

Chapter 9: Human Health

This chapter describes how the alternatives for the Cedar Hills Regional Landfill (CHRLF) could potentially affect the health of local receptors including on-site workers, visitors, and nearby residents. The chapter incorporates and relies on information from other chapters that is relevant to human health, including surface water; groundwater; upland vegetation, wetlands, wildlife, and air and odor. Management of special wastes at the CHRLF is also discussed.

The environmental review determined that there would be no significant unavoidable adverse impacts to human health as a result of implementing any of the alternatives.

9.1 Affected Environment

For a human health risk to exist, two components must be present: 1) toxicity or hazard (the potential for a substance, organism, or situation to cause an adverse health impact) and 2) an exposure vector or pathway (the means for a susceptible individual to come into contact with a substance, organism, or situation). A description of the affected environment for human health risks requires identification of potential exposure pathways to potentially exposed populations.

The primary potential exposure pathways relevant to CHRLF are vectors (animals capable of transmitting disease to humans), water, and air. Each of these pathways, and potentially exposed populations, is discussed below.

9.1.1 Vector Pathways

Washington Administrative Code (WAC) 173-351, Criteria for Municipal Solid Waste Landfills, and the Municipal Solid Waste Handling Permit (Appendix B), issued for the CHRLF by Public Health – Seattle & King County (Public Health), require that vectors such as rodents, flies, and mosquitoes be controlled at municipal solid waste landfills to protect human health and the environment. Populations that could potentially be affected by animal pathways are on-site workers, visitors, and nearby residents.

Daily compaction and covering of the solid waste eliminates most refuge for rodents and reduces fly propagation (breeding). KCSWD performs visual inspections of the landfill for areas of standing water that could provide a breeding ground for mosquitoes. When an area of standing water is identified on the landfill, KCSWD removes the standing water, typically by regrading the area. Catch basins and other structures containing standing water are regularly sampled for mosquito larvae during mosquito breeding season. If larvae are found, the water is treated with a bacteria that specifically targets mosquito larvae. Mosquitoes avoid the leachate aeration lagoons because they prefer stagnant water for breeding. To date, there has been no significant rodent, fly, or mosquito problem at the CHRLF.

Best management practices currently employed to control vectors would continue during implementation of any alternatives for the CHRLF.

9.1.2 Water Pathways

Populations that could potentially be affected by water from the CHRLF are those using surface water downstream or groundwater downgradient, or northeast, of the landfill.

Surface water at the landfill is managed via several systems depending on its path at the landfill and its required treatment before release from the site, based on its potential level of contamination through contact with garbage. Leachate, which is surface water that has infiltrated through garbage, is contaminated with a variety of biological and chemical contaminants that are contained in the solid waste or formed during solid waste decomposition. As discussed in Chapter 5, leachate is captured through a series of pipes and pumps and is conveyed to aeration leachate lagoons before discharging to the King County Wastewater Treatment system. Surface water that runs off the active face of the landfill becomes contaminated stormwater and is collected in a separate conveyance system and routed through the leachate treatment system. All other surface water that runs off the site in the form of uncontaminated stormwater is routed through ditches, culverts, and berms prior to discharge to wetlands and streams on the perimeter of the property. With this system of surface water controls, there is no exposure pathway via surface water.

Groundwater can be contaminated by leachate or landfill gas. Landfill gas can contain trace amounts of toxic compounds that may be harmful to human health at high enough concentrations. Regulatory requirements for groundwater protection and monitoring, a description of the monitoring program, and groundwater quality (currently and under each action alternative) are addressed in Chapter 6.

Groundwater monitoring indicates that some local perched groundwater zones have been contaminated; however, these zones are limited and discontinuous in extent, and there are no known beneficial users of the local flow systems.

There is no indication of contamination in the regional aquifer where it leaves the CHRLF site. As described in Chapter 6, data from monitoring wells to the south of the CHRLF indicate some contamination of the aquifer by chlorinated solvents; however, the source of the contamination is upgradient (to the south) of the site. Groundwater in the regional aquifer flows to the north and east beneath the CHRLF. Contaminants that enter the aquifer from the south are attenuated through naturally occurring processes before groundwater leaves the CHRLF site and reaches any water supply wells off-site (as indicated by data from downgradient monitoring wells). Features such as the dense (impermeable) glacial till and landfill liner systems underlying the CHRLF serve to minimize or avoid impacts to groundwater during construction and operation activities.

