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Case Study of a Closed Landfill with LFG Issues Caused by Stormwater Infiltration - Assessment and Remediation

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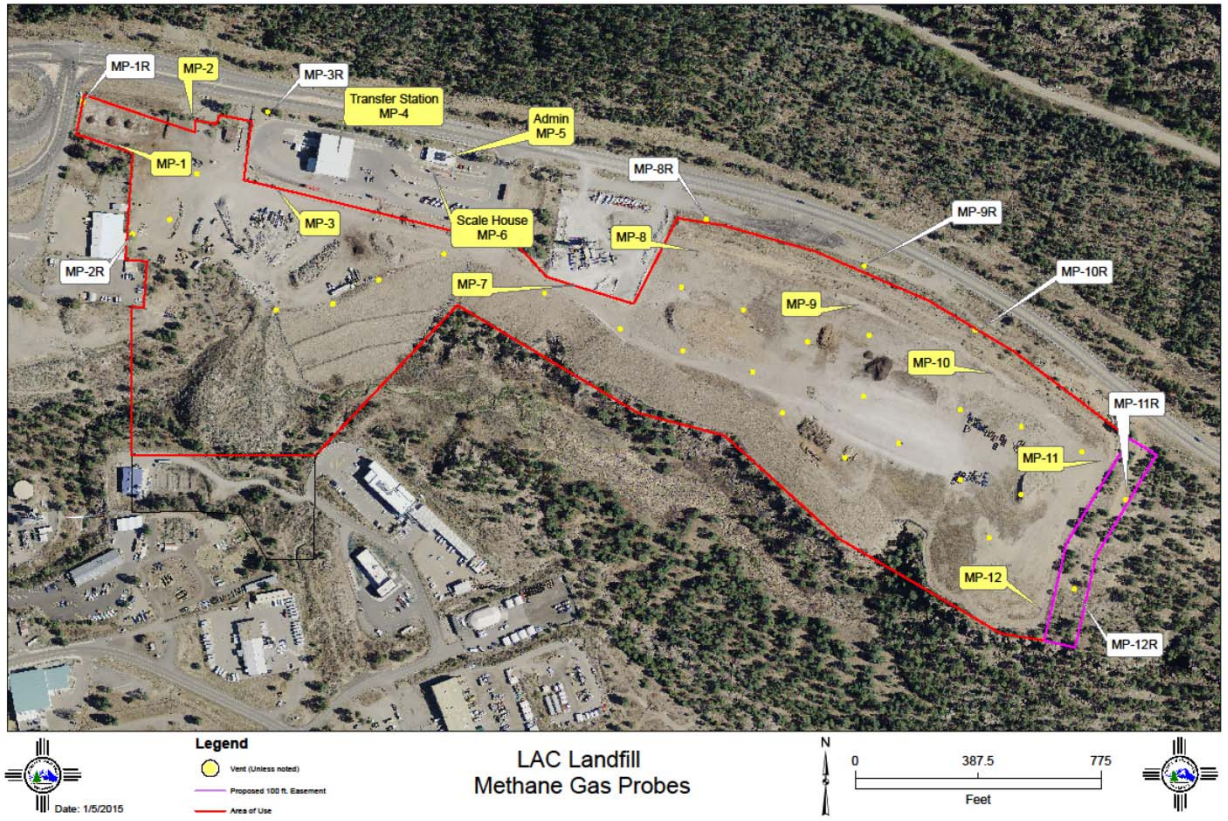
LOS ALAMOS
Environmental Services

Overview

- History of the Landfill
- Site Investigation
- Initial Remediation (Emergency Response to Landfill Gas Concentrations)
- Future Remediation
- Lessons Learned

History of the Landfill

- Los Alamos County Landfill (Closed) and Transfer Station:
  - East Jemez Road to the north
  - Vacant DOE property to east
  - Mobile Home Park to East (within 1000 feet of the landfill beyond the DOE vacant landfill)
  - Sandia Canyon immediately to the south
  - LANL to the west
- Operational Dates: 1974 to 2011
- Size: Approximately 35 acres occupies land owned by DOE but is operated by Los Alamos County
- Trash buried over 100 feet deep in the Bandelier fractured tuff



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History of Landfill Continued

- Averaged 119 tons per day when accepting solid waste at landfill PM1
- Composition
  - Municipal Solid Waste – 51%
  - Construction debris (western portion of the landfill) – 49%

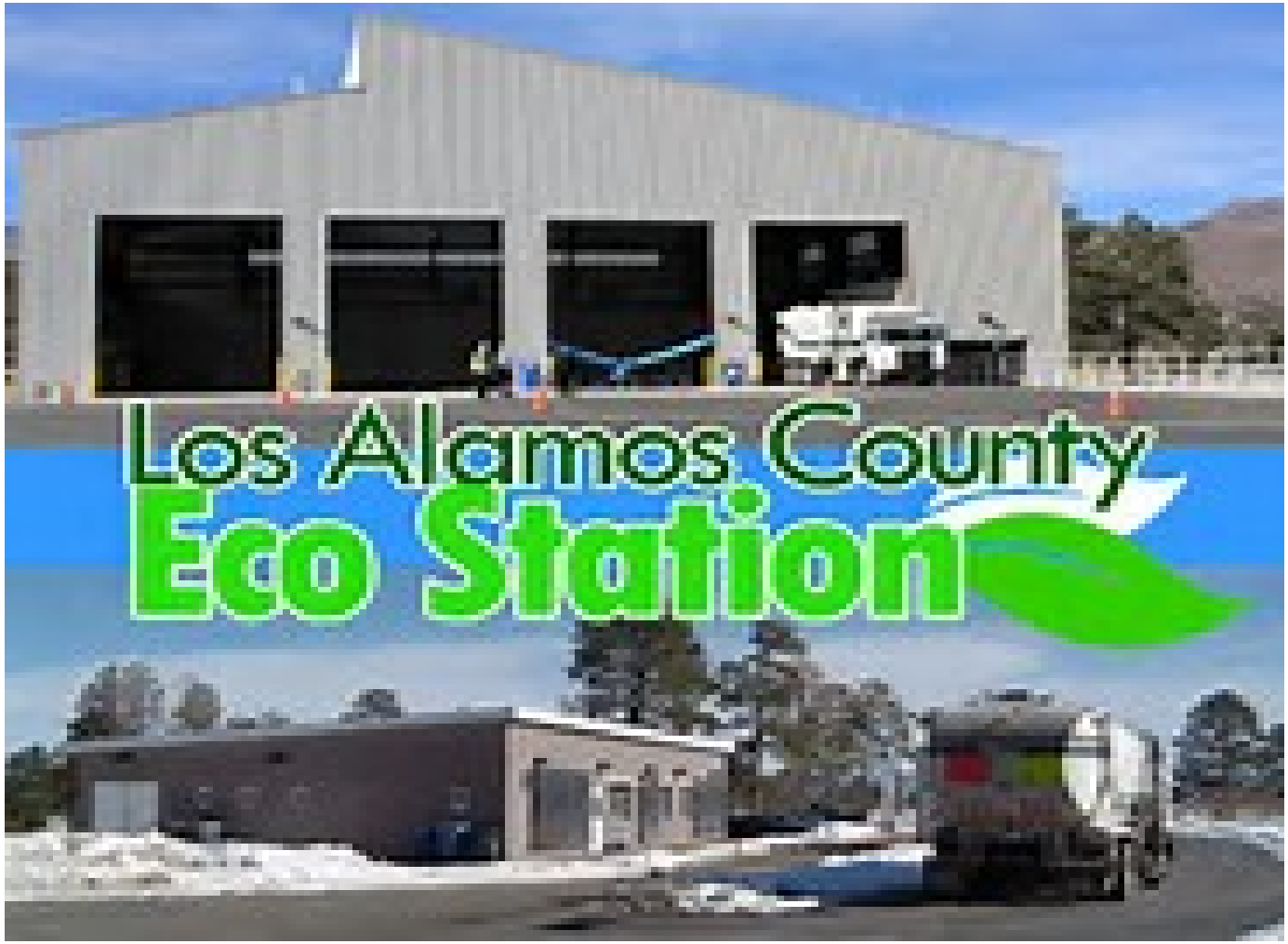
Slide 5

PM1 Anelica do you know how many tons a dsy thr lsndfill took? Do you have copies of the annual report for NMED. They should have the tonnage - thanks.

