Landfills Investigation Guidance Training April 24, 2012

David Barskey, NJDEP, Bureau of Environmental Evaluation and Risk Assessment

609-984-9765 david.barskey@dep.state.nj.us

Jeffrey Dey, Land Resource Solutions, LLC

856-2731009 ext 124 jeffd@rcc-net.com

John Doyon, NJDEP

609-633-0713 John.doyon@dep.state.nj.us

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Landfills Investigation Technical Guidance Subcommittee

- David Barskey, DEP
- Jeffrey Dey, Land Resource Solutions, LLC
- Kathleen Stetser, Roux Associates Inc.

Technical Guidance for Soils Committee

- John Doyon, NJDEP, Committee Co-Chair
- Joshua Gradwohl, NJDEP, Committee Co-Chair
- David Barskey, NJDEP
- David S. Bausmith, LSRP, AMEC E&I, Inc.
- Philip I. Brilliant, LSRP, Brilliant Environmental Services, LLC
- Jeffrey C. Dey, LSRP, Land Resource Solutions, LLC
- Kris Geller, NJDEP
- Mark Gruzlovic, NJDEP
- Steve MacGregor, NJDEP
- John Prendergast, NJDEP
- Kathleen F. Stetser, LSRP, Roux Associates Inc.
- Theodoros "Ted" Toskos, Mactec Engineering and Consulting
- David Whelihan, URS Corporation

Presentation Outline

- Overview
- Site Investigations
- Remedial Investigations
- Questions

Overview

Current Technical Rule and Guidance

- Investigation of landfills in Technical Rule subsections 3.12(a) and 4.6(a)
- No specific guidance for investigation of landfills.

Proposed Technical Rule and Guidance

- Investigation of landfills in Technical Rule at 3.12 and 4.6
- How to from current rule now in this technical guidance
- Posted to SRP web site on February 7, 2012

Overview

Transition

From now until May 2012

- May use this guidance to comply with the requirements of the current Technical Rule and SRRA

After May 2012

- This guidance will be changed to support the new rule requirements
- Use this guidance to comply with the new Technical Rule and SRRA

Overview

General Remediation Process

- **Same as all other Areas of Concern**
  - Preliminary Assessment/Site Review, Site Investigation, and Remedial Investigation
  - Plus, includes detection and delineation of waste
- **Remedial Actions Not Included**
  - Follow normal statutes, regulations, and guidance to select and implement a remedial action
  - Landfill remedial action may involve Department's Solid and Hazardous regulations and guidance

Overview

Limitation to Select Landfills

- Landfill definition: solid waste deposited on or into land for disposal exceeding 6 months, excludes hazardous waste
- Must Remediate Select Landfills per ARRCS
  - Redevelop for human occupancy
  - Remediation uses public funds
  - Final remediation document wanted
- Other Landfills are not addressed by Technical Rule or this guidance

Overview

- Guidance structured for "soup to nuts" investigations for larger more complex landfills with multiple on-site and off-site impacts
- Allows flexibility through the use of professional judgment due to large variability in types and sizes of landfills
- Variances and departures allowed pursuant to N.J.A.C. 7:26E-1.7 when flexibility invoked

Overview

Flexibility

- Guidance can't anticipate all site-specific conditions
- Additional tools or methods not in guidance may be needed
- Use conceptual site model (CSM) to ensure investigation is complete and nothing missed
- All tasks in guidance may not be needed or appropriate
- Remedial action (e.g., closure versus development) may affect the investigation

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Overview

Landfill Examples




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Overview

Other Laws, Regulations, and Guidance

- Need to use or apply as applicable or appropriate
- Guidance does not attempt to identify or list
- Example is a NJDEP landfill disruption permit may be needed for investigations on a landfill
- Health and Safety Plan mentioned as a reminder of its importance

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Site Investigation

Objective

- Required pursuant to N.J.A.C. 7:26E-3.12 to confirm whether a landfill is present or to find its location based on results of PA/site review
- In PA/site review do not exclude an area based solely on aerial photos, which may not be available for appropriate time periods or will falsely indicate no landfill due to revegetation of a filled area
- Historic topographic maps can be useful to determine if an area has been filled

Site Investigation

SI Components

- Visual Inspection
- Geophysical Survey
- Subsurface Investigation
- Additional SI Activities
- Remedial Investigation Decision

Site Investigation

Visual Inspection

- Use to plan and conduct the SI
- Field Sampling Procedures Manual provides info on purpose and types of info to obtain
- Verify PA/site review info, identify physical features, determine need for prompt mitigation, and provide info for HASP
- Record results in narrative form, in photos and videos, and map observations
- Use results to develop or update a CSM

