

# Health Consultation

**Holmes Harbor  
Freeland, Island County, Washington**

September 30, 2006

Prepared by:  
Washington State Department of Health  
under Cooperative Agreement with the  
Agency for Toxic Substances and Disease Registry



## **Forward**

The Washington State Department of Health (DOH) has prepared this health consultation in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR). ATSDR is part of the U.S. Department of Health and Human Services and is the principal federal public health agency responsible for health issues related to hazardous waste. This health consultation was prepared in accordance with methodologies and guidelines developed by ATSDR.

The purpose of this health consultation is to identify and prevent harmful human health effects resulting from exposure to hazardous substances in the environment. Health consultations focus on specific health issues so that DOH can respond to requests from concerned residents or agencies for health information on hazardous substances. DOH evaluates sampling data collected from a hazardous waste site, determines whether exposures have occurred or could occur, reports any potential harmful effects, and recommends actions to protect public health. The findings in this report are relevant to conditions at the site during the time of this health consultation, and should not necessarily be relied upon if site conditions or land use changes in the future.

For additional information or questions regarding DOH or the contents of this health consultation, please call the health advisor who prepared this document:

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For more information about ATSDR, contact the ATSDR Information Center at 1-888-422-8737 or visit the agency's Web site: [www.atsdr.cdc.gov/](http://www.atsdr.cdc.gov/).

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## Glossary

<b>Agency for Toxic Substances and Disease Registry (ATSDR)</b>	The principal federal public health agency involved with hazardous waste issues, responsible for preventing or reducing the harmful effects of exposure to hazardous substances on human health and quality of life. ATSDR is part of the U.S. Department of Health and Human Services.
<b>Aquifer</b>	An underground formation composed of materials such as sand, soil, or gravel that can store and/or supply groundwater to wells and springs.
<b>Cancer Risk Evaluation Guide (CREG)</b>	The concentration of a chemical in air, soil or water that is expected to cause no more than one excess cancer in a million persons exposed over a lifetime. The CREG is a <i>comparison value</i> used to select contaminants of potential health concern and is based on the <i>cancer slope factor</i> (CSF).
<b>Cancer Slope Factor</b>	A number assigned to a cancer causing chemical that is used to estimate its ability to cause cancer in humans.
<b>Carcinogen</b>	Any substance that causes cancer.
<b>Comparison value</b>	Calculated concentration of a substance in air, water, food, or soil that is unlikely to cause harmful (adverse) health effects in exposed people. The CV is used as a screening level during the public health assessment process. Substances found in amounts greater than their CVs might be selected for further evaluation in the public health assessment process.
<b>Contaminant</b>	A substance that is either present in an environment where it does not belong or is present at levels that might cause harmful (adverse) health effects.
<b>Dermal Contact</b>	Contact with (touching) the skin (see route of exposure).
<b>Dose (for chemicals that are not radioactive)</b>	The amount of a substance to which a person is exposed over some time period. Dose is a measurement of exposure. Dose is often expressed as milligram (amount) per kilogram (a measure of body weight) per day (a measure of time) when people eat or drink contaminated water, food, or soil. In general, the greater the dose, the greater the likelihood of an effect. An “exposure dose” is how much of a substance is encountered in the environment. An “absorbed dose” is the amount of a substance that actually got into the body through the eyes, skin, stomach, intestines, or lungs.
<b>Environmental Media Evaluation Guide (EMEG)</b>	A concentration in air, soil, or water below which adverse non-cancer health effects are not expected to occur. The EMEG is a <i>comparison value</i> used to select contaminants of potential health concern and is based on ATSDR’s <i>minimal risk level</i> (MRL).

