



*Michigan
Department
of Environmental
Quality (DEQ)*



Department of Environmental Quality Information Sharing Meeting

October 13, 2009

- Waste and Hazardous Materials Division (WHMD)
- Saginaw Bay District Office
 - 401 Ketchum Street, Bay City, 48708
 - Terry Walkington, P.E., District Supervisor
 - 989-894-6295
 - Tom Fox, Senior Environmental Engineer
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Overview and Purpose of Tonight's Meeting

- Consumers Energy (CE), Bay County
 - Weadock Landfill
 - Karn Landfill
- To explain some historical actions to regulate the impoundments as landfills
- To explain monitoring and compliance studies, designs, and construction work that improves operations and integrity of the 2 existing landfills used by the 2 power plants

Overview and Purpose of Tonight's Meeting

- To explain actions the DEQ is taking to review applications and reissue the 2 operating licenses
- The meeting is **NOT** about the proposed power plant, air permits, or the surface water discharge permit!
- Agenda Handout:
Please see details

Overview of Progress to resolve suspected problems

- CE and State noticed potential for leakage in 1982
- Specific venting standards were developed in late 1990's through 2004, still evolving to present time
- 2001: The 2 LFs assessed, and thought potential that pollutants could migrate to the Saginaw Bay
- 2002-2007: Studied further, here and nationally
- 2007: Venting criteria were set for these sites
- 2008: Slurry wall designed and built at Weadock
- 2009-2014: Construction being required at both
- 2010-Future: Further monitoring of performance

Karn Landfill



Weadock Landfill



Site Historical Perspective

- Some land formed by filling marshes w/ dredge spoils
- Variety of heavy metals and organic contaminants were added to the area
- Inorganic forms of several heavy metals are naturally occurring in the soils and geo-substrata in the area
 - Detectable in surrounding monitoring wells
- Originally the ash settling ponds were surface settling ponds ("impoundments"):
 - Built in phases at Karn and Weadock, 40's to 70's.

Site, cont'd

- Impoundments were built decades before there were state landfill design rules.
- Some of the settling impoundments are now landfill cells that were actually built upon marshy organic Lake Huron bottom lands.
- Some ash piles were built upon dredged spoil piles, next to the Saginaw River.

In 1970-80's the surface water discharges were regulated in NPDES discharge permits:

- For many decades, there was not much regulation of groundwater discharge quality, just some monitoring.
- In 1982, some problems with groundwater under the landfills were noticed by CE and discussed with the DNR (now the DEQ).
- In 1983, more concerns were realized for potential heavy metal impacts from coal ash.
- DNR (DEQ) decided to increase groundwater monitoring requirements to better evaluate what was happening.

Initial Landfill Licenses and Permits

- In 1986, Water Resources Commission authorized discharges from these ash lagoons to groundwaters:
 - As not usable aquifers
 - Had little data quantifying any concerns for pollutants
- Then the DNR (DEQ) licensed the impoundments as solid waste landfills in order to apply additional state groundwater monitoring outside the landfills:
 - More than was in the NPDES permit
 - Karn LF construction permit was issued in 1986
 - Weadock LF const. permit was issued in 1992

Licenses, cont'd

- Variances (approx. 14-16) were necessary to capture the impoundments under the solid waste law for landfills, as not typical landfills.
- During the late 1980's and 1990's, the monitoring showed no concerns.
- 1992-2001: Monitoring requirements were adjusted as data revealed or eliminated concerns.

Tighter standards came to play

- Late 1990's: Discharges to the Great Lakes became regulated more tightly per EPA's National Toxics Rule.
- 2004: DEQ developed tighter leachate and groundwater venting standards for surface waters (to rivers and lakes) at the GSI.
- "GSI": groundwater – surface water interface
- Better low-level test methods became available for many parameters, especially Hg.
- More concerns for persistent toxics and heavy metals in the Saginaw R and Bay systems

2001 - 2002

- Late 2001: Recognition of increased concentrations of some plumes (parameters) outside the landfills:
 - Not shown to reach the Bay yet
 - But could potentially move to the Bay
- February 2002: DEQ requested more studies
- CE was cooperative and studies defined better the extent in plumes
- EPA & university researchers evaluated bio-geo-chemical interactions as plumes moved toward the Saginaw River and Bay.