Site Investigation

Geophysical Survey

- Covers a large area to determine subsurface physical properties and find potential buried waste and containers
  - Rapid
  - Cost-effective
  - Noninvasive
- Not always needed or physical site features may limit or prevent ability to perform or complete a geophysical survey, then proceed to subsurface investigation
- Conduct by a person qualified and experienced in geophysical methods and surveys
- Prepare a work plan to document survey design and methods selected based on site-specific conditions and nature of waste disposed

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Site Investigation

Geophysical Survey cont'd

- Extend survey beyond suspected area of landfill to confirm limits
- Use results to design subsurface investigation and to develop or update CSM
- If presence and location of landfill confirmed by geophysical investigation, can proceed directly to the RI
- Include geophysical report in the SI report
- If not performed, is a variance pursuant to N.J.A.C. 7:26E-1.7

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Site Investigation

Subsurface Investigation

- Conduct using test pits (preferred) and/or borings to confirm buried waste is present based on results of PA/site review and/or geophysical survey
- If no geophysical survey, negative subsurface investigation results will usually need a confirmatory geophysical survey
- If not performed as geophysical survey results led directly to RI, then is a variance pursuant to N.J.A.C. 7:26E-1.7

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Site Investigation

Subsurface Investigation cont'd

- If landfill cap is confirmed, repair in SI or use temporary repair with permanent repair during remedial action.
- Borings usually require larger diameter cores or split-spoons
- Document results in SI report and update CSM
- Test pit and boring logs need clear narrative description of waste

Site Investigation

Additional Site Investigation Activities

May do when necessary for SI or planning RI

- Conduct soil gas and radiation surveys
- Sample and analyze samples of waste, soil, ground water, or other media

Site Investigation

Remedial Investigation Decision

- If SI confirms presence of landfill, then complete RI of landfill pursuant to N.J.A.C. 7:26E-4.6 and this technical guidance
- If SI confirms a landfill is not present, then further investigation is not required.
- If PA or site review confirms presence of landfill, then complete RI of landfill pursuant to N.J.A.C. 7:26E-4.6 without conducting SI of landfill

Determination of landfill Existence

Some times easy …sometimes not so easy

Remedial Investigation

Remedial Investigation Tasks

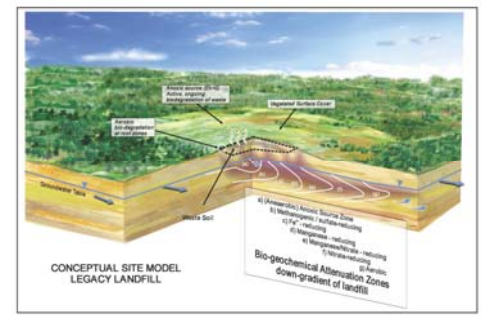
- Conduct a visual inspection
- Update CSM
- Conduct a geophysical survey
- Delineate waste, including buried containers
- Characterize waste, including buried containers
- Delineate contaminants in all media and migration pathways at landfill and off-site

Remedial Investigation

Remedial Investigation Tasks cont'd

- Delineate contaminants in all media at and from all other AOCs
- Conduct a radiation survey
- Conduct a vapor intrusion and methane gas investigation at landfill and off-site
- Conduct an ecological evaluation and ecological risk assessment, where necessary at landfill and off-site

Conceptual Site Model as basis for RI decision making



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Remedial Investigation

Visual Inspection

- Same as in SI, update from SI or conduct if not done in SI

Geophysical Survey

- Same as in SI, update or conduct if not done in SI
- Use transects and extend beyond landfill limits
- Transect spacing at 25-foot intervals recommended
- Take and record readings along each transect, every 5 feet is recommended
- Recommendations from geophysical experts at NJ Geological Survey

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Remedial Investigation

Landfill Delineation-Lateral and Vertical

- Test Pits preferred, borings where test pits not appropriate
- Borings need large diameter cores
- Do not penetrate final caps, bottom liners, or other engineering controls
- Use transects perpendicular to potential landfill limit
- Within landfill, space locations based on site-specific conditions and Data Quality Objectives (DQOs) for RI, use table in guidance as guide based on acreage

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Remedial Investigation

Test Pits and Borings

- Log and record locations
- Collect soil samples below waste for vertical delineation
- Collect waste samples for bulk chemical and RCRA waste classification
- Sample contents of buried containers where possible
- Collect soil samples beyond landfill limits for horizontal and vertical delineation
- Number and spacing of samples based site-specific conditions, investigation of other AOCs, vapor intrusion, and ecological evaluation

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Remedial Investigation

Landfill-Associated Areas and Engineered Systems

- Sample soil erosion and drainage pathways and delineate soil beyond landfill limits
- Sample perimeter seeps and leachate drains
- Screen vents, test pits, and soil borings for methane, H_2S, and volatile contaminants

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Remedial Investigation

Landfill-Associated Areas and Engineered Systems

- Conduct air and gas investigations based on receptor evaluation, remedial action, and landfill closure requirements
  - (none of these in this technical guidance)
- Evaluate landfill cap or cover and delineate - unless will be repaired/restored or is properly installed and not contaminated from landfill or other AOC
- Determine location, condition, and effectiveness of all engineering controls that may affect selection of a remedial action for landfill

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Remedial Investigation

Surface Water/Leachate and Sediment

- Collect surface water/leachate and sediment samples on landfill or where migrated off landfill
- Delineate all contaminants
- Surface water includes leachate where leachate is present on ground surface or has drained to surface water

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Remedial Investigation

Soil, Surface Water, Leachate, and Sediment Analyses

- Analyze all samples for TCL+TICs/TAL, hexavalent Cr, EPH, pH, grain size (sediment only), and TOC (sediment only)
- Analyze sediment in-situ for Eh (redox) when and where appropriate
- Surface water may require filtering for dissolved metals analysis and may also require hardness analysis for setting metals criteria
- Targeted set of contaminants for delineation may be acceptable as a departure with justification

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Remedial Investigation

Ground Water/Leachate

- Determine whether ground water mounding is occurring in landfill- may not always be appropriate
- Double-case wells in landfill, if sampling water below waste and can be properly keyed into competent material - requires professional judgment
- Wells required in all directions around landfill to determine background/upgradient conditions
- Delineate contaminants beyond landfill perimeter a sufficient distance to account for any radial flow from landfill
- Water samples from test pits may be used to supplement well data- discuss low bias for volatiles and high bias for nonvolatiles

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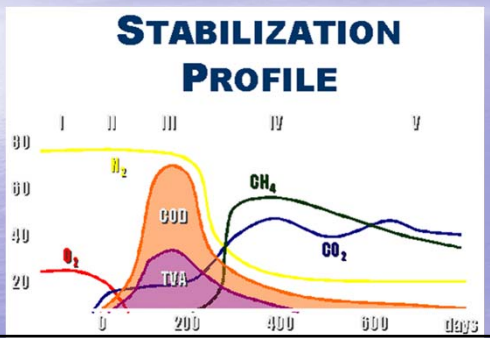
Remedial Investigation

Ground Water/Leachate cont'd

- Leachate in landfill is considered ground water
- Collect samples to identify and delineate all contaminants pursuant to N.J.A.C. 7:26E-3.5 and 4.3 and the Dept.'s GW technical guidance
- Analyze for TCL+TICs/TAL, ammonia-N, nitrate-N, and TDS
- Field measurements include pH, Eh, DO, turbidity, and specific conductance
- Targeted set of contaminants for delineation may be acceptable as a departure with justification

Conceptual Site Model

Waste stabilization profile



Remedial Investigation

Vapor Intrusion and Methane Gas

- Conduct a vapor intrusion and methane gas investigation within and beyond limits of the landfill
- Use the Dept.'s *Vapor Intrusion Technical Guidance* (NJDEP 2012b)
- For methane, also follow Dept.'s Solid and Hazardous Waste Program requirements and guidance

Remedial Investigation

Ecological Evaluation and Ecological Risk Assessment

- Conduct an Ecological Evaluation and/or Ecological Risk Assessment within and beyond limits of the landfill using SI and/or RI results
- Use the Dept.'s *Ecological Evaluation Technical Guidance* (NJDEP 2011a)

Remedial Investigation

Radiation and radionuclides

- Conduct a radiation survey of test pits and borings using hand-held meters
- Survey by person qualified and experienced in radiation surveys (Health Physicist)
- Dept.'s Bureau of Environmental Radiation (BER) provides technical support; contact BER if radiation above background or radionuclides found/present

Remedial Investigation

Radiation and radionuclides - further guidance:

- Field Sampling Procedures Manual (Chapt. 12)

http://www.nj.gov/dep/srp/guidance/fspm/pdf/chapter12.pdf

- MARSSIM

(Multi Agency Radiation Survey & Site Investigation Manual)

http://www.epa.gov/rpdweb00/marssim/obtain.html

Remedial Investigation

Radiation and radionuclides cont'd

BER contact info:

New Jersey Department of Environmental Protection
Radiation Protection Programs
25 Arctic Parkway
Mailcode 25-01
PO Box 420
Trenton, New Jersey 08625-0420
(609) 984-5400 (voice)
(609) 633-2210 (FAX)
rpp@dep.state.nj.us
Questions can also be sent directly to Jenny Goodman at 609-984-5498 or jenny.goodman@dep.state.nj.us

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Remedial Investigation

Radiation and radionuclides
[7:26C-2.3(a)3.i.(4)]

LSRP needs to obtain prior DEP approval before conducting remediation at a site suspected or known to contain anthropogenic radionuclide contamination

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Remedial Investigation

Documents (component) requiring approval:

- Remedial Investigation Work Plan
  (submit with PA/SI Report Form)
- Remedial Investigation Report
- Remedial Action Work Plan
- Remedial Action Report

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QUESTIONS?