Letter Health Consultation

SOIL DIOXIN CONTAMINATION
ADJACENT TO JOSLYN SUPERFUND SITE
BROOKLYN CENTER, MINNESOTA

APRIL 16, 2014

Prepared by:
Minnesota Department of Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

Health Consultation: A disclaimer

The Minnesota Department of Health (MDH) Site Assessment and Consultation (SAC) unit collaborates with the Agency for Toxic Substances and Disease Registry (ATSDR), the lead federal public health agency, to prepare health consultation documents to determine if exposure to contaminants can harm people's health and to prevent and reduce exposures and illnesses. A health consultation is a written response to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material, and considers the levels of hazardous substances at a site, whether people might be exposed to contaminants, by what pathways, and what potential harm the substances might cause to people. In order to prevent or mitigate exposures, a consultation may lead to specific actions and recommendations, such as restricting use of or replacing water supplies, intensifying environmental sampling, restricting site access, or removing the contaminated material. 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 or exposure studies to assess exposure, conducting health studies, characterizing demographics, and/or providing health education for health care providers and community members.

ATSDR provides technical assistance and funding to MDH to help identify and evaluate environmental health threats to communities using the best science, taking responsive public health actions, and providing trusted health information. While this health consultation was supported by funds from a cooperative agreement with ATSDR, it was not reviewed by ATSDR.

The conclusions and recommendations presented in this health consultation are based on an analysis of the environmental sampling data and information made available to MDH within a limited time frame. The availability of additional sampling data, new information and/or changes in site conditions could affect the conclusions and recommendations presented in this document. MDH will consider reviewing additional future data related to the site, if made available and deemed appropriate.

Protecting, maintaining and improving the health of all Minnesotans

April 16, 2014

Steve Schoff, Project Manager, Superfund
Minnesota Pollution Control Agency
520 N. Lafayette Rd.
St. Paul, MN 55155-4194

Subject: City of Brooklyn Center dioxins/furans health assessment

Mr. Schoff,

This Letter Health Consultation is in response to your request to assess the health risk of dioxins/furans found on property in Brooklyn Center, Minnesota. The area in question is owned by the City of Brooklyn Center. It is bordered by a gravel road followed by Upper Twin Lake to the north, railroad tracks to the south and west, and a residential development to the east.

The site is adjacent to the Joslyn National Priorities List (NPL) Superfund site (MND044799856), which is just south of the railroad tracks and has been largely redeveloped. The portion of the Superfund site remaining (West Area) is expected to be remediated this year. The Joslyn site was used for treating wood poles and ties from the 1920s until 1980. Soil, sediment, and groundwater at the site became contaminated with pentachlorophenol (PCP) and polycyclic aromatic hydrocarbons (PAHs). Dioxins were later found in the soil and sediment at the Joslyn site. Dioxins can be impurities in PCP.

In reviewing remedial alternatives for the West Area, it was recognized that floodplain mitigation may be needed if contaminated soils are consolidated and covered in the West Area. Joslyn identified the City property as a potential location to excavate soils to use as backfill in the West Area and provide floodplain mitigation. However, dioxins were found in the City property soil.

Dioxins are a family of chemicals of dioxins and furans that share a similar chemical structure and common mechanism of toxic action (USEPA, 2011). Dioxins occur as contaminants in the manufacture of certain organic chemicals or as unintentional byproducts of combustion. Exposure to dioxins occurs mainly from our food supply, but dioxins are widely distributed throughout the environment in low concentrations. Dioxins are persistent and bioaccumulative.

Dioxins have been characterized by EPA as likely to be human carcinogens and are anticipated to increase the risk of cancer at even background levels of exposure. Animal studies have shown that exposure to dioxins at high enough levels may cause a number of other adverse effects, including changes in hormone systems, alterations in fetal development, reduced reproductive capacity, and immunosuppression (USEPA, 2011).

To estimate the toxicity of dioxin and furan mixtures, a series of toxicity equivalency factors have been developed that compare the toxicity of dioxin and furan congeners to 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). The overall toxicity of a mixture can then be calculated in terms of total TCDD equivalents. All concentrations of dioxins below include addition of congeners and are reported in 2,3,7,8-TCDD equivalents.