<b>Environmental Protection Agency (EPA)</b>	United States Environmental Protection Agency.
<b>Exposure</b>	Contact with a substance by swallowing, breathing, or touching the skin or eyes. Exposure may be short-term [ <b>acute exposure</b> ], of intermediate duration, or long-term [ <b>chronic exposure</b> ].
<b>Groundwater</b>	Water beneath the earth's surface in the spaces between soil particles and between rock surfaces [compare with surface water].
<b>Hazardous substance</b>	Any material that poses a threat to public health and/or the environment. Typical hazardous substances are materials that are toxic, corrosive, ignitable, explosive, or chemically reactive.
<b>Ingestion</b>	The act of swallowing something through eating, drinking, or mouthing objects. A hazardous substance can enter the body this way [see route of exposure].
<b>Ingestion rate</b>	The amount of an environmental medium that could be ingested typically on a daily basis. Units for IR are usually liter/day for water, and mg/day for soil.
<b>Inhalation</b>	The act of breathing. A hazardous substance can enter the body this way [see <b>route of exposure</b> ].
<b>Inorganic</b>	Compounds composed of mineral materials, including elemental salts and metals such as iron, aluminum, mercury, and zinc.
<b>Lowest Observed Adverse Effect Level (LOAEL)</b>	The lowest tested dose of a substance that has been reported to cause harmful (adverse) health effects in people or animals.
<b>Maximum Contaminant Level (MCL)</b>	A drinking water regulation established by the federal Safe Drinking Water Act. It is the maximum permissible concentration of a contaminant in water that is delivered to the free flowing outlet of the ultimate user of a public water system. MCLs are enforceable standards.
<b>Media</b>	Soil, water, air, plants, animals, or any other part of the environment that can contain contaminants.

<p><b>Minimal Risk Level (MRL)</b></p>	<p>An ATSDR estimate of daily human exposure to a hazardous substance at or below which that substance is unlikely to pose a measurable risk of harmful (adverse), noncancerous effects. MRLs are calculated for a route of exposure (inhalation or oral) over a specified time period (acute, intermediate, or chronic). MRLs should not be used as predictors of harmful (adverse) health effects [see <b>reference dose</b>].</p>
<p><b>Model Toxics Control Act (MTCA)</b></p>	<p>The hazardous waste cleanup law for Washington State.</p>
<p><b>No apparent public health hazard</b></p>	<p>A category used in ATSDR's public health assessments for sites where human exposure to contaminated media might be occurring, might have occurred in the past, or might occur in the future, but where the exposure is not expected to cause any harmful health effects.</p>
<p><b>No Observed Adverse Effect Level (NOAEL)</b></p>	<p>The highest tested dose of a substance that has been reported to have no harmful (adverse) health effects on people or animals.</p>
<p><b>Oral Reference Dose (RfD)</b></p>	<p>An amount of chemical ingested into the body (i.e., dose) below which health effects are not expected. RfDs are published by EPA.</p>
<p><b>Organic</b></p>	<p>Compounds composed of carbon, including materials such as solvents, oils, and pesticides that are not easily dissolved in water.</p>
<p><b>Parts per billion (ppb)/Parts per million (ppm)</b></p>	<p>Units commonly used to express low concentrations of contaminants. For example, 1 ounce of trichloroethylene (TCE) in 1 million ounces of water is 1 ppm. 1 ounce of TCE in 1 billion ounces of water is 1 ppb. If one drop of TCE is mixed in a competition size swimming pool, the water will contain about 1 ppb of TCE.</p>
<p><b>Plume</b></p>	<p>A volume of a substance that moves from its source to places farther away from the source. Plumes can be described by the volume of air or water they occupy and the direction they move. For example, a plume can be a column of smoke from a chimney or a substance moving with groundwater.</p>
<p><b>Reference Dose Media Evaluation Guide (RMEG)</b></p>	<p>A concentration in air, soil, or water below which adverse non-cancer health effects are not expected to occur. The RMEG is a <i>comparison value</i> used to select contaminants of potential health concern and is based on EPA's oral reference dose (RfD).</p>
<p><b>Route of exposure</b></p>	<p>The way people come into contact with a hazardous substance. Three routes of exposure are breathing [inhalation], eating or drinking [ingestion], or contact with the skin [dermal contact].</p>

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<b>Surface Water</b>	Water on the surface of the earth, such as in lakes, rivers, streams, ponds, and springs [compare with <b>groundwater</b> ].
<b>Volatile organic compound (VOC)</b>	Organic compounds that evaporate readily into the air. VOCs include substances such as benzene, toluene, methylene chloride, and methyl chloroform.

