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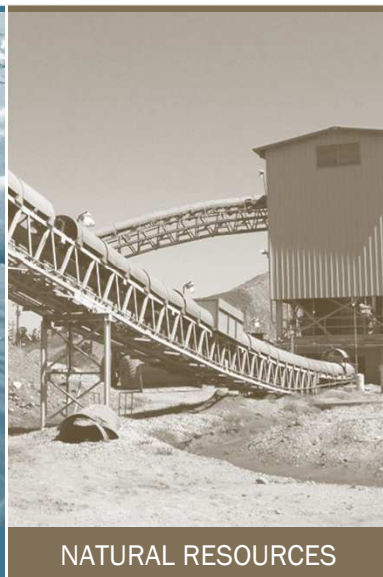
PROJECT CONSIDERATIONS FOR NEW COAL ASH LANDFILLS

PRESENTED AT:
2013 WORLD OF COAL ASH CONFERENCE

April 24, 2013



WATER



NATURAL RESOURCES



ENVIRONMENT



INFRASTRUCTURE



ENERGY

PRESENTATION OVERVIEW

- Introductions
- Regulatory Drivers
- Project Considerations
- Relevant Project



INTRODUCTIONS

- **Sean Rome – Vice President, Energy Waste Program**
 - Responsible for Tetra Tech’s Energy Waste Program
 - In 2012, managed >100 related projects at ~\$300M
 - Participates on numerous technical advisory panels for EPRI, USWAG, etc.

- **Mohamad Al-Hawaree, P.E., – Assistant Vice President Engineering**
 - In 2012, Managed and Designed >150 related projects
 - Serves on numerous technical advisory panels
 - Serves as Technical Expert for liner system design, specifically FGD Ash and Gypsum stacks, for Tetra Tech





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REGULATORY DRIVERS



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REGULATORY DRIVERS

Federal Regulatory Foundations for Waste Disposal:

- Solid Waste Disposal Act (SWDA) in 1965
- Resource Conservation and Recovery Act (RCRA) in 1976
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in 1980



PENDING REGULATORY DRIVERS

Proposed Federal Regulations - *The Game Changers:*

- USEPA CCR Rule*
- HR 2273 / 3409
- SB 1571 / 3512*

***Active Drivers**



HIGHLIGHTS OF SUBTITLE D OPTION

- Effective Date \approx 6 months
- Enforcements by State
- Self-Implementing Corrective Actions
- No Permit Required
- No Liner Required for Existing Landfills
- Groundwater Monitoring Requirements
- Liner and Groundwater Monitoring Requirements for New Landfills
- Closure and Post-Closure Care Requirements



HIGHLIGHTS OF SUBTITLE C OPTION

- Effective Date \geq 1 year
- State and Federal Enforcements
- Corrective Actions Monitored by States and EPA
- Requires Permits Issued by States
- No Liner Requirements for Existing Landfills
- Groundwater Monitoring Requirements
- Liner and Groundwater Monitoring Requirements for New Landfills
- Closure and Post-Closure Care Requirements



ANTICIPATED PROVISIONS OF FEDERAL CCR RULE

- More Stringent Requirements on Design of Bottom Liner and Leachate Collection Systems.
- Tighter Provisions on Groundwater Quality Monitoring.
- More Extensive Material Characterization and Leaching Studies.





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PROJECT CONSIDERATIONS



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PROJECT CONSIDERATIONS

- Location Restrictions
- Design and Operating Criteria
- Groundwater and Gas Monitoring Requirements
- Corrective Action Requirements
- Financial Assurance Requirements
- Closure and Post-Closure Care Requirements