The MPCA's soil reference values (SRVs) for dioxin are 20 parts per trillion (ppt) for residential land use and 35 ppt for industrial land use. The ATSDR residential screening value is 50 ppt; EPA has also recently provided a new residential soil screening value for dioxin of 50 ppt based on their 2012 toxicity assessment (USEPA, 2012).

In February 2008, City property site soils were sampled using composite samples at varying depths – five samples between 0-2 feet and five samples between 0-3+ feet, up to 6 feet. Metals were at typical background concentrations and there were no detections of PAHs or PCP. Dioxins were found in all ten samples. Only one sample exceeded the residential SRV at 58 ppt. The other nine samples ranged from 0.03 - 8 ppt. Three more composite samples at a depth of 0-2 feet were taken near the elevated sample and the concentrations were 31, 56 and 82 ppt (see attached map for locations of concentrations).

In July 2009, additional composite samples at depths of 0-12 inches and 12-30 inches were collected on the City property. The five composite samples in the top foot of soil ranged from 16-51 ppt, while the five deeper composite samples ranged from 0.18-2.2 ppt. The attached map shows the lines (called Zone A through Zone D) where the samples were collected. Samples for Zone E were scattered throughout the Zone reflected on the map.

It is clear from the 2009 sampling that the dioxin concentrations are higher closer to the surface. The sampling wasn't intended to determine human health risk to surficial contaminants, and therefore no surface samples were collected. It is unknown how the dioxin is distributed in the top 12 inches of soil.

MPCA and MDH conducted a site visit on March 26, 2014. The City maintains the property as green space; however, it contains both wetland and wooded areas, is adjacent to railroad tracks, and has "no trespassing" signage. There are several residences across the road from the property. It is possible that in dry conditions, residents could walk through the property. However, it doesn't appear likely that use would be frequent or lead to significant exposure to the soil.

Because the City property is adjacent to the lake, it is reasonable to consider the potential for contaminated site soils to wash into the lake and contribute to lake sediment contamination, which could contribute to dioxins in fish. However, there are no known stormwater culverts or direct connections from the property to the lake, and the property is a lowland, surrounded by topographically elevated terrain, which will reduce the potential for surface water runoff from the wetland into the lake. In addition, MDH has looked at dioxin in fish tissue in Twin Lake due to concerns over the Joslyn site contamination (MDH, 2006) and determined that dioxin in fish tissue in Middle Twin Lake does not differ significantly from dioxin in fish tissue in a sample of 58 lakes in Minnesota. The amount of dioxin the City property could contribute to fish tissue in Twin Lake is likely to be insignificant.

Conclusions

- Concentrations of dioxins in soil found in composite samples on the City property are low, just above residential screening levels.
- No surface samples have been collected. It is unknown, but likely that surface soil dioxin concentrations are higher than the composite sample concentrations.
- Exposure to dioxin on the City property by direct contact is unlikely, based on the land being unsuitable for recreation.
- The amount of dioxin the City property could contribute to fish tissue in Twin Lake is likely to be insignificant.
- The concentrations of dioxins on the City property do not represent a health risk.

Recommendations

- MDH recommends that the City property continues to be managed as non-recreational green space.
- If the land use changes and the potential for human contact exposure increases, surface soils should be sampled for dioxins to ensure safety of the site use.

Sincerely,

Emily Hansen, Site Assessment and Consultation Unit

References

MDH (2006) Health Consultation - Middle Twin Lake Fish Tissue Study, Joslyn Manufacturing and Supply Company Site, City of Brooklyn Center, Hennepin County, Minnesota. Accessed at http://www.health.state.mn.us/divs/eh/hazardous/sites/hennepin/joslynhc706.pdf on March 14, 2014.

USEPA (2012) EPA Non-Cancer Toxicity Value for Dioxin and CERCLA/RCRA Cleanups. Accessed at http://epa.gov/superfund/health/contaminants/dioxin/dioxinsoil.html on March 14, 2014.

USEPA (2011) Dioxins and Furans. Accessed at http://www.epa.gov/pbt/pubs/dioxins.htm on March 14, 2014.

This Health Consultation was supported by funds from a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR).
ATSDR did not review this document and is not responsible for the content.