All measures in place to protect groundwater would be continued and/or expanded during the implementation of any alternatives for the CHRLF.

9.1.3 Air Pathways

Air quality is potentially impacted by operations at the CHRLF. As discussed in Chapter 4, CHRLF operations could impact air quality through toxic or odorous compounds contained in landfill gas, or from landfill operations such as aeration of leachate lagoons. Populations potentially affected by air contamination are on-site workers, visitors, and nearby residents.

Landfill Gas

Landfill gas contains trace quantities of toxic air compounds (TACs), which at high enough concentrations can pose a risk to human health. Some of the compounds found in landfill gas can also contribute to odor. A TAC evaluation for the landfill was conducted for the worst-case of the five action alternatives. The results of the analysis indicate that landfill operations would be below all state and local exceedance levels for all alternatives.

There are three potential pathways by which people can be exposed to TACs and odors associated with landfill gas. The first is emissions of landfill gas from the gas management system. This pathway is not a source of significant landfill gas emissions at the CHRLF because of the destructive efficiency of the flares and the operation of the new gas-to-energy facility. The second potential pathway is emissions off-site as a result of subsurface gas migration. This pathway also is not a source of significant landfill gas emissions at the CHRLF because a gas migration control system has been installed, and perimeter gas monitoring probes are sampled routinely, which confirm that off-site gas migration is not occurring. Finally, emissions through the landfill surface that escape the gas management system, called fugitive emissions, can be a pathway for odors or trace amounts of toxic compounds. However, CHRLF regularly monitors surface emissions, and the results show that surface emissions from the landfill are in compliance with Puget Sound Clean Air Agency (PSCAA) regulations.

Aeration of Leachate Lagoons

CHRLF uses two lagoons in series to aerate leachate collected from the landfill prior to sending the leachate to the sanitary sewer conveyance system for treatment. In response to scoping comments that were received with regard to the potential human health impacts of leachate aeration, an ambient air quality impact analysis was conducted for the existing leachate lagoons (HDR 2009b). This analysis focused on a number of compounds contained in the leachate that are classified as TACs by PSCAA and the Washington State Department of Ecology. All concentrations of TACS were determined to be below acceptable regulatory levels.

Odor

Odor emissions are well controlled as a result of the CHRLF active landfill gas collection system, flaring of landfill gas, operation of the new gas-to-energy facility, minimizing the size of the active solid waste working face, and application of an approved daily cover material. Complaints about odor from the CHRLF are infrequent and, when they occur, are promptly investigated and appropriate remedial actions taken, if necessary.

9.1.4 Special Wastes

The CHRLF is designed, permitted, and operated as a municipal solid waste landfill which does not accept, and takes steps to preclude, dangerous wastes as defined by Chapter 173-303 WAC, Dangerous Waste Regulations. However, some wastes that are accepted at the landfill require an increased level of protection to be safely managed. In addition to federal, state, and local regulations and permit conditions, KCSWD has developed acceptance and operating policies for these wastes. The CHRLF is not open to the public, and any materials arriving at the landfill in vehicles, other than KCSWD, Waste Management,

and Allied Waste vehicles, need a Waste Clearance Decision to be allowed access to the site. Waste types that could have human health impacts, if handled improperly are:

- Asbestos-containing waste
- Biomedical waste
- Sludge and catch basin waste
- State special waste

Asbestos-containing Waste

Asbestos disposal is regulated at the federal, state, and local levels by several agencies including the U.S. Environmental Protection Agency, U.S. Occupational Safety and Health Administration, Washington Department of Labor and Industries, Public Health, and PSCAA. KCSWD has designated an “asbestos corridor” in the working area of the landfill for the placement of asbestos wastes. The asbestos corridor is mapped so that it will not be disturbed by excavation activities. There are no gas or water lines that might require excavation of waste for repair or replacement in the asbestos corridor.

