENT PLANT EFFLUENT			X		X		X			X	X	
OTHER AGENCIES												
CONFEDERATED TRIBES OF WARM SPRINGS												
WATER MANAGEMENT	X				X			X		X	X	
PORT OF PORTLAND												
PORT OF PORTLAND-CAPITAL PROJECT	X				X		X		X			X
ROGUE VALLEY COUNCIL OF GOVERNMENTS												
BEAR CREEK VALLEY WATER QUALITY PROGRAM	X				X		X			X		X

☆ U.S. GOVERNMENT PRINTING OFFICE: 1987—793-483