

# Letter Health Consultation

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Re-Evaluation of Pathways of Concern at

KIM-STAN LANDFILL

ALLEGHANY COUNTY, VIRGINIA

**Prepared by  
Virginia Department of Health**

FEBRUARY 18, 2016

Prepared under a Cooperative Agreement with the  
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Agency for Toxic Substances and Disease Registry  
Division of Community Health Investigations  
Atlanta, Georgia 30333

## **Health Consultation: A Note of Explanation**

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In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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LETTER HEALTH CONSULTATION

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# COMMONWEALTH of VIRGINIA

## Department of Health

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Anthony Iacobone  
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Dear Mr. Iacobone,

The Agency for Toxic Substance and Disease Registry (ATSDR) asked the Virginia Department of Health (VDH) to review recent remediation reports and any available monitoring data for Kim-Stan Landfill to determine if any outstanding health concerns exist following conclusions and recommendations made in ATSDR's December 2000 Kim-Stan Landfill's Public Health Assessment (PHA). Under a cooperative agreement with the ATSDR, VDH reviewed the *Kim-Stan Landfill 2014 Annual Report* submitted to the Virginia Department of Environmental Quality (DEQ) and the United States Environmental Protection Agency's (EPA) 2011 *Remedial Action Report for Kim-Stan Landfill Site* to reevaluate exposure pathways in light of the information available since the PHA was completed in 2000. VDH concludes that the implemented remedial actions at the Kim-Stan Landfill are protective of human health, and the current concentrations of contaminant present at the landfill are not expected to harm people's health. The basis for this conclusion is that potential exposures have been eliminated. VDH does not recommend any further actions at this time. VDH will be glad to review subsequent data as they become available.

### BACKGROUND

Kim-Stan Landfill is located in Alleghany County, Virginia. Kim-Stan was an unlined industrial landfill that was in use from 1972 to 1990. Most of the waste (860,000 tons) was dumped at the site within an 18-month period from 1988 through 1990. Substances dumped at the landfill included municipal, commercial, light industrial and medical wastes. In May 1990, the Kim-Stan Landfill was shut down because of violation of Virginia landfill laws. The company owners went bankrupt and failed to conduct any cleanup. In 1999, EPA placed Kim-Stan Landfill on the National Priorities List (NPL). In December 2000, ATSDR released a public health assessment<sup>1</sup> addressing community concerns and public health implications regarding the landfill.

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<sup>1</sup> ATSDR Public Health Assessment for Kim-Stan Landfill, Selma, VA. December, 2000. EPA Facility ID: VAD077932449

***Public Health Assessment Conclusions and Recommendations (December 2000)***

ATSDR concluded the following:

- Landfill leachate had migrated from Kim-Stan Landfill to areas north (down gradient) of the landfill, including the Oakland Churchyard and the oxbow pond next to Jackson River;
- Metals and organic compounds detected in surface soil, surface water, and sediments were below concentrations that would cause health effects in humans;
- Groundwater in the upper aquifer is contaminated by the landfill, but it did not pose a health hazard as no one was using the upper aquifer for drinking water or other domestic uses (however, additional groundwater sampling data were needed to further evaluate the extent of contamination and possibility that it might migrate to lower aquifer);
- Fecal coliform bacteria were detected in the past in leachate flowing from the landfill and from the oxbow pond;
- Landfill may continue to generate methane and other compounds for years after they are closed. This is categorized as indeterminate health hazard by ATSDR;
- No sampling data are available for fish in the nearby oxbow ponds. Although fishing in the pond is now unlikely, it could occur more frequently in the future. Landfill contamination in the oxbow ponds could pose a public health hazard in the future.

The recommendations at that time included:

1. Decrease future exposure to contamination by reducing the flow of leachate and surface water run-off from the landfill.
2. The following recommendations were made for additional sampling:
  - a. Conduct additional sampling of off-site surface soil to better characterize the extent of contamination from surface water run-off and leachate.
  - b. Conduct additional ground water sampling to further evaluate the extent of the contamination and the possibility that it might migrate to lower aquifer.
  - c. Characterize the production of soil gas in the landfill and evaluate its possible migration to nearby property and estimate air emission of other compounds. Any capping of the landfill must account for variable production of methane.
3. Maintain signs warning against the recreational use of oxbow ponds until 1) remedial action at the landfill is complete, 2) the leachate flow from the landfill is significantly reduced, and 3) the fecal coliform bacteria levels are retested.

