

F - Portland



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February 10, 2012

Mr. David Leland, Program Manager  
Oregon Health Authority Drinking Water Program  
P.O. Box 14450  
Portland, OR 97293-0450

RECEIVED  
FEB 10 2012

Data Mgmt & Compliance  
Drinking Water Program

Subject: Request for Schedule Adjustment of LT2 Requirements for Uncovered Finished Drinking Water Reservoirs

Dear Mr. Leland:

The Portland Water Bureau (PWB) currently stores finished drinking water in five uncovered reservoirs. On March 27, 2009, PWB provided a schedule to the U.S. Environmental Protection Agency (EPA) for compliance with the uncovered reservoir requirements in the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 rule). EPA has indicated in recent correspondence that it would consider schedule adjustments if a water supplier had robust interim measures to protect public health during the deferral period.

On February 1, 2012, the Portland City Council directed the Portland Water Bureau to request an adjustment to the compliance schedule for the uncovered finished drinking water requirements of the LT2 rule (Resolution No. 36904). The purpose of this letter is to propose a schedule adjustment for projects related to replacing the five uncovered finished drinking water reservoirs with buried storage. PWB proposes this solution as it works steadily and consistently towards compliance with the LT2 regulations. The net effect of this proposed adjustment would be completion of the Mount Tabor disconnections in 2024 and the Washington Park reservoirs in 2026. PWB believes the reasons to grant the request for adjustment are compelling.

The Portland Water Bureau is committed to public health protection. Water quality is an obvious and important element of this, but so also is the provision of a consistent and adequate water supply. All customers, including residents, businesses, and medical providers, count on PWB to reliably supply drinking water and water for firefighting. A schedule adjustment would help PWB reduce its operational risks, continue to maintain public health protection, and provide drinking water during a series of major modifications to a 100-year-old system.

PWB believes that the requested schedule adjustment minimizes overall risks to public health during the construction period. The schedule allows PWB to sequence a key set of projects to substantially reduce the risk of supply interruption otherwise posed by simultaneous

implementation. In addition, PWB will also be able to create a rate schedule that more gradually incorporates project costs for ratepayers during the current difficult economy.

PWB has implemented many measures over the years to protect public health from the potential risks of operating uncovered reservoirs. A long record of safe operations attests to the robustness of the measures.

The attached proposal outlines the need for the schedule adjustment and describes PWB's systems to protect public health and the bureau's commitment to keep its protective measures in place until the water system is in compliance with the uncovered reservoir requirements of the LT2 rule.

Please do not hesitate to contact me if you have questions about this proposal.

Sincerely,

A handwritten signature in blue ink, appearing to read "David G. Shaff". The signature is fluid and cursive, with a large loop at the end.

David G. Shaff  
Administrator

Enclosures:

Proposal to Adjust Compliance Schedule for Portland Water Bureau Open Reservoir Projects

Attachments

- A – Correspondence Regarding the Uncovered Finished Water Storage Requirements of LT2
- B – Original and Proposed Compliance Schedule Dates for All Open Reservoir Projects
- C – PWB Revised LT2 and Storage Recommendations Schedule
- D – Significant Project Sequencing
- E – PWB Fiscal Year 2012-13 Five-Year CIP Plan

# Proposal to Adjust Compliance Schedule for Portland Water Bureau Open Reservoir Projects

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## Background

Data Mgmt & Compliance  
Drinking Water Program

Portland has five uncovered finished drinking water reservoirs; three are on the east side of town at Mount Tabor (Reservoirs 1, 5, and 6) and two on the west side at Washington Park (Reservoirs 3 and 4). These reservoirs are capable of providing in-town storage supply for routine operations, emergencies, fire protection, pressurization, and equalization to offset demand fluctuations that occur throughout the day and seasonally. Total system demands vary from approximately 80 million gallons a day (MGD) in winter to roughly 150 MGD in the summer. During the peak season, demand has been as high as 190 MGD. Using the conduits, uncovered reservoir storage, and one dedicated transmission line, PWB serves more than 500,000 customers, including the downtown business district and some of Portland's major hospitals and medical clinics.

