determine well pump performance or well output. Without service meters NBWD cannot bill equitably for water usage and cannot determine how much water production is leaking from the distribution system.

NBWD water distribution system is fully metered, per Water Use Efficiency Rule requirements. Tracking of total water sales and regular comparison to total water production is important to monitor the condition of the water distribution system. As water meters age, they tend to under-report usage. Low reading meters can result in lost revenue and artificial inflation of DSL rates. Typical water meter life is approximately ten years. Water meters can generally be replaced for less than the cost of testing and repairing water meters. Therefore, a water meter replacement program on approximately a ten year cycle will help to keep water sales data accurate.

Water Billing

Water billing software has two important functions: Creating water bills and tracking payments to support the operation of the water system, and regular tabulation of total volume of water sold, which by comparison with water produced, is an indicator of the condition of the water distribution system.

EMERGENCY RESPONSE PROGRAM

Water utilities have the responsibility to provide an adequate and reliable quantity and quality of water at all times. To meet this requirement, utilities must reduce or eliminate the effects of natural disasters, accidents, and intentional acts. Although it is not possible to anticipate all potential disasters affecting NBWD's water system, formulating procedures to manage and remedy common emergencies is appropriate.

NBWD will regularly review and practice its emergency response plan. An Emergency Response Planning Guide is available at the following web site:

https://fortress.wa.gov/doh/eh/dw/publications/publications.cfm?action=pubdetail&type=title&PubId=203&CFID=245767&CFTOKEN=36023621

Following is a summary of emergency response information and actions that may be required in typical emergency situations.

WATER SYSTEM PERSONNEL EMERGENCY CALL-UP LIST

Table 6-4 provides phone numbers for emergency contacts including response agencies, governments, and material suppliers.

TABLE 6-4

Water System Emergency Phone List

Agency/Group	Contact	Phone Number
Fire/Police		911
NBWD Business Office	Bill Neal, General Manager	Office: (360) 665-4144 Mobile: (360) 244-0068
	Jack McCarty, Office Manager	Office: (360) 665-4144
	Robert Hunt, Field Superintendent	Office: (360) 665-4144
Electrical	Public Utility District No. 2	(360) 642-3191
Telephone Service	Century Telephone	(800) 954-1211
Testing Lab	Columbia Analytical Services, Inc.	(360) 577-7222
Washington State Department of Health	SW Regional Office, Teresa Walker, P.E.	(360) 236-3030 (360) 236-3032
	24-Hour Emergencies	(877) 481-4901
Washington State Department of Ecology	Emergency Spill Response	(360) 407-6300
Pacific County	Emergency Management	(360) 875-9340
	Public Works	(360) 875-9368
	General Information	(360) 875-9300
	Planning Department	(360) 875-9356
	Road Maintenance	(800) 875-9380
State Wide One-Call	Utility Locates	(800) 424-5555
Gray & Osborne, Inc. Engineering Services	Olympia Number	(360) 292-7481
	Seattle Number	(206) 284-0860

EMERGENCY PROCEDURES

Bacterial Contamination of Water Supply

Bacterial contamination of the water supply can result from such items as main breaks, backflow events, or pollution from an isolated source. Any time coliform bacteria are detected in a water system sample, the DOH regional office should be notified as soon as possible. The contact number is listed in Table 6-4. WAC 246-290-320 (2) further specifies specific follow-up procedures in the event coliform bacteria are detected in the water system. Table 6-5 lists additional appropriate actions to be taken in the event of the contamination of the water supply.

TABLE 6-5

Water System Bacterial Contamination Response Actions

Distribution System Contamination
• Perform chemical and free chlorine residual analysis at various locations within the system, including the reservoirs and at system extremities.
• Disinfect distribution lines as dictated by the nature of the contamination.
Reservoir Contamination
• Isolate reservoir from system.
• Inspect vent screens, hatches, and piping to identify source of contamination.
• Resample to confirm contamination. Take multiple samples at different locations in Reservoir, if possible.
• Check distribution system for presence of contamination.
• If reservoir water is contaminated and, therefore, considered unsuitable for consumption, drain and clean reservoir.
• Disinfect reservoir if bacteriological standards are exceeded. Follow AWWA Standards. A 50-ppm chlorine solution in the reservoir can be obtained by adding 97 gallons of 5.25 percent chlorine bleach per 100,000 gallons of storage.