## Summary and Statement of Issues

The Washington State Department of Health (DOH) prepared this health consultation at the request of Friends of Holmes Harbor (FOHH), a citizens group concerned about potential contamination of sediment and shellfish in Holmes Harbor. The purpose of this health consultation is to summarize potential health threats related to sediment and shellfish contamination and to make recommendations for actions that ensure the public's health is protected. DOH prepares health consultations under a cooperative agreement with ATSDR.

## Background

Holmes Harbor is approximately 13 miles of sheltered coastline (6 miles long by about 0.75 to 1.75 miles wide) horseshoe-shaped bay on the southern part of Whidbey Island located in Washington's Puget Sound, which flows north and empty into the Saratoga Passage (See figures 1 and 2). At the southern end of Holmes Harbor lies Freeland County Park beach where recreational shellfish harvesting occurs each year. FOHH is concerned that contamination from industrial activities might have contaminated the surface water and sediment, thus posing a risk to human health from consumption of intertidal shellfish harvested, sediments, and beach play in the area. The Washington State Department of Fish and Wildlife (WDFW) seeds this area with Manila clams on a regular basis. In addition, there are native littleneck clams and butter clams present in much lower numbers.

An area proportion taken from the 2000 census indicated approximately 878 people (See figure 1) live within a one-mile radius of the site. Land use in the area is considered rural residential or low density residential with a small mixture of commercial, agricultural and industrial. However, the WDFW has indicated that greater than 4,500 recreational harvesters a year collect shellfish from the Freeland County Park beach growing area of Holmes Harbor [1].

## Discussion

Washington State Department of Health Office of Food Safety and Shellfish Programs (OFSS) classifies recreational and commercial shellfish beaches (Figure 2). In April of 2006, OFSS downgraded the classification of Freeland County Park from Approved to Closed for recreational shellfish harvest. The area is currently not classified for commercial shellfish harvest, but is often harvested by tribes for ceremonial and subsistence purposes.

Recently, OFSS carried out a shoreline survey of the Holmes Harbor shellfish growing area. OFSS identified possible waste sites and businesses regulated by the Washington State Department of Ecology (Ecology) along the shellfish growing area in order to determine if they could potentially affect the shellfish harvest beach. They identified 17 discharge points within Holmes Harbor. Four discharge points were located in the commercially unclassified portion of the Holmes Harbor shellfish growing area near Freeland. Therefore, this health consultation will focus on these four discharge points, two discharges onto the beach at Freeland County Park, and two discharges to the beach just east of Nichols Brothers Boat Builders Incorporated (NBBBI). Four agricultural sites were identified, with one having the potential to influence the growing area during heavy rainfall [1]. In addition, DOH Office of Environmental Health Assessments

identified one industrial site, NBBBI with historical discharge to Holmes Harbor and current discharge to groundwater adjacent to Holmes Harbor.

### **Discharge points of concern**

#### *Freeland County Park*

Two outfalls has been identify at the Freeland County Park, which are associated with storm water runoff. Storm water runoffs have the potential to influence sediments in the shellfish growing areas. Sediments associated with storm water runoff are often contaminated with heavy metals, oil, and grease [2, 3].