The five uncovered concrete reservoirs are more than a century old. Reservoir 1 at Mount Tabor and Reservoirs 3 and 4 at Washington Park were completed in 1894. Reservoirs 5 and 6 at Mount Tabor were completed in 1911. The bureau patches and repairs the uncovered reservoirs as necessary when they are drained for cleaning, about twice a year. Since 1975, PWB has completed several maintenance and security improvements. The bureau has added liners to three reservoirs to reduce leakage and prevent the intrusion of groundwater. The last liner was installed in 2005 and has a 20-year life cycle.

## Regulatory Status

In 2006, EPA finalized the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 rule) [71 Fed. Reg. 654, 659-61 (Jan. 5, 2006)] requiring water providers serving populations of 100,000 or more to cover the uncovered finished drinking water reservoirs or provide treatment at the outlets of such reservoirs to inactivate *Cryptosporidium*, *Giardia* and viruses.

In 2007, the City of Portland challenged the EPA over the requirements of the LT2 rule in the U.S. Court of Appeals for the District of Columbia Circuit Court. In the City of Portland vs. EPA decision, Judge Tatel ruled that the "Safe Drinking Water Act (SDWA), 42 USC §§ 300 f to 300j-26 requires EPA to protect the public from *Cryptosporidium* and other contaminants" to the maximum extent possible. Judge Tatel added that "under the final rule, ... Portland [has] two choices: ...either treat their source water for *Cryptosporidium* and cover their reservoirs, or ...leave the reservoirs uncovered and treat the water for *Cryptosporidium* as it leaves the reservoirs."<sup>1</sup>

Under direction from the EPA in 2008, PWB has taken immediate steps towards compliance, submitting a schedule and plan to EPA on March 25, 2009, for complying with the uncovered

<sup>1</sup> City of Portland, Oregon v. EPA (D.C. Cir. 2007), Docket 06-1068b, page 5. Available at [www.portlandonline.com/water/index.cfm?c=53849&a=330874](http://www.portlandonline.com/water/index.cfm?c=53849&a=330874).

reservoir portion of the LT2 requirements.<sup>2</sup> Approved on March 27, 2009, PWB's schedule and plan includes disconnection of all five uncovered reservoirs from the public water system, relocating storage from the Mount Tabor Reservoirs to new buried reservoirs at Powell and Kelly Buttes, and constructing a new buried reservoir at Washington Park Reservoir 3.

Since 2009, PWB has submitted three inquiries to EPA and the Oregon Health Authority (OHA) Drinking Water Program<sup>3</sup> about possible variance processes available for the uncovered reservoirs. Each response from the regulating agencies indicated that there was no variance process for the uncovered reservoirs—Portland must treat at the outlet or cover the reservoirs.<sup>4</sup> The last response, from OHA, dated December 9, 2011, indicated that, although compliance obligations could not be modified, public water systems may submit a request for a schedule adjustment. The request should include "robust interim measures in place to ensure public health protection."<sup>5</sup>

### **Proposed Schedule Adjustment Requested**

This document proposes an adjustment to delay the start of some projects necessary for the scheduled replacement of uncovered storage with covered storage for finished drinking water to fiscal year (FY) 2017-18. The net effect of this proposal would be completion of the Mount Tabor disconnections in 2024 and the Washington Park reservoirs in 2026. Figure 1 shows the schedule of major open reservoir projects as approved in March 2009 and PWB's proposed schedule adjustments for those larger projects.