Inorganic Chemical/Physical Characteristics Exceedance

Inorganic Chemical/Physical Characteristics (IOC) samples are routinely collected from water supply sources, generally once every three years, unless monitoring waivers have been issued, or a higher frequency has been required. IOC tests include numerous different chemicals. If routine IOC samples detect one or more chemicals in excess of an MCL, additional samples may be collected specifically for that chemical if it reduces follow-up chemical testing costs. If practical, the source of supply that exceeds the IOC MCL should be taken out of service until the cause of the problem is identified and corrected. Follow-up procedures in the event of an Inorganic Chemical/Physical Characteristics MCL violation are specified in WAC 246-290-320 (3). Follow-up actions may vary depending on the specific chemical detected and the level at which it is detected. The DOH regional office should be contacted at the number listed in Table 6-4 to coordinate follow-up sampling and appropriate responses.

Organic Chemical VOC and SOC

Organic Chemical VOC and SOC samples are routinely taken from water supply sources, generally once every three years, unless monitoring waivers have been issued, or a higher frequency has been required. VOC and SOC tests include numerous different chemicals. VOCs and SOCs are generally not detected in water supply sources. Therefore, any detection of VOCs or SOCs may warrant follow-up investigation even if it does not exceed an MCL. If routine VOC or SOC samples detect one or more chemicals,

additional samples may be taken specifically for that chemical or possibly for a surrogate such as Total Organic Carbon if it reduces follow-up chemical testing costs. If practical, the source of supply from which the VOCs or SOCs have been detected should be taken out of service until the cause of the problem is identified and corrected. Follow-up procedures in the event of a VOC or SOC detection are specified in WAC 246-290-320 (6). Follow-up actions may vary depending on the specific chemical detected and the level at which it is detected. The DOH regional office should be contacted at the number listed in Table 6-4 to coordinate follow-up sampling and appropriate responses.

Power Failure

Various types of weather can cause a loss of power. These weather conditions include wind, lightning, freezing rain, or snowstorm. Commonly trees or tree branches fall on power lines due to wind, freezing rain or snow, causing power disruptions. Downed trees can also make it difficult to access the location of the power outage to implement repairs. Additionally, power can be lost through traffic accidents.

In the event of a power outage, NBWD staff will first check reservoir levels visually. The possible length of the power outage will be estimated and customers will be notified of the emergency and water conservation will be requested through radio, television, and newspaper and, if needed and available, through a police loudspeaker system.

NBWD has four diesel powered generators with a combined total capacity 480 kW. Automatic transfer switches automatically start the generators on power failure. These generators are adequate to power all facilities at both wellfields.

Severe Earthquake

A severe earthquake can result in distribution system breaks and structural damage to the wells and reservoirs. Table 6-6 provides procedures to follow in the event of a severe earthquake. A severe earthquake can also cause a power failure. See Power Failure, above.

Note: In the event of a large earthquake along the Pacific coast there is a possibility of a resultant tsunami. The possibility of a tsunami should be taken into consideration when determining appropriate follow-up action immediately following a large earthquake. See section on tsunami later in this chapter.

TABLE 6-6

Severe Earthquake Response Actions

System Component	Proposed Actions
Reservoir	• Observe reservoir for visual signs of structural damage. • If structural damage is apparent, drain reservoir and inspect the interior, exterior, and roof of the reservoir. • If leakage is suspected, isolate reservoir and monitor water level.
Distribution Lines	• Close valves to isolate breaks. • Check reservoir level. • Notify water customers of emergency and request water conservation.
Wells	• Inspect wells and treatment for operation. • Inspect well seals to prevent contamination from entering the wellhead. • Inspect for alignment of pump column and casing.
Note:	• In the event of a large earthquake along the Pacific coast, there is a possibility of a resultant tsunami. The possibility of a tsunami should be taken into consideration when determining appropriate follow-up action immediately following a large earthquake. See section on tsunami later in this chapter.