#### *Nichols Brothers Boat Builders Incorporated (NBBBI)*

Historically, this 16-acre property was a sawmill and machine shop active in the 1920's through the 1940's. Since 1964, the facility (NBBBI) has been operating as a shipyard [4]. The industrial processes involved all aspects of boat and ship construction and repair (fabrication, pressure washing, abrasive blasting, and painting). Sediments associated with shipbuilding and repair yards are typically contaminated with heavy metals, semi-volatile organic compounds, oil and grease, polychlorinated biphenyls, and tributyl tin [3, 5]. NBBBI has not discharged pressure wash water to the infiltration basin since the issuance of the 1998 discharge permit.

Previously, the contaminated waste stream from NBBBI was discharged into Holmes Harbor via outfalls along the beach near to the Freeland County Park area, prior to Ecology permitting the facility in the 1990's [6]. Therefore, the amount and type of contaminants discharged from these outfalls are not known, but generally, the most contaminated waste streams generated from shipyards occur during pressure washing and usually contains high levels of total and suspended solids, and dissolved metals such as chromium, copper, lead, and zinc.

The infiltration basin is located in a wetland area next to the NBBBI facility. Ecology began permitting rinse water discharged to the infiltration basin in 1997. The 2005 Ecology issued permit prohibited any further process water, including rinse water to be discharged to the infiltration basin. Currently, storm water runoff from the yard is collected, treated, and infiltrated to ground water via an infiltration system. The infiltration basin area is occasionally surrounded by marine water during high tide (Photo 2 and 4). There are unconfirmed indications of discharge to marine waters of Holmes Harbor during these events [4]

Contaminants present in the infiltration basin can be inferred from the five years monitoring period July 1, 2000 to January 1, 2005. The 95th percentile of the infiltration basin storm water concentration over that five years period was used in the permit to form the performance-based standards for inorganic contamination at the NBBBI (Table 1) [4, 6]. However, since the new permit was issued on August 9, 2005, reported values for lead have not exceeded 20 ppb, copper-150 ppb, chromium-33 ppb and zinc-870 ppb. Ecology suspects that the discharge is hydrologically-connected to surface water but has not confirmed it is [7]. Ecology has required NBBBI to conduct a hydrogeologic investigation to show that the discharge is not connected to

surface water even in extreme instances. If the discharge is hydrologically-connected, the treated runoffs may not meet Class A marine water quality standards for chronic conditions [4]. The state of Washington has designated Class A marine water quality standards for protection of marine surface waters. Class A marine water quality standards are categories as an excellent quality for aquatic life for rearing and spawning of fish and shellfish.

**Table 1:** Monitoring metals contamination storm water discharge to the infiltration basin and Class A chronic marine standard comparison.

Metals	95th Percentile ( $\mu\text{g/L}$ or ppb) (2000-2005)	Maximum ( $\mu\text{g/L}$ or ppb) (since new permit in 2005)	Class A marine chronic standard ( $\mu\text{g/L}$ or ppb)
Chromium	130	< 33	50
Copper	2344	< 150	3.1
Lead	113	< 20	8.1
Zinc	4293	< 870	81

#### *Discharge points next to NBBBI*

Island County outfall has been identified in the area in front of NBBBI, which is associated with storm water runoff. Storm water runoffs have the potential to influence sediments in the shellfish growing areas. Sediments associated with storm water runoff are often contaminated with heavy metals, oil, and grease [2, 3]. Island County also has two drainpipes that drain from the wetland area owned by NBBBI into Holmes Harbor. The infiltration basin is located in this wetland area. The infiltration basin area is occasionally surrounded by marine water during high tide (Photo 2 and 4).

#### *Agricultural runoff*

One of Island County two drainpipes that drain from the wetland area owned by NBBBI into Holmes Harbor has the potential for agricultural runoff from a neighboring property to affect growing area. Agricultural practices have the potential to influence shellfish growing areas by providing bacteria or viral contaminants to the marine environment from animal excrement or manure. Currently, this parcel of land contains a single animal.