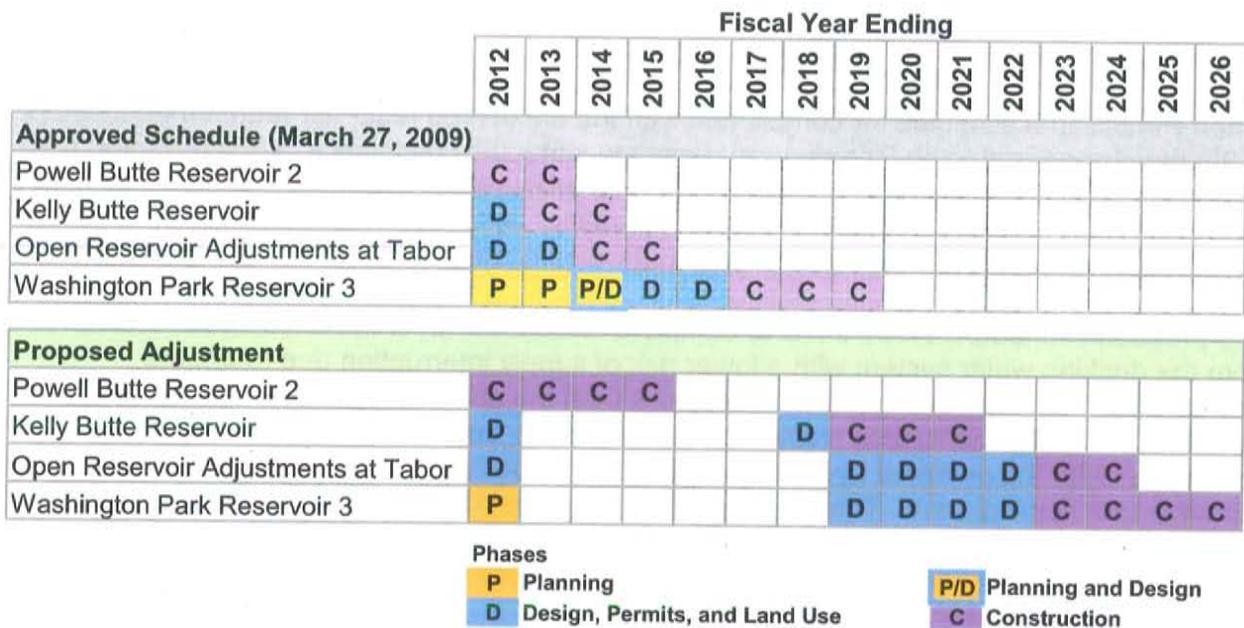
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<sup>2</sup> EPA was the agency with primacy over LT2 rule requirements in Oregon at the time. Since July 2009, OHA has had primacy for administering the LT2 rule in Oregon. This is discussed in detail in PWB's Request for a Treatment Variance to the Long Term 2 Enhanced Surface Water Treatment Rule, available at [www.portlandonline.com/water/index.cfm?c=54913&](http://www.portlandonline.com/water/index.cfm?c=54913&).

<sup>3</sup> In 2011, the Oregon Department of Human Services (DHS) Drinking Water Program changed its name to the Oregon Health Authority (OHA) Public Health Division, Office of Environmental Public Health Drinking Water Program. References to the agency in correspondence and documents dated prior to the change may refer to DHS; those dated after the change refer to OHA.

<sup>4</sup> Correspondence among EPA, OHA, and PWB on the uncovered finished water storage requirements of LT2 is available in Attachment A.

<sup>5</sup> Attachment A, Item 5.



**Figure 1. Time Line Showing Approved Schedule and Proposed Adjustment for Major Projects<sup>a</sup>**

<sup>a</sup>Small supporting system improvement and transmission projects are shown in the detailed schedule available as Attachment B.

Table 1 shows a comparison of the deadline dates of major projects according to the approved schedule and under the proposed schedule adjustment. Attachment B, Original and Proposed Compliance Schedule Dates for All Open Reservoir Projects, includes all dates for all projects.

**Table 1. Approved and Proposed Compliance Deadlines for PWB Open Reservoir Projects<sup>a</sup>**

	Deadlines Approved on 3-27-09	Proposed Deadlines After Adjustment <sup>b</sup>
1. Powell Butte Reservoir 2	2013	2015
2. Kelly Butte Storage	2014	2021
3. Open Reservoir Adjustments at Tabor	2015	2024 <sup>c</sup>
<b>4. Disconnect Tabor Reservoirs 1, 5, &amp; 6</b>	<b>December 31, 2015</b>	<b>June 30, 2024</b>
5. (Replace) Washington Park Reservoir 3	2019	2026
6. Westside Supply Intertie between Tabor and Eastside Header	2016	2021 <sup>d</sup>
7. Connection from Washington Park 299 (Res. 3) to 229 (Res. 4) (Regulators)	2016	2022 <sup>e</sup>
<b>8. Disconnect Washington Park Reservoir 4</b>	<b>December 31, 2020</b>	<b>June 30, 2026</b>

<sup>a</sup>Other system improvement and transmission projects are shown in the detailed schedule available as Attachment B.

<sup>b</sup>See Figure 1 for a Gantt view of the proposed adjustment.

<sup>c</sup>Projects can be completed any time before 2024.

<sup>d</sup>Project can be completed any time before 2021.

<sup>e</sup>Project can be completed any time before 2022.

