Honeywell International Metropolis Works (MTW) Facility

October 5, 2010

NRC Presentation

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Agenda

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- Introduction
- Overview of MTW Ponds and Closure Project
- Closure Design Concept and Criteria
- NRC Decommissioning/MARSSIM Strategy
- Pond Characterization Data
- Dose Modeling – Key Assumptions
- Preliminary Modeling Results
- Next Steps
- Discussion/Feedback
- Concluding Remarks

Overview of Ponds at MTW

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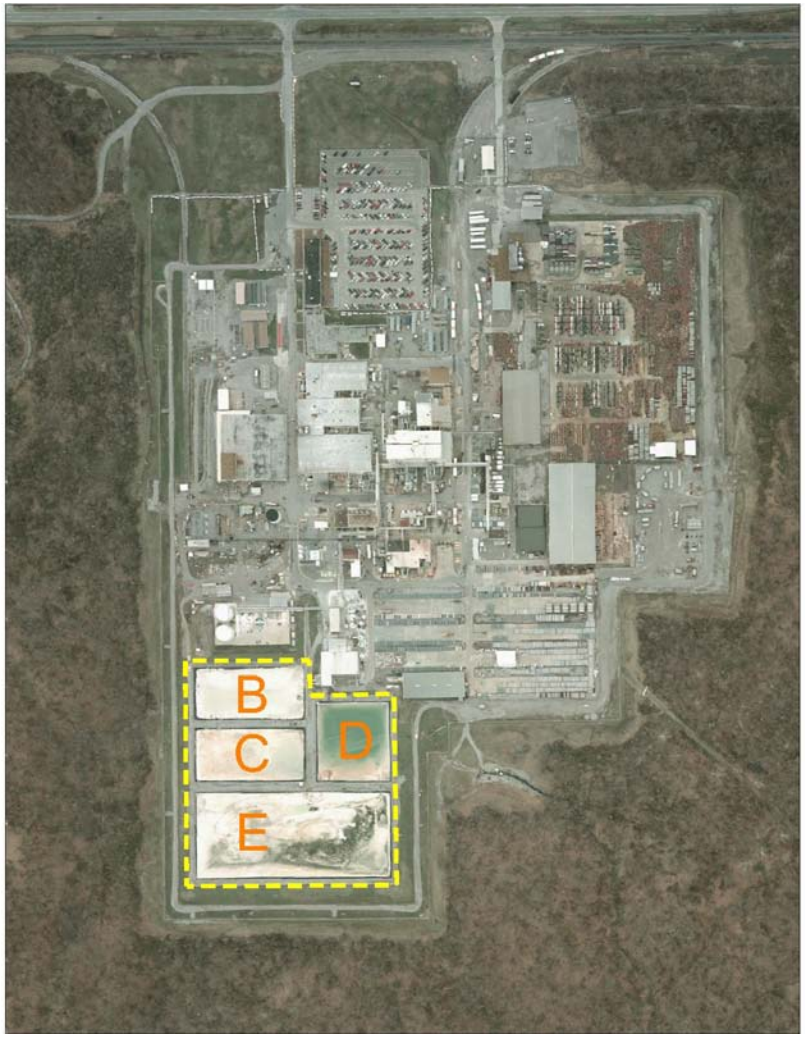
- **Surface impoundments permitted under RCRA**
  - Calcium Fluoride (CaF_2) ponds
  - RCRA sampling verified the materials in the ponds as non-hazardous
  - Contain some residual radioactivity

Pond ID	Volume (cubic yards)
B Pond	13,000
C Pond	13,600
D Pond	9,500
E Pond	52,000



Overview of Pond Closure Project

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- **Three ponds no longer in use, fourth to be removed from use prior to closure**
- **Must be closed in timely fashion per NRC and IEPA regulations**
- **Pond closure must comply with both NRC and IEPA requirements**
  - 10 CFR Part 20, Subpart E regulations
  - RCRA Part B regulations
- **Closure approach**
  - Stabilize/solidify CaF_2 material in-situ within existing pond footprints using a pozzolanic material (e.g., Portland cement)
  - Construct RCRA cover over each pond

Agency Coordination is Essential

Closure Design Criteria

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- **Leave existing ethylene propylene diene monomer (EPDM) liner in place**
- **Stabilize materials in-situ with pozzolanic material above existing EPDM liner**
- **Add a minimum of 4 feet of clean cover soil above stabilized material (cover subgrade slopes at 4%), from top to bottom:**
  - 2 feet of cover soil including vegetated topsoil,
  - 1-foot granular drainage layer,
  - Textured geomembrane (GM),
  - Geosynthtic clay liner (GCL) and;
  - 1-foot minimum of clean cover soil.
- **Armor berm side-slopes and drainage ditches with riprap for long-term erosion protection**

Closure Design Based on Pertinent NRC and RCRA Guidance

Closure Design Criteria – Seismic

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- **Based overall design on IEPA and USEPA Guidance**
  - **475-year Earthquake (IEPA):**
    - Pseudo static slope stability factor of safety (FS) of 1.3 or greater
  - **2,475-year Earthquake (USEPA):**
    - Seismic slope deformations no greater than 6 to 12 inches
- **Considered pertinent sections of NUREGs 1620 and 1623, and RG 3.13**
  - **Slope stability, slope displacement, and settlement analytical methods**
  - **Effects of soil liquefaction**

