

Health Consultation

Yakima Hops/HOP Union - Boyville
Mabton, Yakima County, Washington

July 5, 2002

Prepared by

**The Washington State Department of Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry**

Foreword

The Washington State Department of Health (DOH) has prepared this health consultation in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR), Office of Tribal Affairs (OTA). OTA responds to tribal requests for help with tribal-specific environmental health needs related to hazardous waste sites and pollution. OTA provides a point-of-contact for tribes to access ATSDR and its many environmental public health programs, including agreement state programs such as DOH. 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 quickly to requests from concerned tribal 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 the site visit on January 14, 2002, and should not necessarily be relied upon if conditions change at a later date.

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

Stephen P. Matthews
Washington State Department of Health
Office of Environmental Health Assessments
P.O. Box 47846
Olympia, WA 98504-7846
1-877-485-7316
Website: <http://www.doh.wa.gov/consults>

Glossary

Agency for Toxic Substances and Disease Registry (ATSDR)	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.
Aquifer	An underground formation composed of materials such as sand, soil, or gravel that can store and/or supply groundwater to wells and springs.
Cancer Risk Evaluation Guide (CREG)	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).
Chronic	A long period of time. A chronic exposure is one which lasts for a year or longer.
Comparison value	A concentration of a chemical in soil, air or water that, if exceeded, requires further evaluation as a contaminant of potential health concern. The terms comparison value and screening level are often used synonymously.
Contaminant	Any chemical that exists in the environment or living organisms that is not normally found there.
Environmental Media Evaluation Guide (EMEG)	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).

Exposure	Contact with a chemical by swallowing, by breathing, or by direct contact (such as through the skin or eyes). Exposure may be short-term (acute) or long-term (chronic).
Groundwater	Water found underground that fills pores between materials such as sand, soil, or gravel. In aquifers, groundwater often occurs in quantities where it can be used for drinking water, irrigation, and other purposes.
Hazardous substance	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.
Indeterminate public health hazard	Sites for which no conclusions about public health hazard can be made because data are lacking.
Maximum Contaminant Level (MCL)	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.
Media	Soil, water, air, plants, animals, or any other part of the environment that can contain contaminants.
Minimal Risk Level (MRL)	An amount of chemical that gets into the body (i.e., dose) below which health effects are not expected. MRLs are derived by ATSDR for acute, intermediate, and chronic duration exposures by the inhalation and oral routes.
Monitoring wells	Special wells drilled at locations on or off a hazardous waste site so water can be sampled at selected depths and studied to determine the movement of groundwater and the amount, distribution, and type of contaminant.

No apparent public health hazard	Sites where human exposure to contaminated media is occurring or has occurred in the past, but the exposure is below a level of health hazard.
No public health hazard	Sites for which data indicate no current or past exposure or no potential for exposure and therefore no health hazard.
Oral Reference Dose (RfD)	An amount of chemical ingested into the body (i.e., dose) below which health effects are not expected. RfDs are published by EPA.
Plume	An area of contaminants in a specific media such as groundwater.
Reference Dose Media Evaluation Guide (RMEG)	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 EPA's oral reference dose (RfD).
Remedial investigation	A study designed to collect the data necessary to determine the nature and extent of contamination at a site.
Route of exposure	The way in which a person may contact a chemical substance that includes ingestion, skin contact and breathing.
U.S. Environmental Protection Agency (EPA)	Established in 1970 to bring together parts of various government agencies involved with the control of pollution.

Background and Statement of Issues

The Washington State Department of Health (DOH) prepared this health consultation at the initial request of the Yakima County Health District, and later by the US Environmental Protection Agency (EPA) to evaluate potential human health risks associated with the release of pentachlorophenol (PCP) in soil and groundwater at the Boyville hop field and storage area. DOH prepares health consultations under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR).