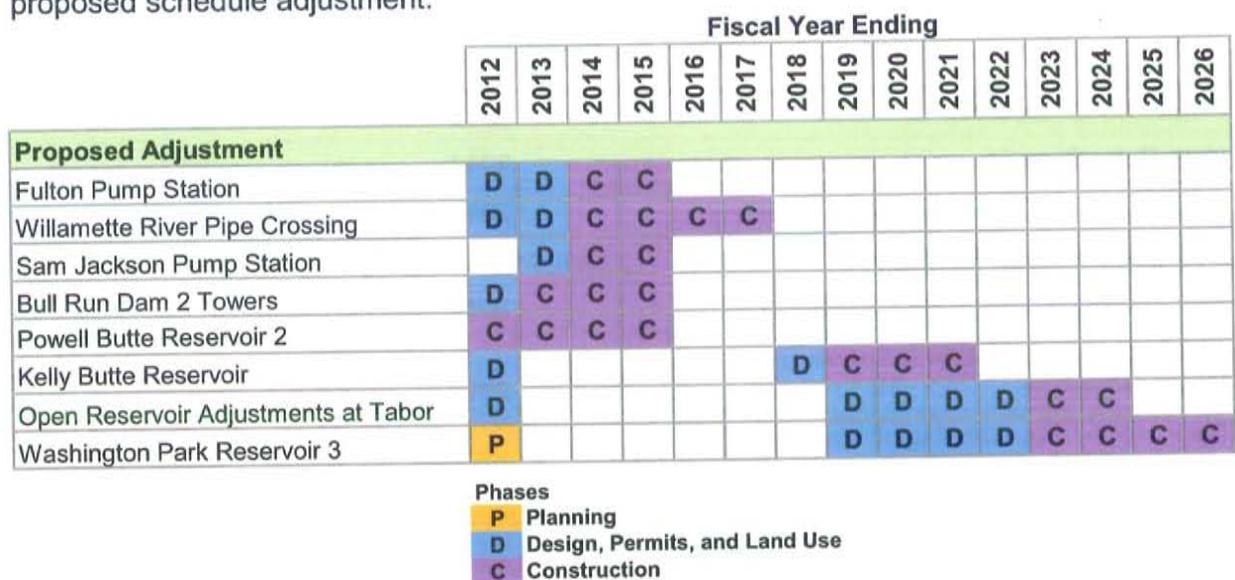
## Rationale for Schedule Adjustment

When PWB filed a schedule for compliance with the uncovered reservoir requirements of LT2 in 2009, there appeared to be little room to negotiate schedule compliance. EPA, however, has recently indicated a willingness to accept schedule adjustments given the “multiple challenges” associated with “managing, maintaining and operating” water systems. Specifically, EPA has said that “there may be specific articulable facts that warrant compliance schedule adjustments.”<sup>6</sup>

The proposed schedule allows PWB to complete disconnection of the uncovered reservoirs from the drinking water system with a lower risk of supply interruption due to project sequencing. This sequencing presents less risk than the sequencing under the approved schedule. A supply interruption would pose a risk for key customers that provide medical services and for the personal hygiene, sanitation, and food preparation of many ratepayers in the west-side service areas. The proposed schedule would also enable PWB to more gradually incorporate project costs and reduce the financial impact on ratepayers during the current recession, when households are facing financial pressures on many fronts. A discussion of the project sequencing and benefits to ratepayers follows.

## Sequencing Critical Projects

PWB is currently committed to a number of critical infrastructure projects that are needed to improve reliability and redundancy and to reduce the vulnerability of the city’s water system. Attachment D, Significant Project Sequencing, shows in Gantt chart form, the schedule for PWB’s construction projects over \$5 million. The projects include the Fulton Pump Station replacement, the Willamette River Pipe Crossing, Interstate Facility Rehabilitation, the Emergency Coordination Center, the Carolina Pump Main Extension, the Dam 2 Towers, and Conduit Maintenance projects. Figure 2 shows the sequencing of these key projects under the proposed schedule adjustment.



**Figure 2. Project Sequencing Under the Proposed Adjustment<sup>a</sup>**

<sup>a</sup>Small supporting system improvement and transmission projects are shown in the detailed schedule available as Attachment B.

<sup>6</sup> Attachment A, Item 5.

