Secretary of State Audit Report

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Department of Environmental Quality: Increase Laboratory Productivity to Better Meet Customer Needs

Summary

The main purpose of our audit was to determine if the Department of Environmental Quality (DEQ) Laboratory could better use its resources to meet the needs of its customers. Our audit focused on the analytical sections of the Laboratory. We also conducted a brief review of the Water Quality Permitting Program.

The mission of DEQ is to be a leader in restoring, maintaining, and enhancing the quality of Oregon's air, land, and water. DEQ administers state environmental laws and delegated federal programs to protect Oregon's environmental quality.

The DEQ Laboratory conducts monitoring, assessment and analytical sample testing to produce environmental data for the Air, Water, and Land divisions. In fiscal year 2010, the Laboratory had 72 positions and funding of about $10.6 million, with 36% of the funding provided by DEQ's Air Quality Division, 6% by the Land Quality Division, and 58% by the Water Quality Division.

We found that the turnaround time for DEQ's laboratory analysis was slower than comparable states. In fiscal year 2010, approximately 83% of sample batches exceeded the agency's general turnaround goal of 45 days. As a result, DEQ divisions and partner agencies experienced delays in monitoring, environmental assessment, cleanup, and decision making.

The Laboratory Information Management (LIM) System is a major contributor to these delays. Unlike systems comparable laboratories use, DEQ's LIM system requires considerable time to manually enter test results instead of automatic uploading from instruments. The slow turnaround time limits the Laboratory's productivity, including its state-of-the-art equipment and its experienced professionals.

In addition, current practices restrict the Laboratory's ability to manage for performance and efficiency. Performance measurement data is limited to weekly backlog reports and some basic turnaround time information. The Laboratory also lacks a cost accounting system or other method to track productivity and cost for each type of analytical test.

In addition, the Laboratory has limited involvement in the development of its budget. Rather, the major budget decisions about the Laboratory are made by the other divisions. For example, the Laboratory needs approval from one or all of the divisions to fill a position or make capital equipment purchases. As a result, the Laboratory does not have the flexibility to make resource decisions to best meet demand for analytical services.

With reduced delays and greater flexibility, the Laboratory could better serve the Land Quality division, which has been contracting with out-of-state laboratories for tests, and apply its testing capacity to serve additional external customers. If the Laboratory increased its workload by 20% with external customers, it could produce about $700,000 in savings per year in laboratory costs for the Air, Water, and Land Quality divisions.

During our audit, we also noted a substantial work backlog in the Water Quality Permitting Program and conducted a review to determine whether DEQ was making adequate efforts to address the backlog. We concluded that DEQ had implemented nearly all the actions recommended by two work groups. We also noted that the current backlog resulted from a suspension of work due to litigation and other external factors.

Recommendations

We recommend that DEQ upgrade its LIM system to reduce manual data entry and error-checking, develop performance measurement and cost accounting systems, and use data from these systems to maximize the Laboratory's productivity. We also recommend that DEQ consider establishing a separate analytical laboratory budget to provide additional flexibility to make resource decisions and serve external customers. Finally, we recommend the Water Quality Permitting Program continue its diligent efforts to reduce the National Pollutant Discharge Elimination System (NPDES) permit backlog.

Agency Response

The agency response is attached at the end of the report.

Background

The mission of the Department of Environmental Quality (DEQ) is to be a leader in restoring, maintaining, and enhancing the quality of Oregon's air, land, and water. DEQ administers state environmental laws to protect Oregon's environmental quality. DEQ also administers federal programs delegated to the state by the U.S. Environmental Protection Agency (EPA), including the surface-water permitting, air permitting, and hazardous waste programs.

DEQ is organized into eight divisions: the Air, Land, and Water Quality Divisions; three regional divisions; the Management Services Division; and the Laboratory and Environmental Assessment Division. The Air Quality Division works to ensure that federal clean air standards are met, the public is protected from toxic air pollutants and the state's scenic areas are visible. The Land Quality Division oversees agency programs in environmental cleanup and site assessment, hazardous and solid waste, spill response, and underground storage tanks. The Water Quality Division sets and enforces water quality standards. This division monitors groundwater and 19 river basins for water quality, issues water quality permits, and implements strategies to protect and enhance Oregon's waters. Management Services provides support to the other divisions, including accounting, budgeting, human resources, and information technology services.

Our audit focused on the analytical sections of the Laboratory and Environmental Assessment Division (Laboratory). We also conducted a brief review of the Water Quality Permitting Program.

Laboratory and Environmental Assessment Division

The Laboratory, located in Hillsboro, shares a new 86,000 square foot state of the art facility with the Oregon State Public Health Laboratory. This facility, which opened in December 2007, has separate laboratory spaces designed for unique purposes. For example, the facility has a room with tightly controlled temperature and humidity for air filter analysis, a clean room for ultra trace metals analysis, and a separate laboratory capable of handling potentially hazardous substances, including those that could be intended for biological and chemical weapons.

The Laboratory is not recognized in the department's legislative budget as a separate division for the purpose of allocating funds. Instead, the Laboratory receives its funding through the three core division budgets. In fiscal year 2010, the Laboratory's funding totaled about $10.6 million.

As indicated in Figure 1, over half the Laboratory's budget comes from the Water Quality Division. The Laboratory receives 37% of its funding from state general funds, 38% is federally funded, often through one of the other

divisions, with lottery and other funds contributing about 25% (see Figure 2).