The Boyville hop ranch, referred to herein as “Boyville,” is owned by Yakima Hops, Inc., also known as Hop Union USA, Inc. Boyville is a 120.11-acre site located near the intersection of Monroe Street and 1st Avenue on the northwest side of Mabton, Washington. Boyville is situated in an agricultural area on a table top shelf overlooking wetland areas (Figure 1).¹

The nearest residence is located approximately one quarter mile to the southeast, followed by other residences and the town of Mabton. To the immediate north of the site, the terrain drops down approximately 25 feet into an area of wetlands and small lakes that drain into the Yakima River. The terrain also drops down on the west side of the site into an irrigation pond.

A site visit was performed by DOH on January 14, 2002. As part of the site visit, a site meeting was held by the Yakima Indian Nation Division of Natural Resources Environmental Program (YNEP), US Environmental Protection Agency (EPA), US Department of Interior-Bureau of Indian Affairs (BIA), AMEC Earth & Environmental (AMEC), and a Yakima Nation Tribal Marshal. AMEC has been contracted by Yakima Hops for conducting an environmental site assessment.

The site is comprised of five dip tanks for soaking the downside ends of wooden poles with PCP in a diesel carrier. The tanks were empty during the site visit, however, there were stockpiled treated poles on site. Three groundwater monitoring wells were observed where soil samples were also taken. A fourth monitoring well was being proposed for installation approximately 50 feet northeast (downgradient) of the dip tanks. The irrigation pond (to the west) was dry at the time of the site visit. To the south and east are hop fields (Figure 2).² Boyville has been used for producing hops since the early 1950s. The process requires netting above the hops held up by poles. These poles have been treated with PCP during the past 10 years.

Soil and groundwater was sampled for PCP, total petroleum hydrocarbons (TPH), polynuclear aromatic hydrocarbons (PAHs), dioxins, heavy metals, and leachable arsenic and chromium.

Soil samples were taken from direct-push soil borings and groundwater monitoring well borings. The highest subsurface concentration of PCP was 1,010 mg/kg on the adjacent west side of the dip tanks at a depth of 8 feet. The highest concentration of PCP in surface soil was 595 mg/kg between two of the dip tanks. The highest concentration of TPH-D was 16,100 mg/kg on the adjacent east side of the dip tanks at 10 feet below ground surface (bgs). The highest TPH-D concentration at the surface was 7,950 mg/kg between two of the dip tanks (Table 1). An

estimated 300 cubic yards of soil contaminated with PCP and diesel is being proposed for remediation through off-site disposal or treatment. The approximate area for proposed excavation is 60 by 35 feet.

Table 1. Contaminants of concern detected in soil at the Boyville Hop Ranch located in Mabton, WA

Contaminant	Maximum surface concentration (mg/kg)	Maximum sub-surface concentration (mg/kg)	Comparison Value (mg/kg)	Comparison Value Reference
PCP	595	1,010	6	CREG
TPH-Diesel	7,950	16,100	2,000	Child RMEG

CREG - Cancer Risk Evaluation Guide

Child RMEG - ATSDR's Environmental Media Evaluation Guide (EMEG) based on EPA's Oral Reference Dose. No health comparison value was available for TPH so the RMEG for pyrene was used as a surrogate.

Depth to groundwater is approximately 20 feet below ground surface. The highest concentration of PCP in groundwater (27 ug/l) was found near the dip tanks. Lower concentrations were found downgradient (north of the dip tank area) at 10 ug/l and 4.1 ug/l. The highest concentration of TPH-D in groundwater was 1,920 ug/l adjacent to the northwest side of the dip tanks (Table 2). Groundwater flow direction has more recently been established as northeast rather than straight north.

Table 2. Contaminants of concern detected in on-site groundwater monitoring wells at the Boyville Hop Ranch located in Mabton, WA

Contaminant	Maximum concentration (ug/l)	Comparison Value (ug/l)	Comparison Value Reference
PCP	27	0.3	CREG
TPH-D	1920	300	Child RMEG

CREG - ATSDR's Cancer Risk Evaluation Guide

Child RMEG - ATSDR's Environmental Media Evaluation Guide (EMEG) based on EPA's Oral Reference Dose. No health comparison value was available for TPH so the RMEG for pyrene was used as a surrogate.