PWB's proposed schedule adjustment for the open reservoir projects is intended to ensure that the bureau can operate in a stable operational environment that provides safeguards for emergencies. PWB believes that the adjustment would provide the greatest likelihood of completing the reservoir replacement projects with the lowest risk of water supply disruption and its consequent public health risks.

### West Portland Facilities

Project sequencing is particularly challenging on the west side of the Willamette River. The Washington Park reservoirs are key components of the system serving the downtown and the rest of the west side, which includes several major medical facilities.

During replacement of the Washington Park reservoirs, there will be no major storage reservoirs for customers on the west side of Portland. PWB will rely solely on the transmission pipes that cross the Willamette River and a limited number of tanks on the west side to supply its west-side customers.

The infrastructure for the transmission mains that cross the Willamette River is not built to current seismic standards. If the Washington Park reservoirs are taken off-line prior to replacement of these mains, PWB risks a major supply outage with subsequent public health risks. Once constructed, the new Willamette River Crossing pipelines will meet the current seismic standards and provide much-needed protection against supply interruptions in the event of a major earthquake while the reservoirs are under construction.

Fulton Pump Station is also a pivotal west-side facility. This station is 100 years old and in poor condition. Constructing the new pump station will improve the city's ability to provide basic levels of water supply as well as emergency service while the Washington Park reservoirs are under construction. The Sam Jackson Pump Station, a smaller project, will also provide some water to west-side customers during reservoir construction at Washington Park.

### Bull Run Watershed Facilities

PWB's Bull Run Dam 2 Towers project adds temperature-control gates to the intake towers at Bull Run Reservoir Dam 2 to meet a portion of PWB's obligation under the federal Endangered Species Act and the Clean Water Act.<sup>7</sup> This project, slated to begin in the spring of 2012, affects all of the water that flows to the municipal transmission and distribution system with the exception of water provided from the Columbia South Shore Well Field as groundwater. For optimal sequencing and risk-reduction, the Dam 2 Towers project should be complete before PWB begins major additional changes to the supply system.

### Interstate Facility and the Emergency Coordination Center

Two additional large pending projects have a major effect on PWB's ability to operate the system as a whole: the Interstate Facility Rehabilitation and the Emergency Coordination

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<sup>7</sup> The Bull Run Water Supply Habitat Conservation Plan (HCP) outlines the measures PWB is implementing towards its ESA and CWA obligations. The HCP is available at [www.portlandonline.com/water/index.cfm?c=46157](http://www.portlandonline.com/water/index.cfm?c=46157).

Center (ECC). The Interstate Facility is the bureau's maintenance and operations center. The construction yard at that facility houses much of the bureau's critical supplies and equipment. Constructed in the 1930s, the facility has outlived its life and would be at severe risk during an earthquake. The Emergency Coordination Center project is the bureau's share of a new City ECC. Both of these facilities are critical to PWB's ability to respond effectively in an emergency.

Completion of these projects—the new Westside Transmission Main and Fulton Pump Station, facilities in the Bull Run watershed and at bureau's Interstate location, and the Emergency Coordination Center—prior to major work at Washington Park will provide the needed operational flexibility to better respond to unanticipated events and reduce the risks of water supply outages during the period when Reservoir 3 is being replaced.

### **Short-Term Rate Relief**

The combination of a treatment variance from OHA and this schedule adjustment would reduce the bureau's Capital Improvement Project (CIP) budget by about \$100 million for the next five years. This means PWB would be able to more gradually introduce water rate increases to fund the necessary projects. Since the 2007-08 fiscal year, PWB's rate increases have increased steadily by several percentage points, with the highest increase in FY 2009-10 to fund projects needed for LT2 compliance.

At the same time that PWB is implementing double-digit rate increases, the Portland community is suffering the effects of a major sustained recession with high local unemployment and many household budgets under extraordinary pressure. In addition, Portland customers have experienced substantial sewer and stormwater rate increases from the Bureau of Environmental Services to finance large capital projects to fulfill other regulatory requirements.

Currently, average residential customers pay about \$28 per month for the water portion of a joint utility bill. This was forecast to increase to more than \$50 per month, with a large portion of the increase attributable compliance with the LT2 rule. The proposed schedule adjustment will moderate these increases.