### **Public Health Implications**

Sediments and shellfish in southern portion of the Holmes Harbor shellfish growing area may have been contaminated by the sources listed above. There are no data to either confirm or disprove that contamination has occurred. Therefore, the extent of past marine water and sediments contamination are unknown and data gaps exist. Although the area is unclassified for

commercial harvest and the public beach a Freeland County Park has been closed, recreational harvesting on private property is likely to be on-going. Sediment contamination and bioaccumulation of heavy metals or other contaminants by shellfish in the impacted areas is of concern. In addition, the area is used for other recreational activities such as beach play and swimming.

#### Potential Environmental and Exposure Pathways

The environmental pathway of concern is uptake (contamination and bioaccumulation) of contaminants by edible aquatic organisms (mainly shellfish) from contaminated surface water and sediments. The human exposure pathway of concern is ingestion of contaminated shellfish. Table 2 below shows the potential human exposure pathways along Freeland County Park of Holmes Harbor.

**TABLE 2 - POTENTIAL EXPOSURE PATHWAYS**

Pathway Name	Environmental Pathway Elements					Time
	Source	Media	Point of Exposure	Route of Exposure	Exposed Population	
Sediments	Outfalls & infiltration basin	Sediment	Public Beaches & shoreline	Ingestion & Dermal Contact	Recreational Users	Past Present Future
Marine Surface Water	Outfalls & infiltration basin	Surface Water	Holmes Harbor	Ingestion & Dermal Contact	Recreational Users	Past Present Future
Shellfish	Outfalls & infiltration basin	Shellfish Tissue	Public Beaches & shoreline	Ingestion	Recreational Users	Past Present Future

### **Children's Health Concerns**

ATSDR recognizes that infants and children may be more vulnerable to exposures than adults may, when faced with contamination of air, water, soil, or food. This vulnerability is a result of the following factors:

- Children are smaller and receive higher doses of chemical exposure per body weight
- Children's developing body systems are more vulnerable to toxic exposures, especially during critical growth stages in which permanent damage may be incurred.

Special consideration will be given to children's exposure to contaminants by assuming that children eat proportionately more shellfish than adults do.

## **Conclusions**

1. Exposure to chemical contaminants from consumption of intertidal shellfish harvested, sediments and beach play at the Holmes Harbor site is categorized as *an indeterminate public health hazard* to the general population because of a data gap about possible contamination.
2. Potential chemical discharges into Holmes Harbor are categorized as *an indeterminate public health hazard* because of a data gap.

## **Recommendations**

In order to fill this data gap, DOH Office of Environmental Health Assessment is recommending that the OFSS sample shellfish and sediments for possible inorganic contaminants for shellfish grown and harvested in the area.

## **Public Health Action Plan**

### **Actions completed**

OFSS conducted a shoreline survey, which resulted in closure of the growing and harvesting area of Freeland County Park due to high bacterial counts from the discharge points of concern along the Freeland County Park and NBBBI.

### **Action Planned**

OFSS provide results of sampling event to DOH Office of Environmental Health Assessment, Site Assessment Section for review and evaluation of the data.