High Wind

High wind can cause downed trees and tree limbs. These, in turn, can block roads and cause power outages. Chain saw, cable, and winch may be necessary to clear downed trees to access facilities. See section on Power Failure, above.

Cold Weather Conditions/Severe Snow Storm

Extended cold weather conditions could cause freezing problems at shallow service connections, valve vaults without an insulating earth cover, reservoirs, and water supply and treatment facilities. Heavy snowfall may impede employees from reaching a problem area and can cause collapse of structures. Water supply should not be interrupted because flowing water is used to prevent pipes from freezing. Heavy snow and/or freezing rain can cause power outages. Commonly, trees or tree branches fall on power lines due to wind, freezing rain or snow, causing power disruptions. Downed trees can also make it difficult to access the location of the power outage to implement repairs. See Power Failure, above. Table 6-7 addresses the possible emergency events and response actions that will be taken in the event of a severe snowstorm.

TABLE 6-7

Severe Freezing/Snowstorm Response Actions

System Component	Proposed Actions
Facilities Access	• Have chains and snow gear ready for maintenance equipment and vehicles. • Contact Pacific County Public Works to expedite plowing to any problem area. • Heavy snow and/or freezing rain can cause downed trees and tree branches, blocking access to some areas. Chain saw, cable, and winch may be necessary to clear downed trees to access facilities.
Reservoir	• Clear snow from roads and walkways. • Clear ice from level gauges, overflows, and vents.
Distribution Lines	• Maintain mapping of valve locations to locate valves as needed. • Frozen lines can be wrapped with heat tape.
Wells	• Clear snow from well access roads. • Inspect wells and treatment for operation. • Install space heater at wells as necessary.

High Water and Flooding

Heavy rains and/or snowmelt can cause the water levels to rise and reach a flood level. Table 6-8 addresses the possible emergency events and response actions that will be taken in the event of high water or flooding. The NBWD area is in the Pacific County Flood Control District #1 which provides flood control facilities including ocean outfalls, surface drains, and pipes that control surface water during the heavy winter storms. Generally, flooding is confined locally as the groundwater level rises above ground level. Onsite septic systems may become flooded and non-operative. Flooded systems could become sources of contamination in the distribution system. If flooding overtops wells, wells should be considered contaminated until sampling indicates acceptable water quality.

TABLE 6-8

High Water/Flooding Emergency Response Actions

System Component	Proposed Actions
Reservoir	• No action should be required as reservoirs are above flood level.
Distribution Lines	• Test for coliform bacteria.
Wells	• Inspect wells and treatment for operation. • Test for coliform bacteria.

Tsunami

The North Beach area is vulnerable to tsunami (tidal wave). A tsunami could be caused by a large earthquake felt locally, or could be caused by a large earthquake at a distant location such as Japan. For tsunamis generated by distant events, a tsunami early warning system is in place. For locally generated tsunamis there may not be time for an early warning system to provide notification. The primary defense against a tsunami is to move to high ground. In the event of a major earthquake all people should move to high ground until the threat of a tsunami has passed.

Damage caused by a tsunami can include flooding of facilities and washing away of structures and water mains. Wells in areas that have been inundated should be considered contaminated until they can be cleaned, disinfected and tested. If storage reservoirs are not over-topped or damaged, water in the reservoirs can most likely be considered safe. If a tsunami were to flood the NBWD wellfields, then the water booster pump systems would most likely be inundated, and would require major repairs to be placed back in service. It is also possible that a tsunami could damage power supply to the entire North Beach Peninsula, so that only emergency power supplies, such as the North Beach backup power generators, may be available. Water from the NBWD reservoirs could be supplied to local residents in need of safe water supply from the piping at the wellfield control buildings. It would be important to maintain the safe supply of water in the NBWD reservoirs until water supply can be restored. Therefore, valves at the reservoir site should be closed as necessary to prevent loss of water from the reservoirs.

CROSS CONNECTION CONTROL PROGRAM

WAC 246-290-490 (3) establishes the minimum requirements for a cross connection control program. The regulation identifies ten elements that must be addressed in a cross connection control program. These elements are further detailed in the DOH Publication *Guidance Document: Cross-Connection Control for Small Water Systems, March 2004.* These elements are summarized as follows: