Water Quality Task Force Report

Steve Holmes

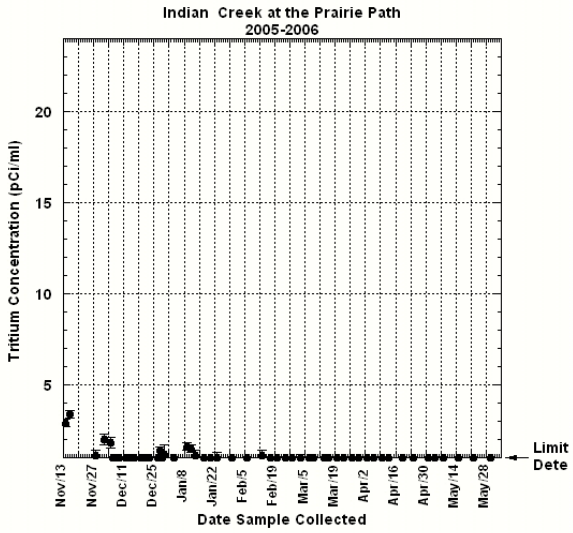
All Experimenters Meeting
June 5, 2006

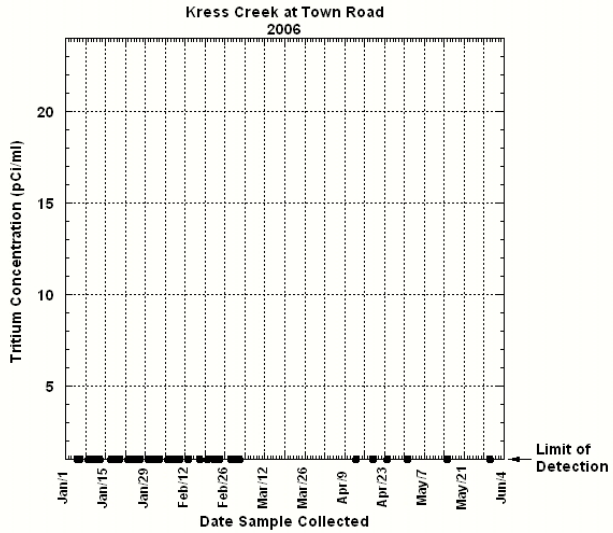
Observations

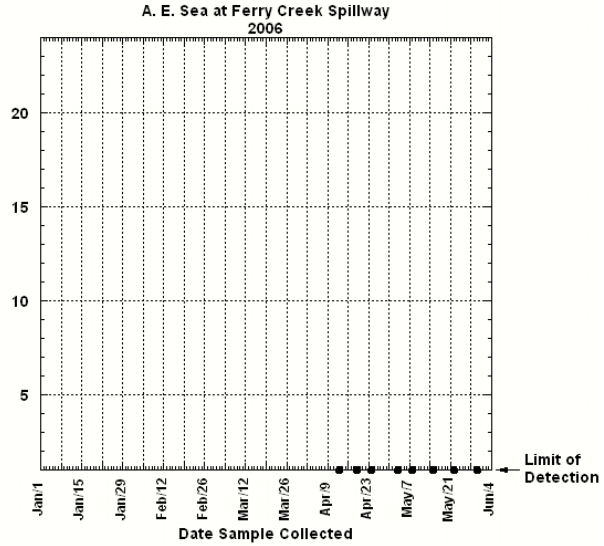
- Detectable (>1 pCi/ml) levels of tritium observed last November in the Indian Creek discharge
  - Measured 3.3 pCi/ml (site boundary)
    - DOE regulatory limit for surface water is 2000 pCi/ml
    - (20 pCi/ml for drinking water)
  - Currently:
    - All (3) creeks below detectable
    - Onsite surface waters at 2-3 pCi/ml
  - Updated levels for all creek outflows publicly available at

http://www.fnal.gov/pub/about/community/creekhub.html

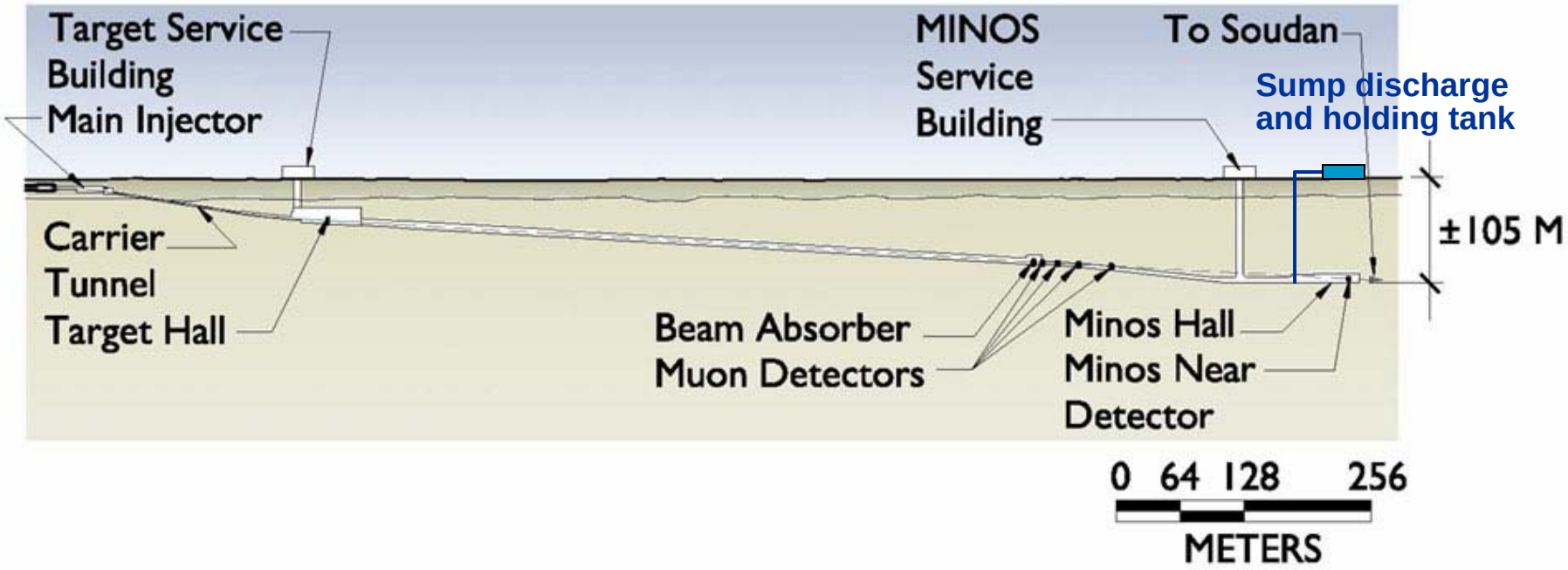
History of the Creeks





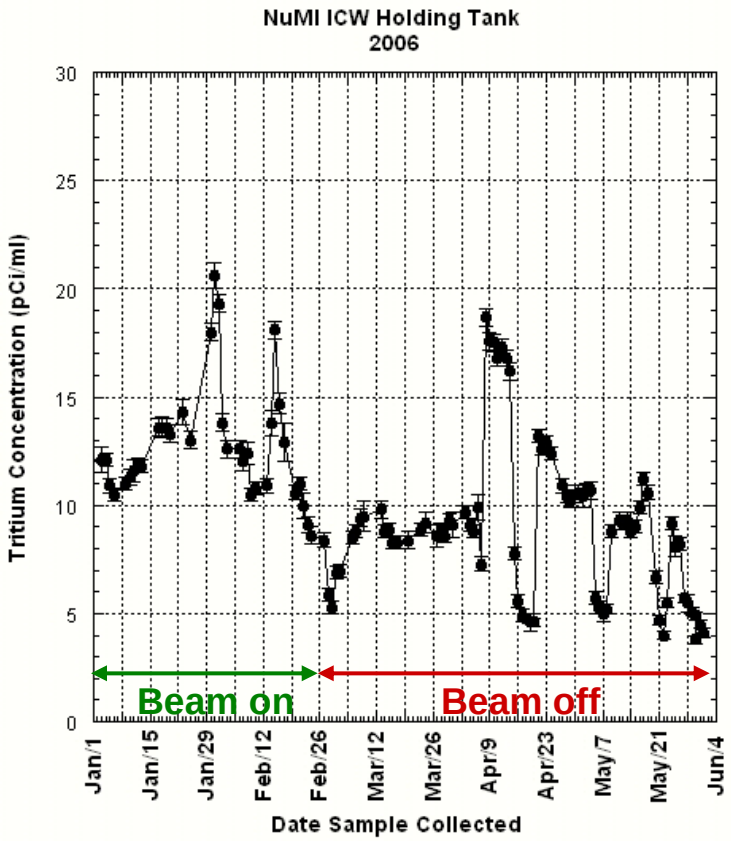


Sources



- Water flowing into the NuMI enclosure is collected in the MINOS cavern and pumped to the surface
  - ~175 gallons per minute @ 13 pCi/ml (pre-shutdown, ~200 kW)
  - Note: Pumping of HTO to the surface is per design to protect the aquifer

Sources



- Levels observed in holding tank exceed expectations, but well below regulatory limits
  - Modeling prediction is ~0.8 pCi/ml due to activation in the rock surrounding the enclosure
- How is it being produced?
  - Primary mechanism appears to be formation of HTO in the target chase atmosphere, followed by condensation and/or absorption into enclosure walls.
    - Measured concentration in target chase humidity is 70,000 pCi/ml

Response

- Task Force established to coordinate response
  - Charge: Develop an ALARA plan, including associated concentration goals, for the short (200 kW); intermediate (1000 kW), and long (2000 kW) terms.
  - Four subcommittees:
    - Source
    - Water management
    - Monitoring
    - Communications
  - Interim report issued 5/5/06
- Strategy (short term)
  - Protect the creeks: Hold water coming from NuMI in our ponds, protecting Indian and Ferry Creeks.
  - Dilute with precipitation and pumping from the Fox River.
  - Direct any discharges towards Kress Creek where there is a significant dilution flow

Response

- Strategy (long term)
  - Reduce source term as much as possible
  - Utilize evaporation to the atmosphere (CUB) to the extent possible
  - Manage site waters to minimize off-site creek discharges
- Remediation actions to date
  - Repaired pipe connecting MI Ponds C-D (immediate source of November discharge)
  - Collecting condensate from target chase chiller (2 gph @ 70,000 pCi/ml)
  - Installed target hall dehumidification system
  - Staged CUB for direct NuMI connection
  - Re-routed Booster sump discharges to protect Indian Creek
  - Re-routed AP-0 sump discharges to protect Indian Creek
  - Engaged service of LBNL Earth Sciences Dept for analysis of water absorption, desorption, and movement within rock and concrete

Response

- Public Communications
  - Letters to all residents of Savannah and Summerlakes subdivisions
  - Briefing for Savannah Homeowners Association
  - Meeting with Warrenville mayor and principal of Johnson School (Summerlakes); Warrenville City Council next Monday
  - Publicly accessible website established (Fact sheets + creek monitoring)
- Interactions with the State of Illinois
  - Informed IEPA on December 8 of the Indian Creek results (so they could be responsive if they received calls from the neighbors)
  - IEMA has taken several concentration measurements which confirm our results
  - On 3/20 we received a Violation Notice from IEPA
    - ➢ NPDES permit addendum and Compliance Commitment Agreement (CCA) submitted to IEPA in April

Prospects

- We have been extremely careful not to promise either the public or the regulatory agencies that there will never be measurable tritium in the creek discharges. We have said we will always be below regulatory limits.
- We will be learning a lot more over the next several weeks as we reinitiate operations with the new dehumidification system
- In parallel we will work with the state and with the neighbors to establish long term goals.
  - Reasonable goals as we understand now would be:
    - Creek discharges (on average): pCi/ml < 2.5 x P (MW)
    - Ground water: < 1 pCi/ml for all power levels

  } Factor 4 reduction/pot

- Plan and goals will be documented in Nova EA