### ***Public Health Assessment Community Concerns (December 2000)***

The community played an important role in the eventual closing of the landfill and in lobbying for clean-up actions. Community concerns associated with the Kim-Stan Landfill included the following:

- Trucks on narrow roads, resulting in traffic hazards causing garbage spills into ditches and onto streets and neighborhoods;
- Aggravated breathing problems caused by dust in the air;
- Strong odor from the landfill;
- The leachate migrating into the Jackson River, which is a drinking water source for surrounding areas;
- Methane accumulating beneath the landfill;
- The impact of the groundwater contamination on nearby well water; and
- The leachate migrating onto the cemetery may potentially be harmful to visitors and maintenance workers.

### ***Remedial Activity***

In 2000, the EPA conducted a remedial investigation and feasibility study (RI/FS) on Kim-Stan Landfill.<sup>2</sup> The study concluded that the site posed a potential threat to human health and the environment because of leachate discharges to the ground and surface water. In 2002, EPA signed a Record of Decision that identified some measures to clean up the site.<sup>3</sup> The measures included:

1. Construction of multilayer landfill cap;
2. Construction of a new leachate collection trench or barrier wall;
3. Leachate transported to Alleghany County Low Moor Waste Water Treatment Plant via pipeline for treatment;
4. Institutional controls; and
5. Groundwater monitoring.

The EPA RI/FS addressed ATSDR's 2000 recommendations to conduct additional sampling of surface soil, groundwater, and soil gas production at the landfill.

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<sup>2</sup> Remedial Investigation and Feasibility Study, Kim-Stan Landfill Site, Selma, VA. April, 2000. Prepared by Tetra Tech/ Black& Veatch. Work Assignment No. 023-RICO-A301

<sup>3</sup> Remedial Action Report for Kim-Stan Landfill Site, Selma, VA. December 2011. EPA Contract No. EP-S3-07-04; Work Assignment No. 007-RARA-A301; Tetra Tech Project No G01010

In December 2011, a Remedial Action report was published by the EPA.<sup>4</sup> The report described the remedial action implementation of each of the three main construction projects for the Kim-Stan Landfill and they include the following:

***Low Moor Treatment Plant Upgrade (began December 2005 and completed October 2006):*** The upgrade of the Low Moor Waste Water Treatment Plant implemented was to increase the capacity of the plant to accommodate additional waste flow from the Kim-Stan site.

***Leachate Pipeline and Sewer Upgrade (began December 2005 and completed in May 2007):*** A pipeline was installed to convey leachate from the landfill to Alleghany County Sewer System. The sewer system was also upgraded to accommodate additional flow from the landfill.

***Landfill Capping and Leachate Collection System (began August 2007 and completed in March 2011):*** The landfill cap is intended to eliminate the potential for contact with the waste on the surface as well as eliminate direct infiltration of precipitation in the waste mass, which should ultimately reduce the quantity of leachate being generated by the landfill. The landfill gas cap is intended to minimize the migration of landfill gases outside of the landfill property.

These actions addressed the 2000 ATSDR recommendations concerning leachate and surface water run-off from the landfill.

### ***Operation and Maintenance***

The EPA and the Virginia Department of Environmental Quality (DEQ) are responsible for the operation and maintenance (O&M) of the Kim-Stan Landfill. O&M include inspection, scheduled maintenance, and monitoring (for a list of long-term monitoring, please see attachment 5). Maintenance actions may be required to address inspection deficiencies but these actions are not scheduled. Furthermore, long-term monitoring of the Kim-Stan Site will be conducted to determine the efficiency of the remedial action.

## **DISCUSSION**

### ***Environmental Data (February 2014)***

Environmental sampling has been conducted on a semiannual basis at the Kim-Stan Landfill. VDH reviewed February 2014 groundwater and landfill gas sampling data. The data also included a summary report of the general inspection of Kim-Stan Landfill.