### **Potential Concerns about Public Health During the Schedule Adjustment Period**

In its response to Portland's request for an indefinite deferral of LT2 compliance, the EPA indicated that compliance requirements will stand but that schedule adjustments may be appropriate and that, if schedule adjustments were granted, water suppliers would be expected to have robust measures in place to protect public health.<sup>8</sup> The adjusted schedule proposed by PWB inherently provides for public health protection as the proposed project sequencing reduces the risk of supply interruption posed by constructing multiple major projects at the same time.

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<sup>8</sup> Attachment A, Item 5.

Over the past ten years, PWB has taken steps to progressively mitigate potential water quality risks posed by the uncovered reservoirs and strengthened every aspect of its operations and security to mitigate risks to the water supply. PWB believes the existing operational and security systems are sufficiently robust to protect public health.

The following sections discuss the risks and measures to protect public health, including physical security, operational protection, and water quality measures.

## Public Health Risk Evaluation

PWB believes that the current observable risk to public health is low. This conclusion is supported by the following:

- *No waterborne disease outbreaks in PWB's service area since inspections began* – One criterion for maintaining a water supplier's unfiltered status is evidence that the water source "has not been the source of a waterborne disease outbreak." This criterion has been verified each year by State of Oregon Drinking Water Program for the Bull Run source since 1991, the effective date of the Surface Water Treatment Rule.
- *A disease surveillance system sensitive enough to identify outbreaks* – Oregon's disease surveillance, investigation, and reporting system has been used as a benchmark of excellence for foodborne outbreaks. The protocols, structures and reporting that make Oregon well-known for foodborne investigations are identical to those used for waterborne illness.<sup>9</sup> Despite the challenges inherent in cryptosporidiosis surveillance, the systems in Oregon are sensitive enough to identify local outbreaks. For example, a 1998 outbreak was traced to a swimming pool in Multnomah County. No cryptosporidiosis outbreaks in Multnomah County have ever been attributed to PWB drinking water as a source.
- *Expert opinion is that the water system presents a low risk for cryptosporidiosis* – A 2011 public health expert panel<sup>10</sup> examined the available data on cryptosporidiosis within the service area. The panel concluded that the data show no indication of an endemic disease burden due to *Cryptosporidium* from the water system and that no cryptosporidiosis outbreaks have ever been attributed to the Portland water supply.
- *Record of safe operations* – The Portland Water Bureau has an outstanding record of safe operations. Yearly watershed inspections conducted by OHA since 1992 have also rated the water supply system as being in good operating condition. To ensure the continued safety of the system, many water quality parameters are monitored at the source and throughout the distribution system far more frequently than is mandated by law. In the event of a total coliform or *E. coli* detection, PWB has a rigorous response

<sup>9</sup> Center for Science in the Public Interest. 2011. All Over the Map: A 10-Year Review of State Outbreak Reporting Including a Report Card on 50 States and Washington, D.C. Available at <http://cspinet.org/new/pdf/allverthemap.pdf>.

<sup>10</sup> The public health expert panel was convened to review PWB's public health data as part of the bureau's request for a variance from the treatment requirements of the LT2 rule. The panel process and detailed opinion are described in PWB's Treatment Variance Request available at [www.portlandonline.com/water/index.cfm?c=54913&](http://www.portlandonline.com/water/index.cfm?c=54913&).

plan that includes a plan for notification, protocols for actions at the reservoir and in the distribution system, record-keeping, and follow-up actions.

- *Limited water quality data collected from two of Portland's uncovered reservoirs indicated no presence of pathogenic Cryptosporidium* – 36 water samples totaling 7,000 liters were collected from Reservoirs 4 and 5 between June 2008 and April 2009 as part of Water Research Foundation study 3021.<sup>11</sup> The testing method employed was not EPA Method 1623 and was instead designed to detect only the presence of infectious *Cryptosporidium*. Zero infectious oocysts were detected in the 36 samples.

### **PWB's Mitigation Measures for Uncovered Reservoirs**

The EPA has concluded that uncovered finished drinking water reservoirs present an opportunity for water quality degradation through the introduction of microbiological, chemical, and physical contamination. These pathways for contamination can be classified as steady-state or episodic risks. The main pathways are detailed in Table 4 along with the related major concerns and the mitigation measures PWB uses. Additional detail is provided following Table 4.