Dioxin concentrations (reported as 2,3,7,8-TCDD equivalents in parts per trillion)

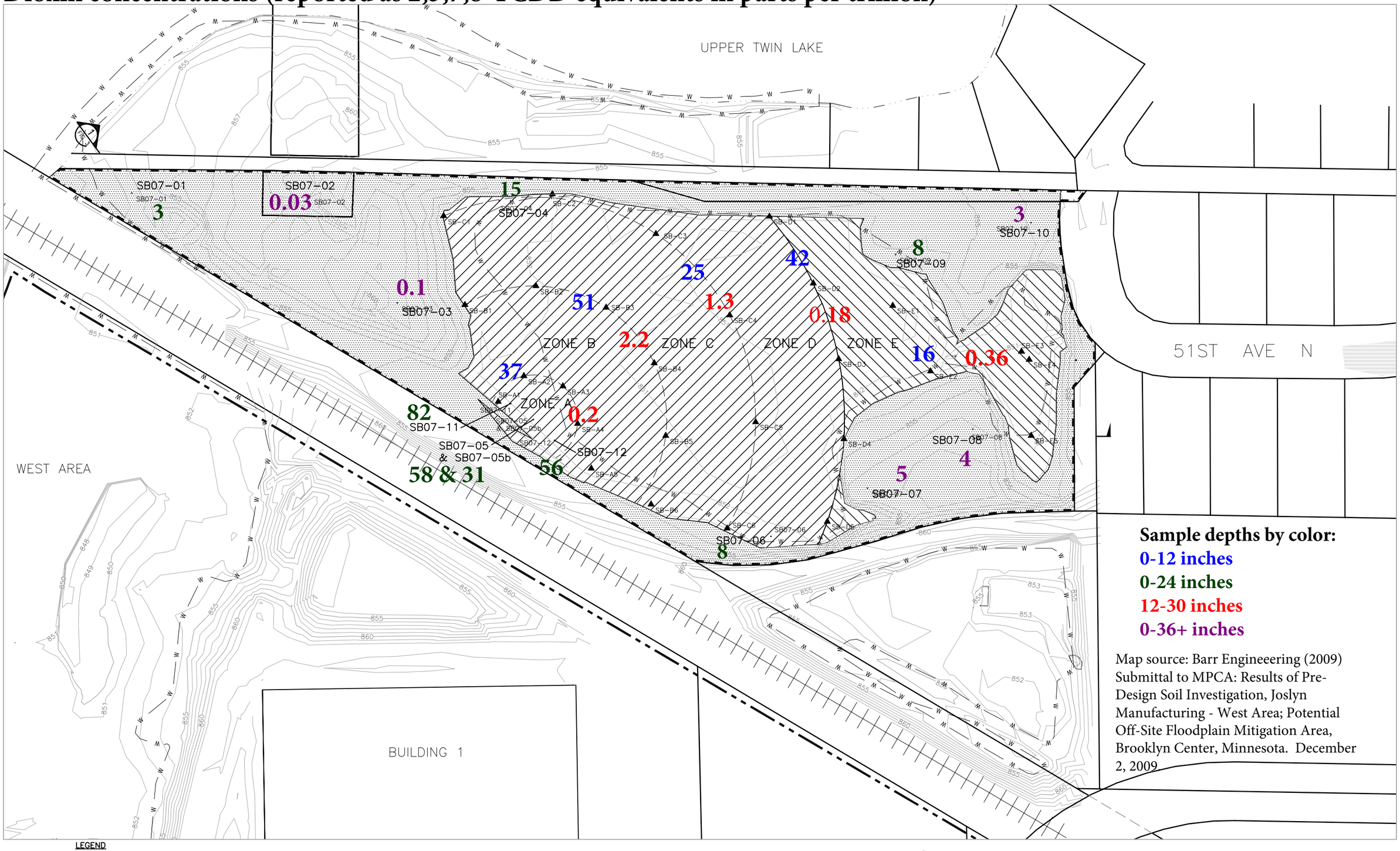

FIGURE 1
SOIL SAMPLING LOCATIONS
POTENTIAL FLOODPLAIN MITIGATION SITE
BROOKLYN CENTER, MINNESOTA