Also do you have a picture of the Transfer station I can include in a slide? Even if just from your smarth\phone.
Pincus, Marcia, 9/14/2016

Transfer Station

- Currently the Transfer Station (Eco Station)
  - Types of materials accepted (86 tons/day):
    - Municipal Solid Waste
    - Construction Debris
    - Concrete
    - Asphalt
    - Clean Dirt
    - Brush
    - Tires
    - Pallets
    - Household Hazardous Waste
    - Single Stream Recycle
    - Oil and Anti-Freeze
    - Electronics
    - White Goods
    - No special waste is accepted



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Features of the Landfill

- Landfill closure features:
  - Geomembrane cover
    - Geosynthetic Clay Liner (GCL) barrier layer covered by 18 inches of protective soil and 6 inches of gravel was used in the solar panel and recycling areas
    - ET cover was used in side slope areas
    - Final cover was completed in 2012
  - LFG vents
    - Total of 27 vents installed 5 feet in the waste
    - 2-3 foot diameter borehole
    - 4 inch HDPE pipe was installed with perforations in waste area portion
    - Used to alleviate LFG buildup under the GCL barrier

Features of the Former Landfill

- Original Gas probes (MP-1 through MP-12):
  - Installed throughout the landfill footprint
  - Gas Probes MP-8 through MP-12 were installed at the toe of the trash
  - Ranged in depth from 8 to 61 feet
  - Contained minimal to no LFG until 2013.

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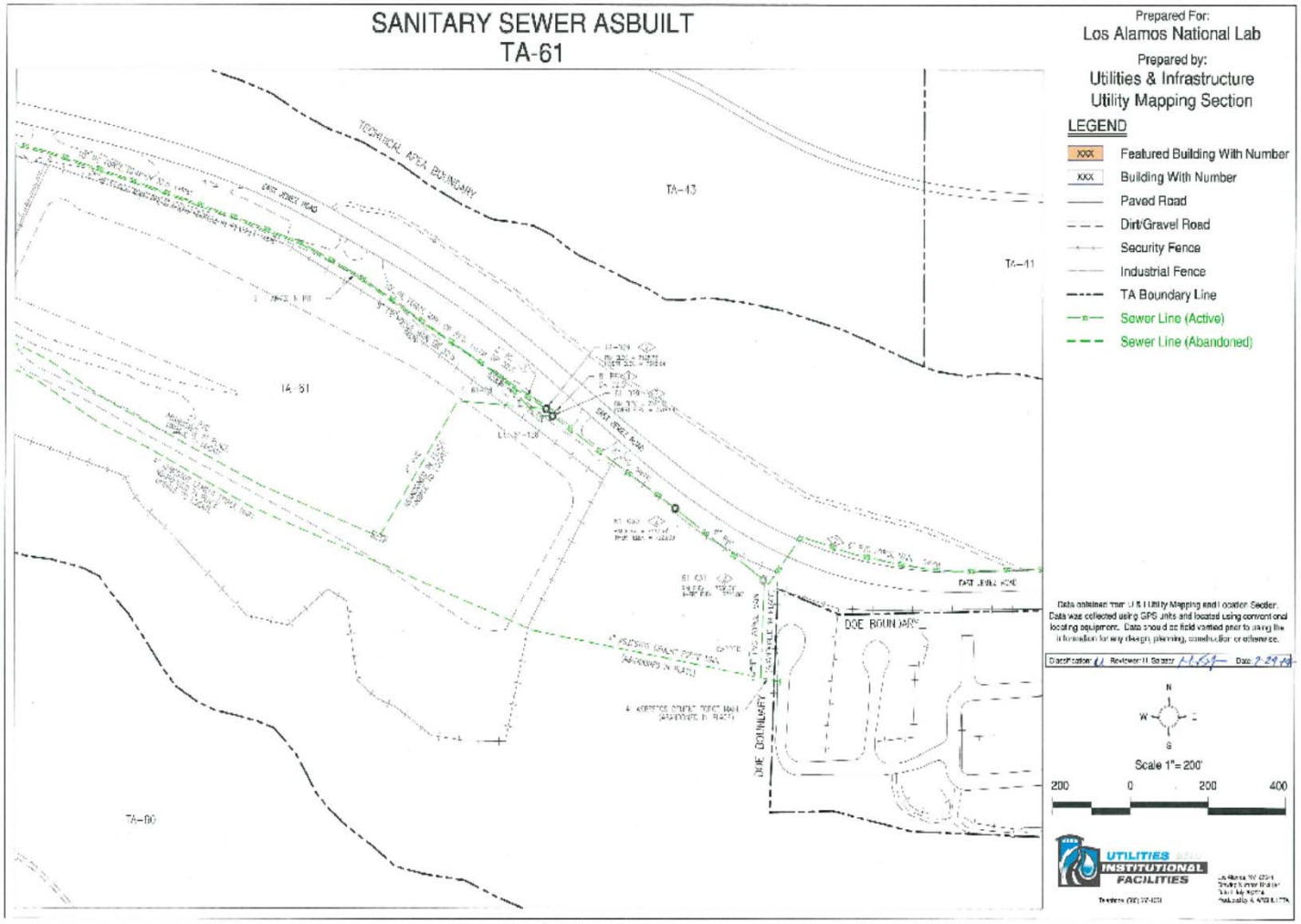
Site Investigations