DESIGN REQUIREMENTS: BOTTOM LINER

Subtitle C

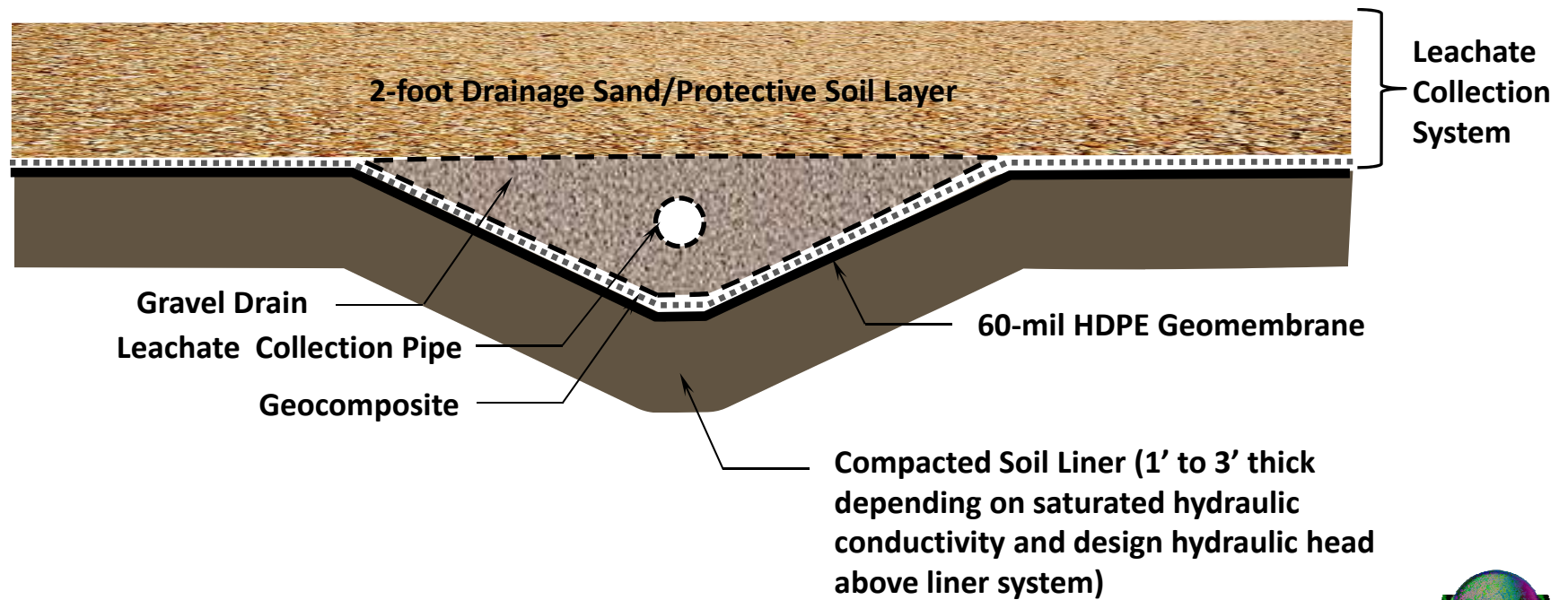
- ❖ Double Liner System with Two Components
 - Top Component: Geomembrane Liner
 - Bottom Component: Geomembrane Liner on Top of 3 Feet of Compacted Soil Liner with a Hydraulic Conductivity of $\leq 1 \times 10^{-7}$ cm/sec
- ❖ Leachate Collection System above Top Component
- ❖ Leak Detection System between components

Subtitle D

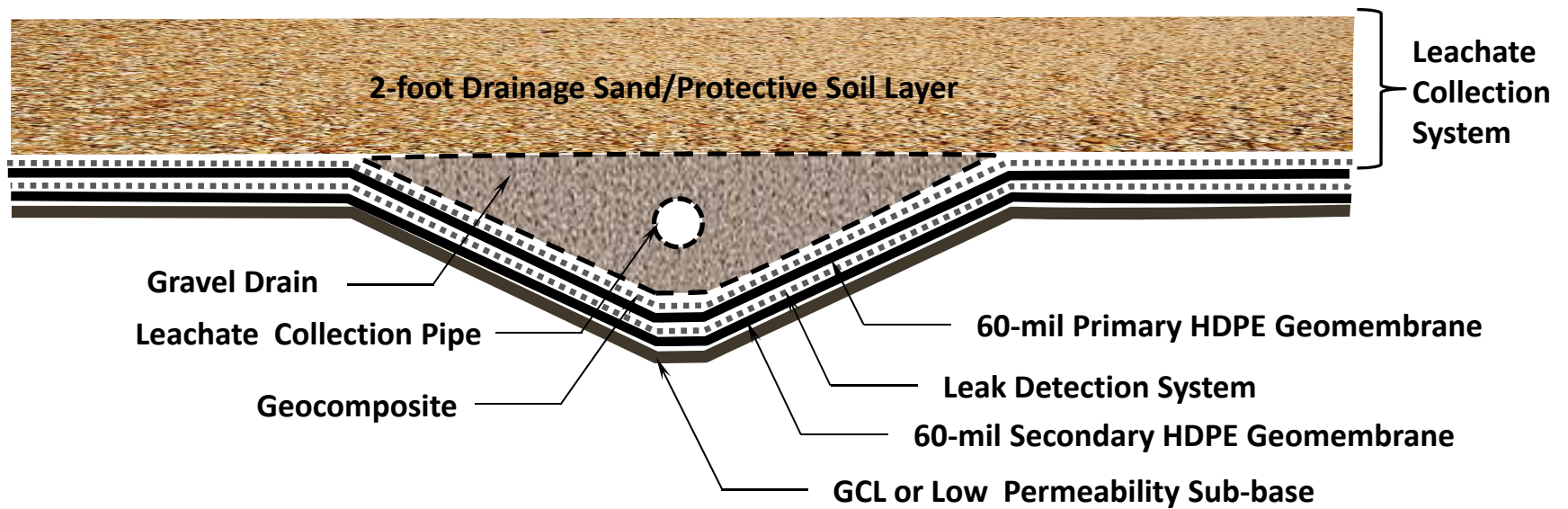
- ❖ Composite Liner System
 - Geomembrane Liner
 - 2 Feet of Compacted Soil Liner with a Hydraulic Conductivity of $\leq 1 \times 10^{-7}$ cm/sec
- ❖ Leachate Collection System
- ❖ ≤ 12 Inches of Leachate Head on Top of
- ❖ Bottom Liner System