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<sup>11</sup> Water Research Foundation. 2010. Detection of Infectious Cryptosporidium in Conventionally Treated Drinking Water. Project #3021. Available at <http://www.waterrf.org/search/detail.aspx?Type=2&PID=3021&OID=3021>.

**Table 4. Uncovered Reservoir Risk Categories and Associated Monitoring and Mitigation Measures**

Steady-State Risks	
<p><i>These are low-level risks of an ongoing nature that can be mitigated by various measures. Examples of these risks include decreasing chlorine residual due to bacteriological introduction or algal growth affecting taste and odor. Water providers can monitor and make adjustments for these steady-state changes so that all water continues to meet regulations and public health risk is minimal.</i></p>	
Risk Category	Monitoring and Mitigation Measures <sup>a</sup>
	Common Source
Pathogens from bird waste	Birds landing on and flying over the reservoir present a source of biological contamination.
Pathogens from other animal waste	Rodents and other animals present a source of biological contamination if entering the reservoirs or defecating around them.
Surface and ground water infiltration	Untreated water entering into the reservoir can carry sources of contamination.
Algal growth	Aesthetic degradation from low levels of algal growth or toxins from a larger algal bloom
Insect infestation	Larvae carried through distribution system or increase of birds drawn by food supply
Air-borne drifts and deposition	Industrial pollutants and particulate carried by air in contact with reservoir

*Continued on next page*

**Table 4. Uncovered Reservoir Risk Categories and Associated Monitoring and Mitigation Measures, continued**

<i>Episodic Risks</i>	
<i>The high-level risks are unpredictable and random potentially causing large-scale contamination due to either intentional acts or atypical occurrences. Water providers can still take mitigation measures against these risks to try to prevent, prepare, and respond as necessary. However, by nature these risks are more difficult to predict due to their rarity.</i>	
<b>Risk Category</b>	<b>Monitoring and Mitigation Measures<sup>a</sup></b>
Intentional introduction of contamination	<p><b>Common Source</b></p> <p>Input of microbial or chemical contaminants as an act of vandalism or sabotage</p> <p><b>Monitoring and Mitigation Measures<sup>a</sup></b></p> <p>Automated continuous water quality monitoring<sup>b</sup></p> <p>Operator water quality monitoring<sup>c</sup></p> <p>24-hour security personnel and camera system</p> <p>Intrusion detection system</p> <p>Emergency response procedures and trained responders</p> <p>Operational flexibility to control reservoir use if contamination suspected</p>
Unintentional introduction of contamination from public access	<p><b>Common Source</b></p> <p>Some debris will inevitably find its way into the reservoir and can be potentially dangerous.</p> <p><b>Monitoring and Mitigation Measures<sup>a</sup></b></p> <p>Automated continuous water quality monitoring<sup>b</sup></p> <p>Operator water quality monitoring<sup>c</sup></p> <p>24-hour security personnel and camera system</p> <p>Public education</p> <p>Isolation of contaminate, draining, and cleaning</p> <p>Operational flexibility to control reservoir use if contamination suspected</p>
Seismic event	<p><b>Common Source</b></p> <p>Reservoirs fail, leaving a portion of the public without access to potable water or fire flow.</p> <p><b>Monitoring and Mitigation Measures<sup>a</sup></b></p> <p>Emergency response procedures</p>
Atypical biological event	<p><b>Common Source</b></p> <p>Large-scale population increase in animals surrounding reservoir or increased disease burden in animal population escalating potential of microbial contamination</p> <p><b>Monitoring and Mitigation Measures<sup>a</sup></b></p> <p>Operator water quality monitoring<sup>c</sup></p> <p>Security personnel alert to unusual changes in wildlife</p> <p>Operational flexibility to control reservoir use if contamination suspected</p>

<sup>a</sup> For more information, see [www.epa.gov/watersecurity/pubs/rptb\\_response\\_guidelines.pdf](http://www.epa.gov/watersecurity/pubs/rptb_response_guidelines.pdf).

<sup>b</sup> Automated continuous water quality monitoring in the uncovered reservoirs consists of monitoring total chlorine, pH, turbidity, temperature, conductivity, and dissolved oxygen.

<sup>c</sup> Routine sampling in the uncovered reservoirs consists of grab samples gathered by Water Quality Inspectors to monitor the impact of the uncovered reservoirs on water quality. This monitoring samples at varying frequencies for indicator bacteria (coliforms and *E. coli*), free ammonia-N, nitrite-N, nitrate, reactive phosphorous, silica, color, algae, chlorophyll, alkalinity, and chlorine species in the uncovered reservoirs.