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<sup>4</sup> Remedial Action Report for Kim-Stan Landfill Site, Selma, VA. December 2011. EPA Contract No. EP-S3-07-04; Work Assignment No. 007-RARA-A301; Tetra Tech Project No G01010

### Groundwater Sampling

Groundwater samplings were conducted at Kim-Stan Landfill on February 24 and 25, 2014. Fourteen semi-annual monitoring wells (MW-03S, MW-03D, MW-04S, MW-04D, MW-05S, MW-05D, MW-06S, MW-06D, MW-07S, MW-07D, LF-15S, LF-15D, LF-16S, and LF-16D) and two piezometers (PZ-01 and PZ-02) were sampled. All groundwater monitoring wells were micro-purged and sampled with a portable ground dedicated polyethylene tubing. Samples were collected in laboratory-supplied, pre-preserved sample containers. After collection, the samples were placed on ice in a cooler and shipped to an EPA designated laboratory. Samples were analyzed for inorganic and organic contaminants.

### Landfill Gas Sampling

Twenty-five locations at the Kim-Stan Land fill were monitored for landfill gas. Locations included gas monitoring wells (GMW-01 through GMW-08), Ntelos pull boxes (NPB-01 through NPB-06), manholes (MH-01 through MH-05 and MH-07), catch basins (CB-1 through CB-3), the leachate collection trench LCT pump station, and the effluent pump station (EPS). Landfill gas was monitored by using the GEM-2000 and a photo ionization detector. Field measurement of percent methane, percent carbon dioxide, percent lower explosion limit, and volatile organic compounds were collected.

### Sampling Results

Table 1 shows the inorganic constituents detected in the February 2014 sampling events. Arsenic was detected in three groundwater monitoring wells (LF-15S, MW-05S, and MW-06S). The highest concentration of arsenic detected in February 2014 was 21.9 µg/L. Iron was also detected at elevated concentrations in LF-15S, MW-05S, MW-05D, MW-06S, MW-06D, and MW-07S; however, the highest concentration detected in February 2014 was 18,300 µg/L. In addition, manganese was detected at an elevated concentration (7,020 µg/L) in MW-07S.



**Table 1. February 2014 groundwater sampling data for inorganic compounds and their comparison values**

Inorganics	Well ID	Highest Concentration Detected (µg/L)	Comparison Value (µg/L)		Type of Comparison Value
			Child	Adult	
Aluminum	LF-16S	834	10,000	35,000	Chronic EMEG
<b>Arsenic</b>	<b>MW-07S</b>	<b>21.9</b>	<b>3</b>	<b>11</b>	<b>Chronic EMEG</b>
Barium	MW-05S	1210	2,000	7,000	Chronic EMEG
Calcium	MW-04S	170,000	No comparison value		
Chromium	MW-07D	19.9	100		MCL
Cobalt	MW-06S	29	100	350	Intermediate EMEG
<b>Iron</b>	<b>LF-15S</b>	<b>18,300</b>	<b>300</b>		<b>Secondary MCL</b>
Magnesium	MW-04S	33,800	No comparison value		
<b>Manganese</b>	<b>MW-07S</b>	<b>7,020</b>	<b>500</b>	<b>1,800</b>	<b>RMEG</b>
Nickel	MW-06D/06S	20.3	200	700	RMEG
Potassium	MW-05S	11,800	No comparison value		
Sodium	MW-05S	141,000	No comparison value		
Zinc	MW-06S	81	3,000	11,000	Chronic EMEG

(Source: EPA) RMEG = Reference Dose Media Evaluation Guide. EMEG = Environmental Media Evaluation Guide. MCL= Maximum Contaminant Level. µg/L= microgram per liter. ppb = parts per billion. **Bold face**=exceeded one or more comparison values.

Samples collected in the February 2014 sampling events were not analyzed for organic constituents. However, organic constituent analysis was conducted during the previous sampling event of August 2013. Data from August 2013 event indicated that naphthalene and pyrene were detected. Naphthalene was detected in MW-07S (0.14 µg/L), the second detection since sampling began in January 2010, and pyrene was detected in MW-07S (0.11 µg/L) for the first time since sampling began.