Design Criteria Addresses Credible Natural Events

Closure Design Criteria – Surface Water and Erosion

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- **Based surface water and erosion control features on IEPA and USEPA design guidance (for landfills and surface impoundments)**
  - **Top cover hydraulic conductivity less than existing bottom liner**
  - **Designed drainage feature sizes based on the 100-year, 24-hour storm**
- **Considered pertinent sections of NUREGs 1757, 1620, 1623, and 6697 (e.g., erosion protection)**
  - **Riprap on all berm sideslopes and ditches**
  - **Considered erosion protection performance during precipitation intensity events greater than the 100-year, 24-hour storm**
  - **Cover erosion rate assumed to be 0.00018 m/yr**

Design Criteria Addresses Credible Natural Events

NRC Decommissioning Strategy

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- **Partial site decommissioning**
  - Ponds cover an approximately 6-acre combined area
  - Closed area will be released from NRC license (approximately 10 acres total)
  - Necessary to ensure consistency among EPA, IEPA, and NRC
  - Consistent with 10 CFR 40.42 (the “Timeliness Rule”)
- **Selected approach is <u>unrestricted</u> release from license**
  - Dose is As Low As Reasonably Achievable (ALARA)
  - Total Effective Dose Equivalent (TEDE) to average member of critical group less than 25 mrem
  - No institutional controls
  - Accounts for dose contribution from balance of site

Consistent with License Termination Rule and NUREG-1757

MARSSIM Methodology

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- **License termination strategy for the ponds**
  - Document existing extensive pond characterization data
  - Develop site-specific radiological computer dose model using available site-specific parameters
  - Select appropriate end user scenario (e.g., industrial worker)
  - Verify that dose exposure criteria will be met when RCRA closure design (or more conservative) is implemented
  - Recognize that dose exposure used by partial release of the closed ponds from the license reduces the dose release criteria for the remainder of the site at eventual site decommissioning
- **Approach shows that post-closure exposure levels achieve 10 CFR Part 20 requirements**
- **Methodology is consistent with using derived concentration guideline levels (DCGLs) to demonstrate 10 CFR Part 20 compliance**

Consistent with License Termination Rule and NUREG-1757

Pond Characterization

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- **Pond Characterization Investigation**
  - Pond characterization data collected in 2009 by Andrews Engineering
  - Used to calculate mean uranium concentrations for each pond

Location	Grid Composite Mean Uranium Concentration (as is basis)		N
	(pCi/g)	(ppm)	
Pond B	160	240	26
Pond C	191	287	36
Pond D	163	245	34
Pond E	135	203	105

Uranium is Present at Levels Less Than Source Material (500 ppm)

Dose Modeling – Key Assumptions

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- **Critical Group – Industrial Worker**
  - Industrial use consistent with nearby land uses
  - Area surrounding closed ponds (*i.e.*, balance of MTW operations area) is expected to remain an industrial facility under NRC license
  - IEPA RCRA closure restrictions will proscribe certain uses/activities
- **Exposure Pathways**
  - Conservatively includes drinking water pathway
  - Suppresses plant, meat, milk, and aquatic food ingestion pathways
  - Occupancy factors (40-hour work week; 2,000 work hours/year)

Consistent with License Termination Rule and NUREG-1757

Dose Modeling – Key Assumptions

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- **Size, thickness, and hydrogeologic properties of contaminated zone, cover materials, unsaturated zones, and saturated zones are defined**
- **Engineered cover required by RCRA and IEPA regulations**
  - Minimum 4’ cover
  - Severely restricts water infiltration and potential migration of waste materials
  - Evaluations based on reasonably conservative average cover thickness at each pond
- **Engineered cover only credited for passive performance**
  - Assumes no maintenance or monitoring
  - Modeling will consider range of failure mechanisms
    - Erosion
    - Flood
    - Earthquake

Consistent with License Termination Rule and NUREG-1757

Dose Modeling – Additional Conservatism

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- **Industrial worker alternative modeling evaluated a range of parameters:**
  - Impact of cover thickness and erosion
  - Impact of unsaturated zone hydraulic conductivity
  - Impact of stabilization volume increase and concentration decrease
  - Impact of saturated zone porosity
  - Impact of no sub-pond liner
- **Maintenance and monitoring of engineered cover will be required by IEPA**
- **Conservatively modeled Resident Farmer scenario as a check**

Model Yields Conservative Results

Dose Modeling – Preliminary Results

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- **RESRAD dose model (probabilistic mode)**
  - Conceptual site model
  - Preliminary cover design
  - Site-specific geologic and hydrologic parameters
- **Maximum industrial worker dose values for conservative average cover thickness was approximately 2 x 10^{-7} mrem/year at 1,000 years**
- **Resident farmer scenario, evaluated as a conservative comparison, resulted in an estimated dose value of 6 x 10^{-7} mrem/year at 1,000 years**

Doses Far Below Part 20 Limits

Next Steps…

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- **Submit License Amendment Request and Decommissioning Plan to NRC (November 2010)**
- **Submit Class 3 Permit Modification Request and Closure Plan to IEPA (November 2010)**
- **Begin Pond Closure (March 2013)**
- **Complete Pond Closure (May 2016)**

NRC Approval Key to Closure Plans

Questions/Comments

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