Figure 1: Laboratory Funding by Program FY 2010

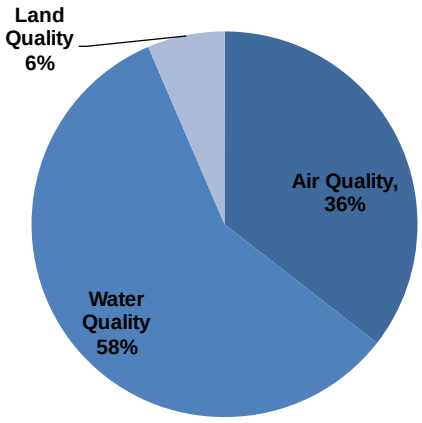
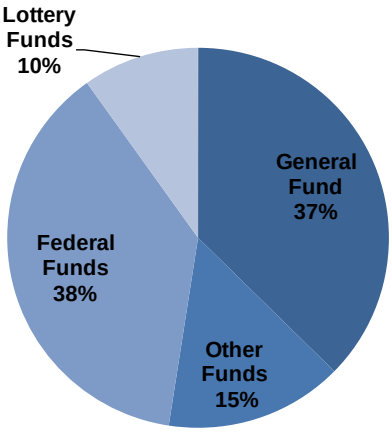


Figure 2: Laboratory Funding Sources FY 2010



As shown in Table 1 below, the Laboratory's funding has been steady over the past few years, increasing slightly in 2008 and 2009, and decreasing slightly in 2010. Laboratory staffing has also been steady. In fiscal year 2006, the number of FTE (full time equivalents) was 74. Staffing peaked in fiscal year 2009 at 76 FTE, and declined to 72 FTE in fiscal year 2010.

Table 1: Laboratory Expenditures and FTE by Fiscal Year

	2006	2007	2008	2009	2010
Expenditures	$8,490,925	$9,262,190	$11,089,264	$11,778,416	$10,612,929
FTE	74	72	73	76	72

Monitoring Efforts

The Laboratory collects and analyzes samples of air, water, soil, and tissues to provide information on Oregon's environment to the Air, Water, and Land divisions. Monitoring data is used to determine if environmental standards have been met and the impact of pollution on human and environmental health. Monitoring data helps DEQ identify pollution sources. It also helps DEQ and other stakeholders judge the effectiveness of industrial compliance and sound agricultural and forestry management practices in reducing pollution. Investigation of toxic chemical spills relies on Laboratory analysis, as do some criminal investigations.

Monitoring data also helps inform DEQ and stakeholders of their progress in reducing pollutants in the environment. For example, monitoring watershed improvement projects can demonstrate whether public funds spent on restoration projects improved environmental conditions and benefited target species.

The Total Maximum Daily Load (TMDL) program is a Water Quality program that relies on the Laboratory for environmental data. TMDL program staff use laboratory monitoring data to determine how much pollutant a water body can receive without violating water quality standards. Laboratory staff work with TMDL program staff to develop sampling plans to characterize baseline water quality conditions. If data from the samples show water quality needs improvement, DEQ staff work with local agencies to develop TMDL implementation plans that will achieve water quality standards. The Laboratory then gathers data to determine if water quality actually improved.

The Laboratory's Air Quality Monitoring Program manages air quality monitoring and sampling equipment that measures air pollutant levels. The Laboratory conducts analytical testing of the air filter samples for substances such as arsenic, beryllium, cadmium, chromium, cobalt, and lead. Much of the data the Air Quality Monitoring Program produces are included in the federal Environmental Protection Agency's database used for determining air pollution trends and compliance with National Ambient Air Quality Standards. This data also supports DEQ's air quality monitoring projects and studies.

Sample Analysis

The Laboratory conducts a variety of organic and inorganic analytic chemistry tests, including tests for nitrate/nitrite, ammonia, metal compounds, and substances such as herbicides, pesticides, and petroleum. The Laboratory also performs specialized testing to identify substances such as hormones, steroids, and some pharmaceuticals.

The laboratory's chemists are rich with experience. The average years of chemistry experience in the Inorganic unit is 26, and 9 years for the Organic chemistry unit.

Laboratory chemists use highly specialized testing equipment, including a Hi-Resolution Mass Spectrometer, Liquid Chromatograph Mass Spectrometer, and Collision Cell Inductively Coupled Plasma Mass Spectrometer (ICPMS). Staff from the comparable state laboratories told us they had none or at most one of these pieces of equipment.

Additionally, Laboratory staff conduct special projects, which sometimes require developing new testing methods for compounds. For example, the Oregon Legislature required that DEQ develop a list of priority persistent pollutants and work with municipalities to implement reduction plans. Oregon municipalities then contracted with the DEQ Laboratory to develop methods to test water samples for the pollutants on the list.

In fiscal year 2010, the Laboratory performed or contracted out 31,947 analytical tests for 6,798 samples, and produced 191,039 data points. One sample can be used for multiple analytical tests that in turn can result in multiple data points. For example, a test for metals could result in data points for lead, mercury, arsenic, and zinc, among others.

Over time, the Laboratory's volume of tests has decreased, although the number of data points has increased. For example, during fiscal years 2006 through 2010, the number of tests decreased from 37,208 to 31,947 or about 14 percent (see Table 2). However, the number of data points increased at an even greater rate from 133,129 to 191,039 or about 43 percent. The increase in data points is due mainly to a trend in the Organic Section where more substances were added to specific types of tests each year.

Table 2: Volume of Tests and Data Points by Year

Year	Total Samples	Total Tests	Total Data Points	Tests per FTE	Data Points per FTE
2006	7145	37,208	133,129	1801	6444
2007	9346	38,180	172,115	1829	8243
2008	8776	32,887	152,754	1514	7033
2009	8287	36,616	188,555	1638	8436
2010	6798	31,947	191,039	1358	8122

During our interviews with DEQ and other comparable state laboratories, we learned the DEQ Laboratory offers highly sophisticated and specialized testing, such as pharmaceutical, hormone, and steroid testing, in addition to similar tests other state Laboratories perform. As discussed below, we also noted that the comparable laboratories do not have monitoring units.

Other Laboratory Services

The Laboratory also performs monitoring and assessment activities for the Air and Water Quality Divisions. Unlike other state environmental laboratories, DEQ integrated the Air and Water Divisions' monitoring sections into the Laboratory to achieve better coordination. The Laboratory's monitoring services include developing project work plans and collecting environmental samples for analysis. Monitoring staff travel throughout the state to draw air, water, and tissue samples for analysis in the Laboratory in accordance with plan objectives and in response to Division requests.

The Laboratory also provides various technical services. For example, staff maintain and update the Laboratory Analytical Storage and Retrieval (LASAR) database, which stores all environmental data the Laboratory collects and analyzes, as well as data analyzed by contract laboratories. Monitoring staff also compile and perform statistical analysis, interpretation, and reporting of the monitoring data to provide concise information needed for making decisions that affect environmental outcomes.

Laboratory data users include other agencies and stakeholders, such as the EPA, local Watershed Councils, Oregon tribes, the Oregon Department of Agriculture, the Oregon Department of Fish and Wildlife, and the Oregon Department of Forestry. For example, the EPA uses air quality data from Oregon and around the country to provide information on national air quality trends, emissions data, and nonattainment areas, among other things. As another example, Watershed Councils use the data for monitoring efforts that guide local restoration efforts. In Calendar Year 2010, these agencies and others accessed the LASAR database about 58,000 times.

The Laboratory participates in the Oregon Environmental Laboratory Accreditation Program, which reviews Oregon and out-of-state environmental laboratories that test environmental samples to ensure that they follow national standards. The DEQ Laboratory participated in 20 laboratory accreditation reviews in fiscal year 2010.

Audit Results

The DEQ Laboratory has not met its sample testing turnaround goals, and takes longer to complete testing than comparable laboratories in other states. The slower turnaround time is adversely affecting other DEQ divisions, as well as partner agencies outside DEQ. A major contributor to the slow turnaround time is the Laboratory's information system, which depends on manual data entry, rather than automatic data transfer from the testing equipment.

Improving turnaround times could lead to opportunities for maximizing the productivity of the Laboratory's modern facility, state-of-the-art testing equipment, and professional staff.

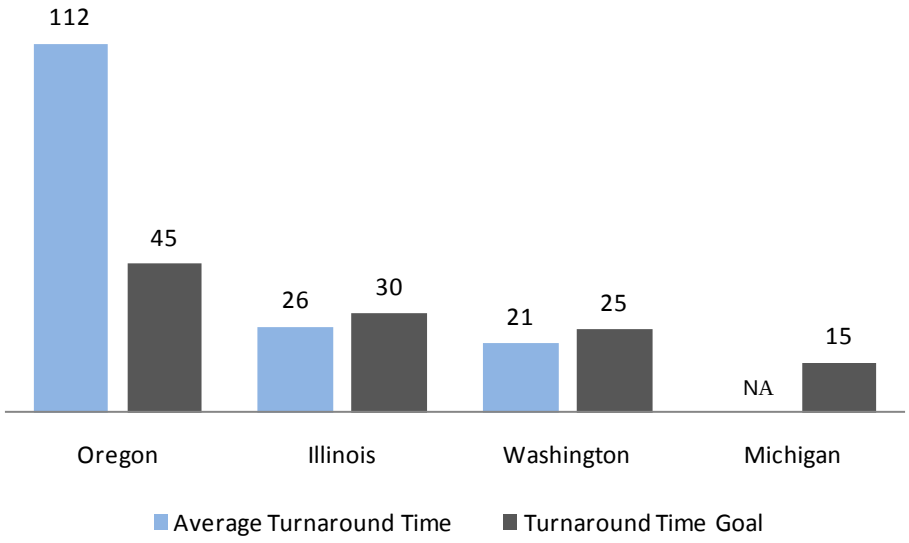
In addition, current budgeting and management practices limit the Laboratory's ability to make full use of its capacity. The laboratory could better serve existing DEQ customers and may be able to offer services to additional external customers, such as other state agencies and municipalities. The revenue generated from external customers could reduce the laboratory's dependence on the General Fund.

Sample Turnaround Times Need Improvement

We analyzed data in DEQ's laboratory information system and interviewed staff from three comparable state environmental laboratories. While we found similarities in laboratory staff productivity, such as the average number of tests processed by each chemist, we also found that DEQ's laboratory turnaround time was slower than the comparable laboratories in fiscal year 2010. For example, the average number of days from sample login to final data release was 112 days for DEQ's laboratory, as compared to an average of 21 and 26 days reported by two of the comparable labs. The third laboratory did not report its average turnaround time, but staff said they meet their turnaround criteria in the majority of cases.

Approximately 83% of sample batches exceeded DEQ's own general turnaround time goal of 45 days. As shown in Figure 3, the comparable laboratories have 15, 25, and 30 day turnaround time goals. Although DEQ's general turnaround goal is 45 days, individual project expectations may vary from this goal. For example, some of DEQ's air programs expect air quality and emissions tests to be turned around in 90 days, whereas the expectation for asbestos samples is 24 hours.

Figure 3: Average Sample Analysis Turnaround Time Relative to Goals for Comparable State Laboratories



Slow Laboratory Turnaround Time Reduced DEQ's Effectiveness

Slow sample turnaround adversely affected DEQ's monitoring, environmental assessment, cleanup, and decision making efforts. For example, monitoring data collected from the Yamhill Basin as part of the Pesticide Stewardship Partnership monitoring program was delayed and only preliminary data was available for a DEQ presentation to agriculture stakeholders. This presentation was intended to inform program participants of their progress in lowering pesticide levels in the Yamhill Basin.