The results for the February 2014 well gas monitoring indicated that methane was detected in GMW-04 (56.1%), GMW-05 (0.2%), MH-03 (2.1%), and MH-04 (0.4%). In previous monitoring events, methane was measured at similar concentrations at these same locations. Methane was undetected in any other manholes or gas monitoring wells. Because methane was detected in two manholes on the east side of the property, methane monitoring was performed inside the Union Millworks building, (adjacent to Kim-Stan site) to determine if off site migration of methane was occurring. Results indicated that methane was undetected in the building.

### ***Exposure Pathway Analysis***

Contaminants in the environment can only affect human health if individuals are exposed to them and they are present at sufficient concentrations. Based on concerns from the December 2000 PHA, VDH examined the following exposure pathways:

*Surface Soil:* Kim-Stan Landfill is capped and the potential for direct contact with soil has been eliminated.

*Groundwater:* Arsenic, iron, and manganese were the only inorganic constituents detected above their comparison values (CVs). Although arsenic was detected in some onsite groundwater monitoring wells, it is unlikely that individuals are being exposed to the contaminated groundwater because the area is served by municipal water and wells in the area have not shown any level of contamination. To further eliminate this exposure pathway, the district has implemented institutional controls that prohibit any drinking wells from being constructed.<sup>5</sup> Concentrations of iron and manganese detected in the monitoring wells are consistent with previous sampling events. The elevated concentrations of iron and manganese can be attributed to the presence of degraded groundwater quality.

*Air:* Methane was the only volatile organic contaminant detected onsite. It is unlikely that individuals are being exposed to methane because no evidence of offsite migration of methane exists.

*Fish:* Per recent communications from DEQ<sup>5</sup>, the oxbow ponds are not easily accessible, because they are located between the mainline railroad tracks and the interstate highway. Environmental agencies do not have any evidence of fishing currently taking place in the oxbow ponds. As documented in EPA Region 3's Administrative Record for the Kim-Stan site, the National Oceanic and Atmospheric Administration (NOAA) completed an evaluation of biological habitats of concern near the Kim-Stan site in 2003. The only NOAA habitat of concern identified at this site is the Jackson River, adjacent to the landfill. NOAA's evaluation indicated that no information was available on recreational fishing in the oxbow ponds located on private property next to the site. Furthermore, given that landfill leachate is now intercepted and pumped to a treatment plant, there is no longer a pathway of surface water contamination leaving the site to impact these ponds. Therefore, this pathway is eliminated.

### ***General Inspection Results***

In addition to the sampling events, a quarterly site inspection of the Kim-Stan Landfill is conducted. The landfill cap, gas management system, groundwater monitoring wells, leachate collection system, engineered wetland ponds, and aeration channel were inspected (see Attachment 3). Some minor issues were identified and included the following:

- A non-functional whirly bird gas vent at GV-6, GV-7, GV-8, GV-11, GV-13, GV-14, and GV-18;
- Fence post damage (southeast corner of landfill);
- Minimal ponding of water (northeast corner near toe drain); and
- Issue with force main valve causing water to pour out over WOT-1 flush mount.

The deficiencies detected during the general inspection were corrected by Alleghany County personnel.

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<sup>5</sup> Personal communication with Tom Modena, Virginia Department of Environmental Quality, December 22, 2015.

## CONCLUSION

VDH concludes that the implemented remedial actions at the Kim-Stan Landfill are protective of human health, and the current concentrations of contaminants present at the landfill are not expected to harm people's health. The basis for this conclusion is that potential exposures have been eliminated.

## RECOMMENDATION

VDH does not recommend further actions at this time. VDH will be glad to review subsequent data as they become available.

We trust that the above information will help you. Should you have any additional questions please contact Dwight Flammia by phone at (804)-864-8127 or by email:

[Dwight.flammia@vdh.virginia.gov](mailto:Dwight.flammia@vdh.virginia.gov)

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