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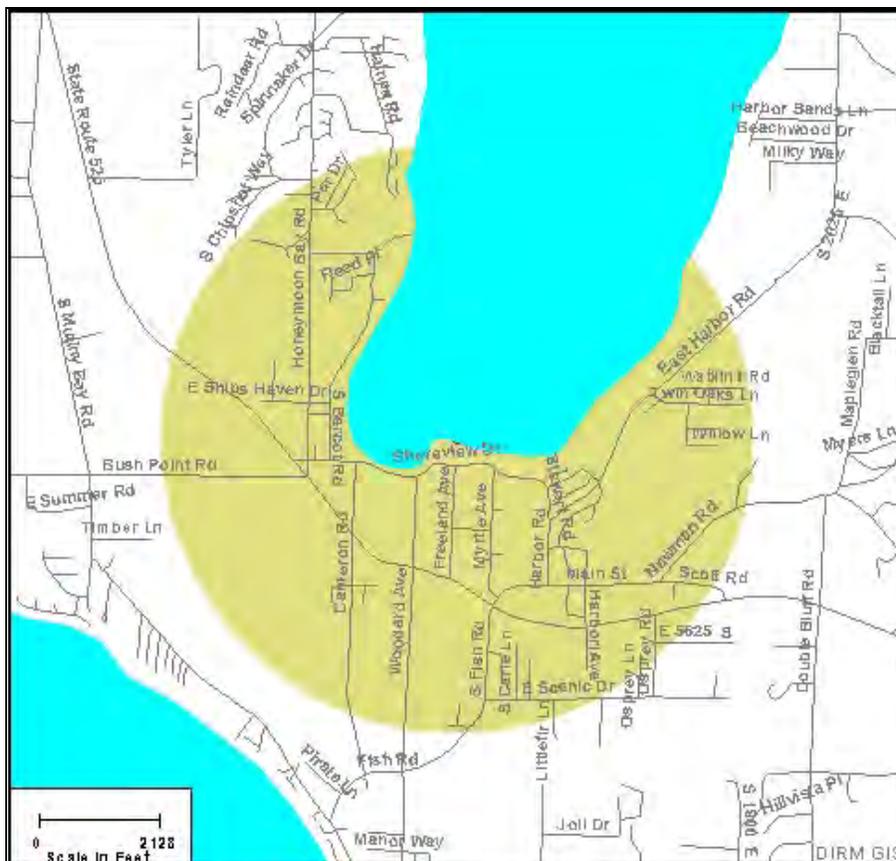
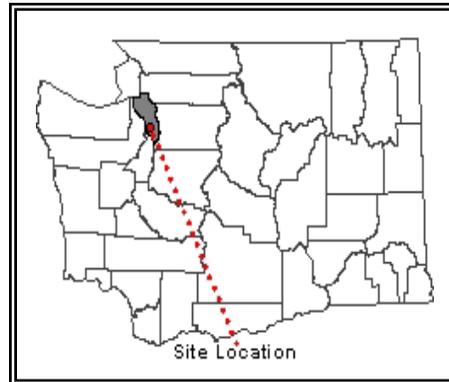
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**Figure 1.** Demographic Statistics Within One Mile of the Site\* - South end of Holmes Harbor, Island County.

<b>Total Population</b>	<b>878</b>
<b>White</b>	<b>830</b>
<b>Black</b>	<b>3</b>
<b>American Indian, Eskimo, Aleut</b>	<b>8</b>
<b>Asian or Pacific Islander</b>	<b>9</b>
<b>Other Race</b>	<b>3</b>
<b>Hispanic Origin</b>	<b>25</b>
<b>Children Aged 6 and Younger</b>	<b>66</b>
<b>Adults Aged 65 and Older</b>	<b>132</b>
<b>Females Aged 15 - 44</b>	<b>166</b>
<b>Total Aged over 18</b>	<b>679</b>
<b>Total Aged under 18</b>	<b>200</b>
<b>Total Housing Units</b>	<b>432</b>



\* Calculated using the area proportion technique. Source: 2000 U.S. CENSUS

**Figure 2.** Holmes Harbor, Southwest Whidbey Island Shellfish Growing area, Island County Washington State



Prohibited    Approved    Unclassified

**Photo 1.** Southern Shore of Holmes Harbor during normal tide



**Photo 2.** Southwestern Shore of Holmes Harbor during high tide, showing the infiltration basin for NBBBI wastewater and storm water



**Photo 3.** Southwestern Shore of Holmes Harbor during low tide



**Photo 4.** Southwestern Shore of Holmes Harbor during high tide



## Certification

This Health Consultation was prepared by the Washington State Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was begun.



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for Robert Knowles  
Technical Project Officer, CAT, SPAB, DHAC  
ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health consultation and concurs with the findings.



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for Alan Yarbrough  
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