In 2009, DEQ received special grant funding from EPA Region 10 to study toxic contaminants in Oregon as part of the Columbia River Ecological Condition Assessment. The DEQ Laboratory Watershed Assessment section and the EPA collected samples and sent them to the DEQ Laboratory between July 2008 and July 2009, but the sample analysis had not yet been completed as of February 2011. The original grant contract had a May 2010 completion date, which had to be extended to May 2012 due to the delays at the Laboratory.

The Columbia River Inter-tribal Fish Commission Lamprey Project, an add-on project to the Columbia River Ecological Condition Assessment project, had similar and related delays. Samples collected for the project were sent to the Laboratory in August 2009 and had not been tested as of February 2011. The Lamprey Project was spearheaded by tribal groups and included analysis of toxic contaminants in lampreys in the Columbia River.

As a result of the laboratory delays, the EPA could not make its presentation on the status of toxics in the Columbia River planned for summer of 2010, and the tribes did not have the information needed for their own projects. Additionally, we were told that without the results of

their past grant efforts, the tribes were not able to apply for additional grants.

In fiscal year 2009, the Land Quality Division decided to use the Laboratory for samples collected for the Columbia Slough Project, a cleanup project of sediment contamination. The Columbia Slough is a narrow waterway in the floodplain of the Columbia River in and around Portland. At the time we interviewed the program manager, 15 months after the samples were collected, the data had not yet been finalized. Since completion of the Columbia Slough Project was delayed, the start of another cleanup project was also delayed.

As a result of the slow turnaround time at the DEQ laboratory, Land Quality began using out-of-state contract laboratories for the majority of sample analysis. DEQ paid approximately $168,000 in fiscal year 2010 to out-of-state laboratories for services the DEQ Laboratory has the ability to do.

An Updated Information System and Better Workload Management Could Improve Timeliness

While the Laboratory contains highly sophisticated testing equipment, its Laboratory Information Management System (LIM) requires personnel to manually enter test data, and review entries for keying errors. LIM systems comparable laboratories use automatically upload data from instruments. For example, a DEQ chemist who conducts a test that produces 150 results must manually enter all 150 data points into the LIM system. With data points increasing from 133,129 in FY2006 to 191,039 in FY2010, hand entry and manual quality control reviews have increased over time.

Quality assurance reviews are important for reliable data. However, between the current LIM system and the reviews, a significant amount of chemist time is used. Chemists we interviewed said that it is not uncommon for them to spend one day in the Laboratory analyzing samples and an additional two to three days on data entry and quality assurance responsibilities.

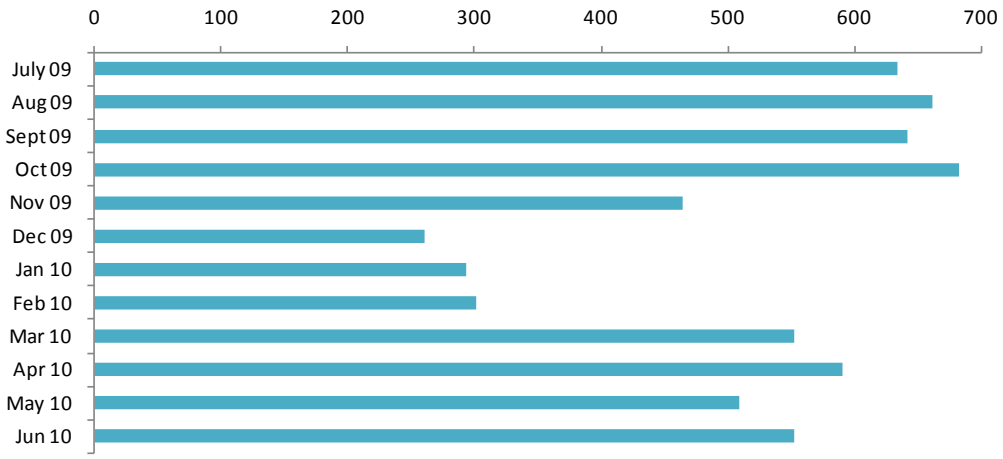
Other workload issues chemists face can delay sample testing. Chemists spend part of their time working on method development for new tests. Laboratory management told us 2010 was an unusually heavy year for development of new tests. A persistent toxics program the Oregon Legislature passed in 2007 added about 1,600 hours of additional method development work in fiscal year 2010.

Chemists also spend part of their time on other non-analytical duties. For example, the inorganic air chemists we interviewed told us there were times when they assisted the air monitoring unit in preparing and shipping filters to customers. Experienced chemists also spend time preparing and extracting samples, and cleaning testing tools and Laboratory space. These tasks could be performed by entry level chemists, or others, such as college interns. Contributing to this situation is the large number of analytical

capabilities the DEQ Laboratory maintains, which requires more higher level chemists.

The seasonality of work also causes bottlenecks during peak sampling months. For example, during the summer season, a large amount of water samples are collected and logged at the Laboratory. See Figure 4 for all samples logged at the Laboratory by month for fiscal year 2010.

Figure 4: Number of Samples Logged by Month for FY 2010



The analytical sections of the Laboratory use few seasonal employees, and mostly operate with a fixed number of professional personnel throughout the year. As a result, they have less ability to respond to fluctuations in workload, which can create workload imbalances, delays during peak periods, and underutilization during periods of low workload.

Efficiency and Utilization Can Be Increased With Enhanced Management Tools

Successful organizations use management tools such as performance measures, cost analysis, and budgeting to monitor activities, and improve efficiency and effectiveness of operations.

Current Practices Impede Decision-Making and Efficiency

We found that current management practices do not support the Laboratory's ability to manage for performance and efficiency in its analytical sections. The lack of performance management data and strategic planning, an incomplete understanding of the Laboratory's analytical costs, and the existing decision making and budget structure all contributed to slow turnaround time and other inefficiencies that hinder the Laboratory from operating at full capacity.