2004-2007

- 2004: The landfill licenses were last reissued
 - DEQ required extensive monitoring studies
 - CE to proceed with corrective actions, if needed
- 2004-2007: Studies showed:
 - Concerns for a short list of parameters that needed control
 - Other parameters warranted continued study

2004-2007 Study results

- Some of the pollutants were heading toward the Saginaw Bay, but no transect data found any reaching Bay above water quality criteria.
- Evaluations of data were complicated by:
 - Natural background geological concentrations of many parameters, e.g., Arsenic, Mercury
 - Likely low-level contamination coming from the dredge spoils piles
 - Potential influences of groundwater from the Saginaw River itself

In 2007

- All sampling data were re-evaluated again:
 - by CE, consultants, and DEQ (WHMD, WB)
 - Hydrogeological plume mapping
 - Initial toxicity criteria calculated at the GSI
- Data compared to other national studies
- Borings assessed the dike soils
 - Permeability
 - Calculated flux (mass movement)
- ALSO: WHMD requested and reviewed dike and slope stability evaluations

Discussion of Studies in 2007

- Pollutants were moving toward the Bay and reached the Bay in some locations
 - not all parameters consistently
 - indicating spotty leakage through the dikes
- Some heavy metals occurred naturally and underwent chemical changes due to buried marsh soils, redox conditions, etc.
- Some locations potentially received pollutants migrated from the river and dredge spoils.

2007 - 2008

- 2007: DEQ Water Bureau calculated venting (GSI mixing zone) criteria for all parameters of concern, i.e., As, B, P, and Hg
 - GSI criteria were set here for inorganic arsenic, boron, mercury, and phosphorus
 - Arsenic: (notations, more info later)
 - Organic forms of As bioaccumulate in biota
 - Inorganic As is not as toxic
 - Inorganic form of As is regulated to protect the Saginaw Bay as a drinking water supply

2008

- DEQ thought venting may exceed the 2007 calculated criteria in some spotty locations
- CE concurred in the concerns
 - Designed a slurry wall for the Weadock LF
 - Weadock LF is to be used long-term, as the Karn Landfill is almost filled
 - July 2008: DEQ, WHMD approved the Weadock LF slurry wall design
 - December 2008: CE completed construction of Weadock slurry wall

Weadock Landfill

- The slurry wall reduces the flux of pollutants to $< 10\%$ (maybe $< 3\%$) of pre-wall venting flux.
- How Much ?
 - As
 - P
 - B
 - Hg
- Is the subject of future studies ...

August 2009: Both Landfills

- CE and DEQ continued to discuss the GSI criteria, mixing, dilution, etc., and WB revised/corrected the GSI criteria for the quality of groundwater that can vent to the River and Bay and protect for human health and the environment
 - Some concerns remained for As, B, P, and Hg
 - New higher values may be achieved more easily with proper containment systems
 - But, complex monitoring is needed to confirm landfills meet performance criteria

Karn Landfill

- September 2009, DEQ and CE discussed (again) the need for a slurry wall or comparable system and construction schedule for the Karn Landfill.
- DEQ and CE agreed that further work is needed:
 - To construct a slurry wall or other adequate containment system at Karn Landfill
 - Evaluate dike and slope stability and upgrade if/where needed

Landfill Compliance: Both sites

- No known violations, but lack certain proof of compliance for some parameters
- Unlikely threat of violations
- Likely comply with the new criteria
- Confirmation monitoring is required
 - Prove landfills comply with water quality standards to protect drinking water sources, wildlife, and human health
 - Prove the containment systems work hydraulically, as intended

Both Landfills

- Must demonstrate that the two containment systems are adequate
- Containment systems, e.g., slurry wall system must prove work adequately from a hydraulic and contaminant migration standpoint
- DEQ requests final studies of dike stability and slope stability, for Weadock and Karn
 - Confirmed by soils mechanics analyses
 - Improve dikes, slopes, if/where needed

License Conditions

- DEQ proposes to impose special conditions in the landfill operating licenses to:
 - Construct a slurry wall or alternative containment system at Karn LF
 - Prove the containment systems at Weadock and Karn meet performance criteria at both sites (for the Saginaw River and Bay)
 - Monitoring

Monitoring Of:

- Ash and leachate quality in the landfills
- Groundwater quality immediately under and outside the dike walls
- Hydrostatic levels to determine the future rates of leakage, to calculate flux (mass)
- Groundwater quality where venting might reach surface waters at the river and bay
- Monitoring is during landfill future operations, and 30 years after landfills are closed
- Monitoring schemes can be adjusted as concerns are eliminated or added at each LF

DEQ and CE Staffs will provide further discussion and are here to answer questions:

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 - 517-373-1316
- Tom Fox, WHMD, Senior Environmental Engineer
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- Consumers Energy
 - Dennis Dobbs, Site Manager