KEYS TO SUCCESSFUL CONSTRUCTION QUALITY ASSURANCE (CQA)

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CQA Definition

- A planned system of activities that provides the owner and permitting agency assurance that the facility was constructed as specified in the design (U.S. EPA 1993).

Landfill Construction Components

- Composite Liners and Final Covers
  - Low Permeability Soil Layer
  - Geosynthetic Materials
- Leachate Collection Systems
- Gas Collection and Control Systems
- Storm Water Management Structures
Low Permeability Soil Liner
• Identify Borrow Source
• Identify Processing Methods
• Processing Location
• Transportation
• Define the Placement Criteria
• Maintenance of Placed Material

Geosynthetic Materials
• Geomembrane, Geotextile, Geocomposite, Geosynthetic Clay Liner (GCL), and Possibly Others (Geogrid)
• Order the Right Quantity
• Coordinate Delivery and Storage

Other Construction Components
• Leachate Collection and Landfill Gas Systems
  – Piping and Granular Material
  – Requires Coordination with Other Construction Activities
  – Maintenance During Construction
  – Protect Existing Gas Wells
• Storm Water Management Structures

Recipe for Successful Construction
• Select the Right Team
  – Earthwork Contractor
  – Geosynthetics Contractor
  – CQA Consultant
  – Certification Surveyor
  – Soil and Geosynthetics Testing Laboratories
• Coordinate, Coordinate, Coordinate
• Communicate, Communicate, Communicate
Earthwork Contractor

• Experienced in Low Permeability Soil Liner Construction
• Proper Equipment
  – Bulk Earth Moving
  – Moisture Addition and Distribution
  – Compaction
  – Surface Preparation
• GPS/Surveying Capabilities

Geosynthetics Contractor

• Experienced; Reliable
• Proper Equipment
  – To Move and Place Material
  – For Field Testing (Tensiometer, Air Testing, Vacuum Box Testing)
• Enough Laborers
CQA Consultant

- Certifying Engineer
  - Proper Credentials (Typically P.E.)
  - Significant CQA Experience
  - Good Working Relationship With Regulators
  - Effective Communication Skills
  - Attention To Detail
  - Availability – Timeliness of Review

CQA Consultant

- Field Technician(s)
  - Soil and/or Geosynthetics Training
  - Ability To Think On Feet
  - Strong Communication Skills
  - Assertive Personality
  - Attention To Detail
  - Good Work Ethic

Certification Surveyor

- Licensed to Practice in Colorado
- Familiar with Project Requirements
  - No negative tolerance for thickness
  - Resurvey points that do not meet project specifications
  - Provide proper documentation
- Communicates Effectively with the CQA Team and Contractor
Soil & Geosynthetics Testing Laboratories

- Proper Accreditation
- Understand Landfill Liner Construction
- Capacity To Complete Testing Quickly

Coordination, Coordination, Coordination

- Material Availability
  - You don’t want to be waiting for materials (geosynthetics, aggregate)
- Construction Sequencing
  - Complete one component before starting the next, or piggyback – follow each other

Communication, Communication, Communication

- Define Responsibilities and Roles – Who is Taking the Lead for What
- Between Various Contractors, Surveyors, Consultants, and Regulators
- Language Barrier
Techniques for Positive Construction Experience

- Planning Ahead
- Monitoring Progress
- Identifying Common Problems
- Implementing Corrective Measures

Planning Ahead

- Review the CQA Plan and Permit Documents
  - Regulatory Notifications
  - Personnel Responsibilities and Authority
  - Reporting Requirements (Daily, Summary, Photos, Etc.)
  - Soil Liner Testing Requirements
  - Geosynthetic Testing Requirements

- Review Previous CQA Reports
  - Obtain Historical Test Results
  - Identify Historical Borrow Sources
  - Review Construction Methodology
  - Identify Potential Obstacles

Planning Ahead

- Preconstruction Soil Testing
  - Start Early: Can be a Long Process
  - Collect Extra Samples
  - Utilize Historical Data
  - Boutwell Testing
Planning Ahead
- Prequalify Construction Materials
  - Review Manufacturer Quality Control Data
  - Collect Samples of Aggregate Materials Prior to Delivery

Monitoring Progress
- Daily Reports and Data Transmitted to Project Manager
- Data Reviewed by Project Manager on a Daily Basis
- Double-check Field Test Records
- Hold Frequent Progress Meetings
- Communicate!!!!

Identifying Common Problems
- Uneven Moisture Distribution
- Desiccation
- Poor Construction Timing
- Settlement
- Weather Adversity (Expect it!)
- Wildlife

Uneven Moisture Distribution
Desiccation

Poor Construction Timing

Settlement
- Final Cover – Thickness Verification
  - 5.5-foot Thick Water Balance Cover Settled 5 feet in a 6-month Period

Weather Adversity (Expect It!)
Implementing Corrective Measures

- Work Together to Develop a Plan (Contractor, Owner, CQA Engineer, Regulators, Designer)
- Effectively Communicate the Plan to All Parties
- Monitor and Document Effectiveness

Summary

- Successful Construction and CQA Projects Require:
  - The Right Team
  - Project Understanding and Planning
  - Communication
  - Perseverance!!

Thank You!

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