Discussion

Site environmental sampling data were screened using federal (ATSDR and EPA), health-based criteria (comparison values). Comparison values are media-specific concentrations used to select environmental contaminants for further evaluation. Contaminant concentrations below comparison values are unlikely to pose a health threat, and were not further evaluated in this health consultation. Contaminant concentrations exceeding comparison values do not necessarily

pose a health threat, but were further evaluated to determine whether they are at levels which could result in adverse human health effects.

Groundwater

PCP and TPH-D are the only groundwater contaminants that exceed available health comparison values. The maximum concentration of PCP found in groundwater (27 mg/l) exceeds both its health comparison value of 0.3 ug/l and the maximum contaminant level (MCL) of 1 ug/l. MCLs are enforceable standards established for public drinking water supplies. The maximum concentration of TPH-D found in groundwater (1,920 ug/l) exceeds its comparison value of 300 ug/l. Since there is no comparison value for TPH-D, the value for pyrene was used as surrogate. Pyrene is considered as a surrogate for the entire group of aromatic petroleum hydrocarbons, and is the most toxic non-carcinogenic PAH. Both of these maximum detections in groundwater were found near the dip tanks at a depth of 10 feet below ground surface.

The nearest drinking water well is located approximately one quarter mile southeast of the site. Groundwater appears to move northeast from the site indicating that this drinking water well is crossgradient of a potential contaminant plume. This well does not appear to have been sampled in order to confirm the absence of contamination. No other wells are located in the area. It is, therefore, unlikely that exposure to contaminants in groundwater is occurring.

Other potential human health pathways could include children playing along the shore of the wetland area. Groundwater contamination near the dip tanks could potentially leach from the dip tank area northward toward the wetland area and cause contamination along the shore. This could be a potential pathway if children frequent the area. However, a neighbor whose residence overlooks the area indicated that children have not been seen playing along the shore of the wetland. It is, therefore, unlikely that exposure to potential contaminants in sediment is occurring.

Another potential pathway is contamination of the irrigation pond on the west side of the dip tanks. This pond is approximately five acres in size and 25 feet lower in elevation of the PCP dip tanks. This water is used for irrigation of hops and could cause the hops to be contaminated and spread to the brewing process. There has been no surface or sediment sampling of this pond. However, it is unlikely that exposure from contaminated hops is occurring because this pond is upgradient of the dip tanks, and the irrigation of hops is applied on the ground only and not sprinkled from overhead, thus preventing contamination to the hops themselves.

Soil

The maximum concentration of PCP in soil is 1,010 mg/kg at a depth of 10 feet below ground surface. This exceeds the child EMEG health comparison value of 50 mg/kg, and the CREG comparison value of 6 mg/kg. However, the depth of this contamination is approximately 10 feet below ground level and, therefore, inaccessible to area children. The highest concentration of PCP in surface soil is 595 mg/kg, exceeding the CREG comparison value of 6 mg/kg. Since the

dip tank area is not restricted, direct contact with soil near the tank could be a pathway of concern for area children. However, statements from nearby residents overlooking the area stated that they have never seen children playing in the storage/dip tank area. The possibility of exposure for adults working in the area is unlikely or will be infrequent since the dip tanks are no longer being used.

The highest subsurface concentration of TPH-D was 16,100 mg/kg on the adjacent east side of the dip tanks at 10 feet below ground surface (bgs). The highest TPH-D concentration at the surface was 7,950 mg/kg between two of the dip tanks. This exceeds the comparison value of 2,000 mg/kg. As stated above, children have not been seen playing in this area.