- Quarterly methane monitoring for years showed little to no LFG
- Major storm event in Fall of 2013
- Start to see increase in LFG concentrations (above the LEL) at gas probes (MP-9 through MP-12) during the March 2014 quarterly event
- Conducted a field survey outside east boundary fence of landfill using a slide hammer (landfill perimeter)
  - Obtained readings within 5, 25 and 50 feet of fence
  - Had difficulty with Bandelier Tuff – some areas were eroded, some areas contained rock.
  - Some elevated LFG readings were obtained

Site Investigation Continued

- Hydraulic push hammer used to obtain LFG samples on vacant DOE property to the east
  - Installed tubing to take future readings
- Mobile Home Park (MHP) - check various areas immediately adjacent to west side of vacant DOE property (cracks, utility penetrations, beneath trailer skirts, etc.)
  - LFG readings ranged from 0 to 27 percent of the LEL
- Camera the sewer line from East Jemez Road to MHP
- Excavate sewer lines to see condition of connections
  - One sewer line ran the length of the landfill from west to east
  - One sewer line ran from East Jemez Road north to south and intersected landfill sewer
  - Sewer line went into MHP is connected to the other two lines


SANITARY SEWER ASBUILT
TA-61
Prepared For:
Los Alamos National Lab
Prepared by:
Utilities & Infrastructure
Utility Mapping Section
LEGEND
XXX Featured Building With Number
XXX Building With Number
Paved Road
Dirt/Gravel Road
Security Fence
Industrial Fence
TA Boundary Line
Sewer Line (Active)
Sewer Line (Abandoned)
TECHNICAL AREA BOUNDARY
TA-43
TA-41
TA-61
TA-60
DOE BOUNDARY
Scale 1"= 200'
200 0 200 400
UTILITIES
INSTITUTIONAL
FACILITIES

Site Investigation Continued

- Installation of additional perimeter gas probes at the fence line of landfill
  - Gas probes installed to a depth of 50 to 80 feet below ground surface
  - North side parallel to East Jemez Road
  - East side near adjacent DOE property
  - Determined LFG exceeding 100% of the LEL reached the perimeter boundary of the landfill on the north and east side of the landfill boundary

Initial Remediation (Emergency Response)

- PVC pipe on ground surface and mobile blower unit to extract gases
  - Problems with above ground system of piping
    - » Freezing pipes in winter due to lack of adequate slope
    - » In the way of the drainage swale liner contractor
- Line drainage swales and retention pond
- Weekly gas readings on landfill and DOE property adjacent to mobile home park by County
- Weekly gas readings in mobile park area near DOE property
- Weekly gas readings from slide hammer sampling on DOE property (thru tubing)
- Replace mobile extraction unit with permanent blower system

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Future Remediation

- Locate piping below ground with proper slope.
- Connect permanent blower system with below ground piping to protect from freezing.
- Add condensate sumps.
- For air quality/odors may need to flare system or install carbon canisters.
- Add additional wells to address areas still with above 100% LEL.
- May need additional blowers in areas where above 100% LEL and too far from current blower.

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FULL PORT
BALL VALVE
Relief Valve

Lessons Learned

- Make sure your drainage system is working!
- Keep in contact with NMED all phases of work.
- Make sure stack is vented at proper elevation.
- Place closure gas probes at the landfill boundary and NOT by the toe of the waste mass.
- Make sure your LFG monitoring device is working correctly and is calibrated each time used.
- Try not to install an above ground LFG extraction system in areas subject to freezing (except in emergency situations). If installed in winter use mulch or other insulating material.

Lessons Learned Continued

- Best to use HDPE pipe if have time and funds.
- Make sure pipes are sloped properly to allow for drainage of condense.
- Use glued couplings to connect pipe if using PVC.