## Physical Security Measures

As indicated in Table 4, PWB currently has security measures in place to reduce risks associated with the uncovered reservoirs. PWB's robust security program includes onsite security 24 hours a day, 7 days a week (24/7). The security personnel have close ties to the Portland Police Bureau. PWB has installed security cameras with infrared capability that are monitored 24/7 by security personnel from a centralized location. Intrusion detection devices have been installed on the fences along the reservoir parapets, monitored 24/7 by security personnel.

Full-time staff are also dedicated to emergency management, and PWB has a complete all-hazards emergency response plan. PWB is also fully compliant with the National Incident Management System (NIMS).

## Operational Protection Measures

PWB's Water Control Center (WCC) is staffed 24/7. Operators are trained to monitor a variety of sensors to track the physical status of the system and monitor events that are out-of-the-ordinary. Operators handle trouble calls at night with the goal of solving system problems. The WCC works closely with the security section to monitor all aspects of system operations. During the work day, PWB's Water Line staff handle telephone reports of water quality or water pressure concerns and questions. The Water Line staff are also trained to watch for unusual complaints and be aware of trends that are unusual. In addition, PWB minimizes the use of uncovered reservoirs during normal low-demand periods and conducts uncovered reservoir draining and cleaning in order to best maintain water quality. PWB's protocols capture many of the best practices from EPA's Emergency Response Toolbox.<sup>12</sup>

The measures, as they relate to known or potential risks, are shown in Table 4. These mitigation measures have served PWB well, despite the vulnerability of the uncovered reservoirs. Since September 2001, PWB has further developed its monitoring program and response protocols. The monitoring has proven to be sufficiently sensitive to detect contamination, and the response protocols have been effective in isolating and addressing events.

## Water Quality Protection Measures

PWB also has a suite of detailed event protocols that have been effective for isolating and addressing events. Depending on the circumstance, the protocols may include shutting down the reservoir, notifying the health authority and regulatory agencies, and modeling for potential areas of impact. The bureau also has notification systems in place and provides for temporary supplies of drinking water as appropriate.

Indicators of microbial contamination, such as total coliform and *E. coli*, are regularly monitored through the bureau's Total Coliform Rule plan and additional total coliform testing for operational needs. Response measures are in place to address any increased levels of coliform production indicating potential concern.

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<sup>12</sup> See the EPA web site for details: [www.epa.gov/watersecurity/pubs/rptb\\_response\\_guidelines.pdf](http://www.epa.gov/watersecurity/pubs/rptb_response_guidelines.pdf).

## Summary

PWB will comply with the LT2 requirements. Current circumstances, however, lead the bureau to request a schedule adjustment to delay the start of some of the projects necessary to replace uncovered reservoirs with covered storage. When EPA approved PWB's compliance schedule in 2009, it did not indicate that deferrals in the schedule were possible. PWB's compliance plan assumed some operational risks in order to comply with the regulations. Recent communications from EPA indicate that a deferral in the schedule for compliance may be possible, providing a utility has appropriate measures to protect public health.

PWB has two principal reasons to request a schedule adjustment. First, an adjustment would reduce the public health and safety risks associated with supply interruption posed by multiple large projects occurring either at the same time or with substantial overlap. Second, an adjustment would reduce rate pressures on ratepayers during a prolonged recession.

PWB has outlined a strategy in this proposal that would culminate with its uncovered reservoir storage replaced with enclosed storage by 2026. This strategy would allow PWB to make steady and consistent progress toward compliance while completing several major construction projects sequentially to mitigate the risks of major supply interruptions by reducing system vulnerability and increasing operational flexibility.

The proposed strategy would allow PWB to provide some rate relief for ratepayers. Ratepayers nation-wide are feeling pressed by the costs of more stringent regulation and aging infrastructure systems. The current LT2-related rate increases, coupled with the recent economic downturn, leave PWB's ratepayers pressing for relief from any quarter.

PWB has implemented robust measures to manage the risks to water quality. These measures, which would remain in place during the deferral period, include extensive physical security, an exceptional testing and monitoring regime, and a detailed event-response capability. PWB's excellent operational record is indicative of the skill and care of the operating staff and the entire bureau.