Biomedical Waste

Biomedical waste is waste material from health practitioners, clinics, and hospitals that could contain pathogenic microorganisms infectious to humans. Most biomedical waste, when treated in accordance with Title 10 of the Code of the King County Board of Health, is considered solid waste and may be disposed into the general solid waste stream. An exception to this is sharps waste (needles, scalpels, syringes with needles attached, etc.), which is required to be placed in leak-proof, rigid, puncture and break-resistant containers for storage, handling, and transport. If these containers are disposed in the general waste stream, the rigid containers can easily be broken by solid waste collection, transfer, or landfill equipment, releasing the sharps. Loose sharps can puncture tires or shoes, or become lodged in equipment where they are a safety hazard to maintenance workers. Needle-stick injuries can transmit infectious diseases, especially blood-borne viruses. KCSWD requires sharps waste from health care providers to be segregated and transported directly to the landfill where it is buried in the same corridor as asbestos-containing waste.

Wastewater Grit and Biosolids

Although they are generally recycled, grit and bio-solids from wastewater treatment facilities may be accepted at CHRLF during maintenance activities, when there are process breakdowns, and from some small treatment facilities. Acceptance of biosolids requires the approval of Public Health. These materials could contain microorganisms infectious to humans. They must be dewatered and are accepted directly at the landfill, but are not allowed at transfer facilities.

State Special Waste

State special wastes are specific wastes defined by the state in Chapter 173-303 WAC, Dangerous Waste Regulations. These are wastes that the state has determined pose a relatively low hazard to human health and the environment, and can be safely managed with an intermediate level of protection between dangerous and municipal waste. These wastes go through Waste Characterization by Public Health prior to being considered for Waste Clearance and are required to be disposed directly at CHRLF without passing through any

transfer station or other intermediate handling facility. KCSWD conducts worker training and keeps records of these wastes as required by Chapter 173-303 WAC.

9.2 Environmental Impacts

9.2.1 Direct Impacts

The following discussions apply to the action alternatives and the No Action Alternative. The factors that vary from alternative to alternative are the duration of the impact and the location of the active solid waste work area relative to the potential receptor.

Vector Pathways

To date, there have been no significant rodent, fly, or mosquito problems at CHRLF due to control measures, such as daily cover and compaction of solid waste, and monitoring for and elimination or treatment of standing water. These control measures would continue under all alternatives, so no significant health risk from these pathways would be anticipated.

Water Pathways

Proposed landfill areas would not drain to any surface water body used as a water supply. With the proposed stormwater controls, no significant adverse impact to off-site surface water quality would be anticipated. Due to the lack of both exposure and toxicity, there would be no reason to expect any human health risk related to potential contamination of surface water from landfill operations.

Despite the lack of engineered bottom liners in some areas of the landfill, monitoring data show no evidence that groundwater quality in the regional aquifer has been affected by leachate, landfill gas, or any landfill operations, most likely because of the hydrogeology of the site. Based on this experience, the potential for leachate or landfill gas from lined development areas to affect the regional aquifer is considered remote.

Due to the extremely low potential for water quality impacts to the regional aquifer, there would be no reason to expect a health risk for users of the aquifer under any of the alternatives.

Air Pathways

The impacts due to exposure to landfill gas and emissions resulting from the leachate lagoons would be expected to be well below the federal, state, and local ambient air quality standards.

Compliance with the ambient air quality standards demonstrates acceptable impacts on the area surrounding the landfill for all alternatives.

Air Toxics

No significant impacts would be anticipated due to the low levels of toxic air compounds.

Odor

Continuation of the odor control program at CHRLF is anticipated to keep odor emissions and resulting complaints to a minimum.

Special Wastes

It is anticipated that special wastes would continue to be handled in the same manner as they are at present. Therefore, no impacts to human health would be anticipated.

9.2.2 Indirect and Cumulative Impacts

Odor impacts could occur in neighboring communities as a result of CHRLF operations, but they are expected to be temporary and minor. With the ongoing success of the odor management program, such as gas control systems and daily landfill cover, odors are transient in nature and do not cause indirect or cumulative impacts to human health.

9.3 Mitigation Measures

To avoid any potential health impacts from the landfill operations, KCSWD has been implementing best management and engineering practices in designing, operating, and maintaining environmental control systems, including the landfill gas, leachate, stormwater, and surface water systems. With these controls in place, no additional mitigation measures are necessary.

9.4 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to human health would be expected under any of the alternatives.