Child Health Initiative: Developmental/Reproductive Effects

ATSDR's Child Health Initiative recognizes that the unique vulnerabilities of infants and children deserve special emphasis with regard to exposures to environmental contaminants. Infants, young children, and the unborn may be at greater risk than adults from exposure to particular contaminants. Exposure during key periods of growth and development may lead to malformation of organs (teratogenesis), disruption of function, and even premature death. In certain instances, maternal exposure, via the placenta, could adversely effect the unborn child.

After birth, children may receive greater exposures to environmental contaminants than adults. Children are often more likely to be exposed to contaminants from playing outdoors, ingesting food that has come into contact with hazardous substances, or breathing soil and dust. Pound for pound body weight, children drink more water, eat more food, and breathe more air than adults. For example, in the United States, children in the first 6 months of life drink 7 times as much water per pound as the average adult. The implication for environmental health is that, by virtue of children's lower body weight, given the same exposures, they can receive significantly higher relative contaminant doses than adults.

DOH evaluated the likelihood of adverse health effects for young children potentially exposed to the detected contaminants in groundwater, shoreline sediment and surface water, and surface soil near the dip tanks. In the absence of completed exposure pathways, no adverse health effects would be expected to result from exposure to pentachlorophenol and diesel. It does not appear that children have routinely played in the dip tank area, but this area appears to be unrestricted and could be accessed by children.

Conclusions

1. Surface soil in the dip tank area is contaminated with PCP and TPH-D. However, neighbors reveal that children have never been seen playing in this area indicating that direct contact with soil at this site is infrequent and poses *no apparent public health hazard* to children. The possibility of infrequent exposure for adults working in the area is also considered to pose *no apparent public health hazard*. However, it should be understood that if future land use includes residential homes with private wells near the

former dip tanks, exposure to PCP and TPH in drinking water could be of concern.

2. Currently, the nearest drinking water well is located approximately one quarter mile southeast of the site. Although this well has not been sampled for PCP and TPH it is located crossgradient of any potential groundwater contaminant plume. Exposure to PCP and TPH in groundwater is, therefore, unlikely. Until this well is sampled, however, this pathway will be considered an indeterminate public health hazard.

Recommendations/Public Health Action Plan

1. Contaminated soil in the dip tank area will be excavated as appropriate, thus removing a potential exposure pathway to children and adults. However, since construction generally attracts children, access to this site should be restricted during soil and groundwater remediation.
2. The residential drinking water well, located approximately one quarter mile southeast of the dip tanks, should be sampled and analyzed for PCP and TPH-D to ensure that this well is not impacted.
3. Periodic groundwater monitoring should continue in order to provide more data regarding potential offsite migration of groundwater contaminants. Another groundwater monitoring well should be installed northeast of the dip tanks assure that contaminated groundwater is not moving off-site.
4. DOH is available to review any new environmental data.
5. Copies of this health consultation will be provided to Yakima Nation Division of Natural Resources Environmental Program (YNEP), US Environmental Protection Agency (EPA), US Department of Interior-Bureau of Indian Affairs (BIA), Ecology Central Regional Office, Yakima County Health District, and Yakima Hops, Inc.

Preparer of Report

Stephen P. Matthews
Washington State Department of Health
Office of Environmental Health Assessments
Site Assessment Section

Designated Reviewer

Robert Duff, Manager
Site Assessment Section
Office of Environmental Health Assessments
Washington State Department of Health

ATSDR Technical Project Officer

Debra Gable
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

References

1. Quarterly Groundwater Monitoring Report. Third Quarter 2001. Hop Union USA, Inc., by AMEC Earth & Environmental, Inc. October 2001.
2. Expanded Phase II Environmental Site Assessment. Yakima Hops/Hop Union - Boyville. March 2001.

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.

Debra Gable
Technical Project Officer, SPS, SSAB, DHAC
ATSDR

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

Richard Gillig
Chief, SPS, SSAB, DHAC
ATSDR