Performance measurement is an ongoing monitoring and reporting of program accomplishments, particularly progress towards pre-established goals. Performance measurement data for the Laboratory is limited to weekly backlog reports and some basic turnaround time information.

Performance measurement trend data could allow the Laboratory to better forecast and adapt to changes in program needs. If trend information is tracked and reviewed on a consistent basis, management would have the information to make evidence-based decisions regarding resource allocation and ways to increase the laboratory's productivity.

We found that the three comparable laboratories in other states use performance measures to a greater degree than DEQ. Additionally, comparable states track samples on a daily and weekly basis and pull reports on sample analysis turnaround time for each test type.

Improved Turnaround Time Could Better Utilize the Laboratory's Capacity to Meet Division Needs

The Laboratory has the capacity for more sample analysis. Slow sample analysis turnaround time reduces the number of tests the Laboratory is able to process in a given amount of time and contributes to its inability to keep up with current demand for sample analysis from DEQ programs. In fiscal year 2011, the Toxics Program had the funding to do additional monitoring above what it was originally budgeted. However, the laboratory could not test these additional samples and the program had to scale back on the number of samples collected. If turnaround time were improved, the Laboratory could process a larger volume of samples.

Laboratory management knew the LIM system was highly inefficient, was the main cause of slow turnaround time, and limited their ability to maximize the Laboratory's capacity. Management attempted to address the inefficiencies by fixing the LIM system in house. However, this attempt did not work, and recently DEQ management initiated the process of procuring a commercial off the shelf LIM system. An analysis of Laboratory costs and capacity may have led management to replace the LIM system sooner.

Developing an Activity Cost System Could Improve Decision-Making

The Laboratory lacks a cost accounting system or other method to determine the actual or at least a close estimate of costs associated with various analytical section activities, including the cost of processing different analytical tests. Cost accounting helps organizations track and analyze costs associated with their products or activities. Total costs would include fixed costs and variable costs. Fixed costs would include rent, administrative overhead, and personnel costs for maintaining the laboratory's analytical capabilities. Variable costs would include materials and supplies, and could include personnel costs if additional staff were needed to meet an increased demand for analytical tests. Laboratory management must decide how sophisticated of a system is needed and define the activities to include.

This cost information could help Laboratory management plan, budget, and make effective decisions for allocating resources to the Laboratory's analytical sections. All three comparable laboratories use cost accounting to some degree, and charge for services based on a cost per test model.

Because the Laboratory lacks such information, management is forced to make resource allocation decisions without a complete understanding of the costs incurred. For example, we noted that some specific types of samples were in small batches that may have been more cost effective to subcontract out.

Further, current budget practices hinder the Laboratory's ability to operate at maximum capacity. Budgets are planning tools for allocating resources to effectively meet an organization's objectives and goals. The Laboratory does not have a formal budget separate from the budgets for the Air, Land, and Water Quality Divisions. Consequently, management from those Divisions makes the majority of Laboratory budget decisions.

DEQ's budget office personnel told us the separate and distinct legislative budgets for Air, Water, and Land Divisions resulted from requests made by the State's Legislative Fiscal Office and the Department of Administrative Services. Thus, DEQ incorporated the Laboratory budget into the Division budgets. Budget office personnel also told us that DEQ budget development and implementation decision making is a collaborative process that includes program management teams responsible for the major program activities. However, Analytical Laboratory managers are not well represented in this process. As a result, Laboratory management does not have the flexibility to make resource decisions to best meet demand for Laboratory analytical services. For example, the Laboratory needs approval from one or all three Divisions to fill a Laboratory position or to make capitol equipment purchases.

Additionally, the Laboratory does not have a dedicated budget analyst who could help Laboratory management estimate costs, revenue, and resources needed to conduct sample analysis. A DEQ budget analyst currently provides information to the Laboratory about its budget and expenses, but only supports the Laboratory on a part time basis.

A More Productive Laboratory Could Lower Costs and Serve More Agencies

Better utilization of the modern laboratory facility, with its state-of-the-art equipment and experienced professionals, could bring back Land Quality as a primary customer, and better meet the demands of the Air and Water Quality Divisions.

Increasing productivity and establishing activity costs could also create the opportunity to bring in work from additional customers. In fact, with its specialized equipment and capabilities for environmental testing, the Laboratory is well positioned to attract external customers. For example, it has a Hi-Resolution Mass Spectrometer, Liquid Chromatograph Mass Spectrometer, and Collision Cell ICPMS. With these and other equipment, the Laboratory can test for pharmaceuticals, hormones, and steroids.

We interviewed representatives from the City of Portland, Oregon Department of Agriculture, and Oregon Department of Forestry. These

three were interested in possibly using the DEQ Laboratory if it could meet cost and turnaround needs.

Over the long term, bringing in additional samples from external customers could increase the Laboratory's Other Funds revenues, reduce the average cost per test, and help reduce the amount of General Fund dollars needed to pay for fixed costs. In fiscal year 2010, 37% of the Laboratory's funding was from the General Fund, whereas Other Funds made up 15%.

Using expenses for the Laboratory's analytical sections, we calculated that the average cost per test in fiscal year 2010 was $152. If the Laboratory were to increase the volume of tests by 20%, for example, and assuming the Services and Supplies expenditures also increased by 20%, the average cost per test would be $130. If that 20% increase in work was paid for by external customers, the Air, Water, and Land Quality divisions would realize about $700,000 per year in reduced costs for their own testing.

Prior Recommendation Follow-Up

Work Backlog in the Water Quality Permitting Program

During our audit we noted a substantial work backlog in the Water Quality Permitting Program and conducted a review to determine whether DEQ was making adequate efforts to address the issue. We concluded that DEQ had implemented nearly all the recommendations it had previously received to address the backlog, and that the current backlog resulted from a suspension of work due to litigation and other external factors.

Water Quality Permitting Program

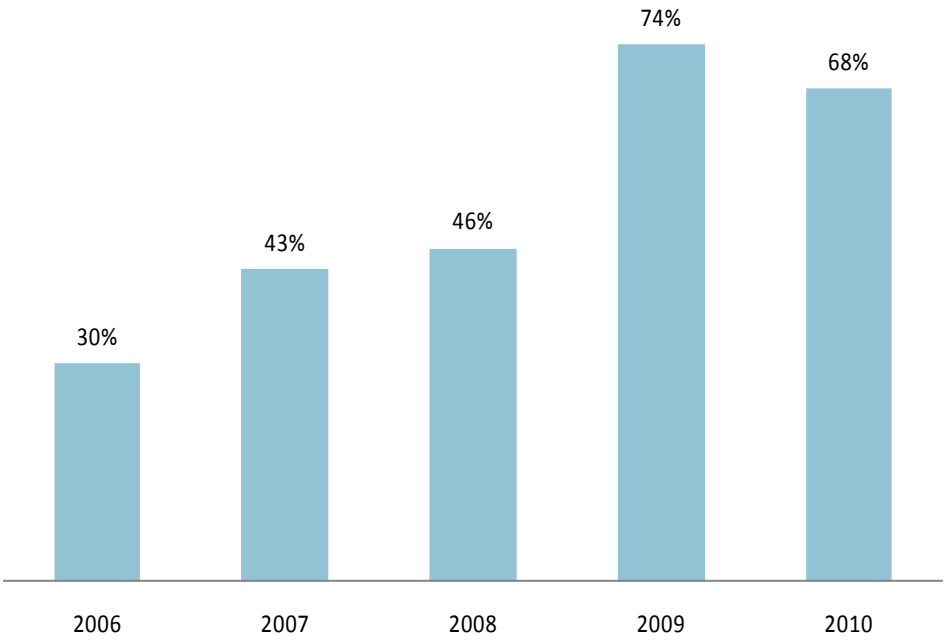
DEQ regulates point sources of water pollution to reduce their adverse impacts on Oregon's waters. DEQ issues discharge permits allowing for a limited amount of pollutants based upon an evaluation of the receiving waters and their uses, such as drinking, swimming, fishing, and aquatic habitat. DEQ's Water Quality Permitting Program issues these permits as part of the National Pollutant Discharge Elimination System (NPDES).

A permit is considered backlogged when the allowed discharges have been administratively extended beyond the permit's expiration date. Not issuing permits in a timely manner can delay implementation of updated water quality standards.

Previous Backlogs in the Permitting Program

In the past, the Water Quality Permitting Program was under much scrutiny for its permit backlog and perceived inefficiency. For example, in 2001, DEQ had a backlog of 60% for major individual permits, the highest backlog rate in the nation at that time. As a result, the Oregon Legislature mandated annual reporting of the backlog beginning in 2006. Figure 5 below shows the backlog trend since 2006 for NPDES major permits. The backlog percentages used for each year are based on fourth quarter data.

Figure 5: Major NPDES Permit Backlog by Calendar Year



Reviews of the Permitting Backlog

DEQ's internal Wastewater Permitting Improvement Team reviewed the department's NPDES permitting activities to identify process improvements that could increase program efficiency and effectiveness while ensuring protection of the environment and public health. The review concluded in early February 2001 with recommendations in areas such as permit writer guidance, training, data management, and management priorities.

In addition, the Blue Ribbon Committee was convened in 2002. It was comprised of a diverse group of business, municipal, consulting, environmental, and community representatives from across Oregon. The committee developed recommendations to reduce the NPDES permit backlog through innovation, permit writer tools, and resource allocation decisions.

Status of Past Recommendations to Reduce the Permitting Backlog

We reviewed all of the recommendations from the Wastewater Permitting Improvement Team and Blue Ribbon Committee directly related to the permit backlog. We found that DEQ has fully implemented all but four of the 32 recommendations. Of the four, one was partially implemented and Water Quality Program management decided not to implement the remaining three because they believed the recommendations were not relevant or did not fit with program needs. The one partially implemented recommendation was to update the permit writer's manual, which is still underway.

DEQ Was on Track to Meet its 2007 Goal

DEQ set a goal of reducing the backlog for major individual NPDES permits to 10% by the end of 2007. As a result of implementing the above recommendations, DEQ reduced the backlog from 60% in calendar year 2001 to as low as 22% at the end of the third quarter of 2006.

However, the backlog began growing again in 2007 as a result of a lawsuit that challenged part of DEQs permit requirements, EPA's objections regarding the permitting of Sanitary Sewer Overflows, and a switch in the way permits were scheduled.

In September 2007, the Northwest Environmental Defense Center sued the EPA over its approval of Oregon's compliance schedule rule. A compliance schedule is a series of steps and deadlines, which upon completion, enables the permittee to meet the permit's requirements. The permit program postponed issuance of permits and diverted resources from permit development to litigation response.

Another challenge that DEQ faced was the EPA's objection to Sanitary Sewer Overflows permit language. Specifically, the EPA objected to template language in a section of NPDES permits that DEQ has used since 2004 to incorporate the state water quality standard for bacteria into permits for municipal sewage treatment plants. The issue was resolved in late 2009 and DEQ resumed processing municipal permits after two years of negotiations with the EPA.

Position vacancies also contributed to the backlog with six out of 62 positions vacant in the Wastewater Permit Program for some or all of 2009. DEQ management said that replacing the program's engineering positions was a particular challenge, and when qualified staff were hired, current staff needed to be redirected away from writing permits to train them.

In 2010, DEQ continued to work toward its goal of reducing the backlog for major individual NPDES permits to 10%. By the end of 2010, it had reduced the backlog to 68%, down from a 74% backlog in 2009.

Recommendations

To improve the Laboratory's turnaround time and operate at maximum capacity, we recommend that the Department of Environmental Quality:

- Evaluate available LIM system options and implement one with automatic data upload and streamlined quality assurance review modules.
- Develop a performance measurement system to help improve Laboratory processes and align decisions to meet Laboratory objectives.
- Develop a cost accounting system or other method to track the Laboratory's analytical productivity and costs, and use this data to allocate resources to the analytical units to best maximize the Laboratory's capacity.
- Consider working with the Legislative Fiscal Office and the Budget and Management Division to establish a separate analytical laboratory budget. At a minimum, involve laboratory management throughout the budget process, and ensure the budget process incorporates cost information for analytical services provided to the Divisions and allows for services to external customers.
- Provide the Laboratory with additional flexibility to make resource decisions to best respond to DEQ's service needs, and explore opportunities to increase utilization of Laboratory capacity through outside customers.

To most effectively manage the adverse impacts of point sources of pollution on Oregon's waters, DEQ should continue its diligent efforts to reduce the NPDES backlog.

Objectives, Scope and Methodology

One objective of our audit was to determine if the DEQ Laboratory could better use its resources to meet the needs of its customers. Between October 2008 and July 2009, the DEQ Laboratory conducted a process improvement project called Lean Kaizen to create efficiencies and reduce sample analysis turnaround time. While the project led to some immediate process improvements and prioritized the need for additional changes, when we started our work at DEQ in early 2010, we found that turnaround time was still an issue. We then focused our audit on determining the causes and impacts of the slow turnaround time.

We analyzed fiscal year 2010 LIM system data provided by Laboratory staff. The data was for tests that were analyzed and reported in fiscal year 2010. We analyzed the data to determine the number of days between the different steps of the sample analysis and reporting process, the workload and volume of laboratory work, and the number of tests that exceeded turnaround time goals.

We identified three comparable state environmental laboratories to interview. We considered factors such as the number of FTE devoted to analytical work, types of services delivered, and types of tests performed. The three states we selected were Washington, Illinois and Michigan. These state laboratories closely matched the profile of Oregon's lab.

To identify best practices and criteria, we asked the comparable laboratories about their turnaround time goals, average turnaround times, service delivery models, costs, outputs, and customer profiles.

We interviewed DEQ's Laboratory management and staff to gain an understanding of the Laboratory's workload, bottlenecks, and planning efforts. We requested and reviewed the Laboratory's budget and expenses, and analyzed the Laboratory's outputs.

The second objective of our audit was to review DEQ's progress in implementing Environmental Protection Agency and internal process improvement recommendations aimed at reducing the NPDES wastewater permit backlog. Early during our fieldwork we found that the EPA did not have specific recommendations but recommended that DEQ continue to implement the Wastewater Process Improvement Team's recommendations to reduce the NPDES permit backlog.

To accomplish the second objective, we identified and compiled Wastewater Process Improvement Team and Blue Ribbon Committee recommendations related to reducing the NPDES permit backlog. We also gathered and reviewed evidence of DEQ's progress toward implementing the recommendations. In addition, we interviewed Water Quality program management and regional staff, and obtained and reviewed program policies and procedures, staff performance evaluations, and other information we obtained from DEQ's website and Intranet.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient and appropriate evidence to provide a reasonable basis for our audit findings and conclusions based on our audit objectives. We believe the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objective.

Oregon

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Agency Response

Secretary of State Audit Report

Department of Environmental Quality: Increase Laboratory Productivity to Better Meet Customer Needs – May 2011

Audit Recommendation:

- ***Evaluate available LIM system options and implement one with automatic data upload and streamlined quality assurance review modules.***

Agency Response:

The Department of Environmental Quality agrees that the current LIM system is a primary factor contributing to long turnaround times and limits overall productivity. DEQ is purchasing a commercial off the shelf laboratory information management system that will meet the needs of the laboratory identified in the audit report. Funding for the COTS LIM System has been identified by DEQ's program administrators and has been approved by the DEQ budget office. The project is now following two tracks; one through the Department of Administrative Services Chief Information Officer for IT issues, and the second through the procurement process with both DAS procurement office and DEQ's procurement office. The Laboratory and Environmental Assessment Division has developed a project plan to purchase a new LIM system and the request proposal criteria are being developed. LEAD has submitted an information resource request and business case to the DEQ information systems oversight group, it received their approval and it has been signed off by the agency Business Systems Development Manager (Sohng Shin) and DEQ's Deputy Director (Joni Hammond). Currently the IRR is in review by Ying Kwon from the CIO office. He has given us preliminary feedback for additional information to support our business case. Our response will be sent directly to him by May 6, 2011. Connie Thorstad is the DEQ procurement officer assigned to the LIM system purchase. LEAD staff and other members of the agency are developing the specifications, and criteria for judging prospective vendor responses and product demonstrations. The draft should be completed by May 19, 2011.

Audit Recommendation:

- ***Develop a performance measurement system to help improve Laboratory processes and align decisions to meet Laboratory objectives.***

Agency Response:

The Laboratory Management Team has evaluated potential performance measures that can be used to satisfy the recommendation and has established a set of measures that will be used. While overall turnaround time is a useful metric, meeting customer expectations (most often established in the Quality Assurance Project Plan) is more important. The current 45 day default is arbitrary and in many cases inappropriate. In some cases the customer needs may be fully satisfied with longer times or the customer may need shorter turnaround time. Therefore in addition to overall turnaround time, the laboratory is also going to track the percent of cases meeting project specific turnaround time goals. The current LIM system capabilities limit the options available. During the development of

requirements for the new LIM system, LEAD is including specifications around generating performance metrics. Performance measures that will be generated from the existing system will include:

1) Overall turnaround time in days (time from case login to case release)
2) Percent of cases meeting turnaround time goal
3) Overall turnaround time by Program in days (Air, Water, Land Quality)
4) Percent of cases meeting turnaround time goal by Program (Air, Water, Land Quality
5) Time from login to manager approval and time to release broken out by program and analytical work group.
6) Number of samples, tests, and data points total and by workgroup

Audit Recommendation:

- ***Develop a cost accounting system or other method to track the Laboratory's analytical productivity and costs, and use this data to allocate resources to the analytical units to best maximize the Laboratory's capacity.***

Agency Response:

The Laboratory Management Team is and will continue to work with the Management Services Division accounting and budgeting staff to develop better tools for measuring and tracking both fixed and variable actual costs associated with various analytical activities. One of the more challenging aspects of this task is to understand how the fixed or prorated costs are allocated and impact the costs per tests. The existing accounting system limits the ability to allocate costs to only 10 categories. While better understanding of the costs associated with different tests will be a valuable tool in helping the laboratory make effective budget planning and allocation decisions, DEQ would prefer not to go to a strictly costs per analysis system. The reason for this is there are a number of factors that significantly affect the actual costs aside from the type of test. These include the number of samples, timing, expected turnaround time, and sample matrix issues. More accurate costs estimates can be made on a project by project basis.

The needs of the Laboratory for better performance measures aligns perfectly with an overall outcome based management approach that DEQ is in the process of developing. In this system agency core processes are identified, and then sub-processes for each core process are developed. For each process and sub-process performance measures are established from the highest to the lowest level. Those performance measures are then evaluated on a quarterly basis and when found unsatisfactory the processes are analyzed to identify primary performance constraints (such as the current LIM system). As part of that process we are currently working on analytical productivity measures and looking at other areas where measures can be put into place to monitor LEAD performance. Because of the wide differences in how much work is involved in producing different types of analytical results, we want to make sure those productivity measures reflect true apples to apples comparisons.

Audit Recommendation:

Consider working with the Legislative Fiscal Office and the Budget and Management Division to establish a separate analytical laboratory budget. At a minimum, involve laboratory management throughout the budget process, and ensure the budget process incorporates cost information for analytical services provided to the Divisions and allows for services to external customers.

Agency Response:

LEAD and Management Services Division in coordination with other programs and with advice from Legislative Fiscal Office as appropriate, will look to ensure that budgeting decisions take into account LEAD's unique position of working across all three programs and for external customers. The budgeting decisions will be made to minimize the impacts in productivity, costs, and maximize the laboratory's potential. The solutions must also make it feasible

to maintain the full range of analytical capabilities required to provide the data DEQ needs to make well informed decisions. The solutions must also recognize the critical role of the LMT in working with the programs and the Executive Management Team in making decisions that can achieve these goals in balance with the entirety of DEQ operations. If this analysis determines that a separate budget for LEAD is in the best interest of overall agency operations, the Management Services Division will work with the Programs and LEAD to explore this potential with the Legislative Fiscal Office.

DEQ will work to develop solutions to resolve existing problems that may be exacerbated as LEAD moves to performing more work for external customers. Currently when the laboratory brings revenue into the DEQ it goes into one of the program budgets. The solution will need to ensure the laboratory has the ability to fully utilize those funds and to hire the staff and resources necessary to conduct the work and meet commitments. The inability to obtain those resources which results in the use of existing staff to conduct this new work has created imbalances between resources and commitments. This has been one of the biggest factors in the development of large work backlogs and slow turnaround times.

Audit Recommendation:

Provide the Laboratory with additional flexibility to make resource decisions to best respond to DEQ's service needs, and explore opportunities to increase utilization of Laboratory capacity through outside customers.

Agency Response:

In taking on outside work it will be important for the agency to establish clear policies under which they would accept such work. DEQ would need to ensure that no conflict of interest arises from doing so. DEQ is cognizant of the potential issues around competing with the private environmental analytical laboratories and is looking to provide services that are not generally provided by instate commercial laboratories. External work should not interfere with the laboratories capabilities to meet the needs of DEQ. The laboratory has developed methods that are highly specialized and should make these capabilities available to other agencies and organizations.

The agency is currently working with its accounting staff in the Management Services Division to develop processes that will make it easier for outside customers to use the DEQ Laboratory and for DEQ to accommodate such work. These efforts include developing efficient processes to enter into revenue agreements with external clients and mechanisms to track expenses and provide information to generate invoices and receive payments. DEQ is working on developing intergovernmental agreements for conducting monitoring and analytical work with Oregon Department of Fish and Wildlife, Oregon Department of Forestry and the Oregon Department of Agriculture. DEQ acknowledges the budgetary benefits identified in the audit report of fully utilizing capacity and spreading fixed costs out over a larger customer pool.

Agency Response Summary

DEQ is purchasing a new LIM system which will go a long ways to improving turnaround time and productivity. DEQ will develop and utilize performance measures and cost analysis tools to provide better data that can be used to improve overall laboratory productivity. DEQ will seek to do more work for external customers when such work is consistent with established policies. Many of the issues identified result from the inability of the LMT to effectively manage their own budget. DEQ will explore all feasible solutions to this issue. DEQ would like to also recognize the audit finding that despite the many opportunities for improvement identified through the audit, the DEQ laboratory analytical productivity is comparable to those of the other state laboratories evaluated.

About the Secretary of State Audits Division

The Oregon Constitution provides that the Secretary of State shall be, by virtue of her office, Auditor of Public Accounts. The Audits Division exists to carry out this duty. The division reports to the elected Secretary of State and is independent of the Executive, Legislative, and Judicial branches of Oregon government. The division audits all state officers, agencies, boards, and commissions and oversees audits and financial reporting for local governments.

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The courtesies and cooperation extended by officials and employees of the Department of Environmental Quality during the course of this audit were commendable and sincerely appreciated.