Responses to CAC Comments on Freon-11 Groundwater Contamination

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Agenda

- Brief overview/review of plume details
- What has been done so far?
- Responses to comments raised at September meeting
- Next steps
Plume Overview/Review

Freon-11 Release at Building 452

Extent of contamination
- Plume 300 ft. wide, 600 ft. long.
- Maximum concentration = 36,000 µg/L.

Source of contamination
- Building 452 (AC Shop) area
- Based on length of plume spill probably occurred 2 to 3 years ago.
- Estimated amount of Freon-11 in groundwater is 15 to 25 gallons.
What Has Been Done So Far?

- Developed plans to hydraulically control and remediate plume early for maximum efficiency
  - Previous success remediating the Carbon Tetrachloride plume.
- New extraction well was installed to capture high concentration portion of plume.
- Existing Building 96 extraction well RTW-1 will capture lower concentration part of the plume.
- 12 new monitoring wells were installed
  - Monitor groundwater near Building 452 for the next year to determine if there is a continuing source of Freon-11.
CAC Comment:
Is it better to leave the Freon-11 in the ground?

- According to the OU III Record of Decision on groundwater approved by EPA, NYSDEC, and DOE, the Laboratory must:
  - Meet the drinking water standards in groundwater for VOCs (the drinking water standard for Freon-11 is 5 µg/L; highest concentration observed was 36,000 µg/L)
  - Prevent or minimize further migration of contaminants
  - Complete clean-up of the Upper Glacial Aquifer by 2030
CAC Comment: What are the regulators’ concerns?

- Regulatory framework for remediation and method of public outreach.
  - Regulators, DOE and the Lab are working on an approach that will meet everyone’s needs. BNL/DOE recommended:
    - Include the plume under the OU III ROD
    - Designate the location a new Area of Concern (#32)
    - Document with an Explanation of Significant Differences (ESD)
CAC Comment: What alternatives have been evaluated?

1. Liquid Phase Granular Activated Carbon (GAC)
   - No air emissions
   - Poor removal efficiency
   - Cost $900K greater than air-stripping (based on 3 year project life-cycle)

2. Air Stripping (with air emissions treatment)
   - High removal efficiency
   - Air emissions treated with GAC
   - Cost $100K greater than no air emissions treatment (based on 3 year project life-cycle)

3. Air Stripping (without air emissions treatment)
   - High removal efficiency
   - Some air emissions (within regulatory limits)
CAC Comment: What option did you select and why?

- Air Stripping (without air emissions treatment)
- NYSDEC Division of Air Resources (DAR)-1 Screening Model
- Model assumptions: Freon-11 concentrations of 36,000 µg/L and treating 120 gals/min
- Modeled emissions from the air stripping system using the highest concentrations observed
  - Projected result was 1/10th of the NYSDEC guidance
CAC Comment: What option did you select and why? (continued)

- Used NYSDEC Air Guide 20 “Economic and Technical Analysis for Reasonably Available Control Technology” to evaluate cost to treat air emissions.

Assumption

- GAC filter captures 0.05 tons/yr.

Results

- NY State guidance for VOC treatment (what is reasonable) = $5,000/ton
- Estimated treatment cost = $356,000/ton
Emissions Comparison

Air Stripper Emissions

• Estimated 15 – 25 gals in groundwater
• Operation for approximately 3 years
• Approximately 100 lbs./yr.

Ozone Depleting Substance Equivalents (~ 100 lbs/yr)

• 2- Halon 1211 portable fire extinguishers
Next Steps

- Complete construction of treatment system
- Begin system operation early 2012
- Continue progress updates to CAC, BER, Lab community
Ed Murphy
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What Actions Have You Taken to Better Secure BNL’s Refrigerant Inventory?

Secure Storage

- All R-11 was moved to CCWF, Bldg. 600
  - Building is staffed / supervised 24/7/365
  - Improved temperature control
  - R-11 & R-123 drums stored on secondary containment
  - CCWF has a refrigerant detection system – alarms to BNL fire department

- “Re-purposed” a hazardous material storage building for high pressure refrigerant storage
  - 80% complete (waiting for new cylinder racks, signage and communications)
  - Building designed for hazardous material storage
  - Card reader access – records who accesses building

Re-Training

- Info session for A/C engineers – R11 and groundwater
What Plans Do You Have to Better Secure BNL’s Refrigerant Inventory?

Better Inventory Management
- Maintain refrigerant log (inventory) in CCWF
- Studying moving all high pressure (gaseous) refrigerant inventory to new storage building
  - Evaluating high pressure refrigerant log

Refrigerant Management Plan Revisions
- Update for:
  - New storage locations
  - New inventory management procedures
  - Organizational changes and job titles
Questions