COMPOSITE LINER SYSTEM



DOUBLE GEOMEMBRANE LINER SYSTEM



DESIGN REQUIREMENTS: FINAL COVER

Subtitle C

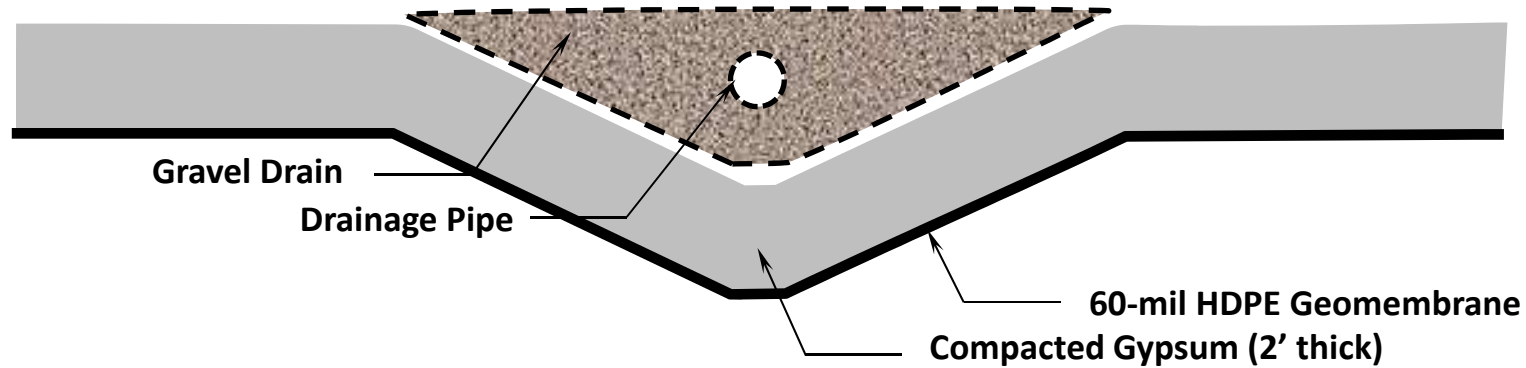
- ❖ 24 Inches of a Topsoil and Drainage Layer
- ❖ 24 Inches of a Compacted Soil Liner with a Hydraulic Conductivity of $\leq 1 \times 10^{-7}$ cm/sec
- ❖ Geomembrane Liner on top

Subtitle D

- ❖ Infiltration Barrier:
 - 18 Inches of Soils with a Hydraulic Conductivity of $\leq 1 \times 10^{-5}$ cm/sec
- ❖ Erosion Layer:
 - 6 inches of Soils to Support Vegetation Cover



INVERTED COMPOSITE LINER SYSTEM FOR PHOSPHOGYPSUM STACKS



DIFFERENCES BETWEEN COAL ASH AND MSW LANDFILLS

Coal Ash Landfill

- ❖ Relatively homogenous/inert industrial waste stream
- ❖ Waste is not biodegradable; no landfill gas; minimal settlement
- ❖ Waste is sometimes stabilized or conditioned
- ❖ No daily or intermediate cover required
- ❖ Does not attract vectors
- ❖ Dense waste compacted with vibratory compactors
- ❖ Leachate contains primarily metals and inorganics

MSW Landfill

- ❖ Heterogeneous residential/commercial waste stream
- ❖ Waste decomposes, settles and produces landfill gas.
- ❖ Waste is usually landfilled as received
- ❖ Requires daily and intermediate soil or alternative cover
- ❖ Attracts birds, rodents, etc.
- ❖ Compaction with specialized steel-wheeled compactors
- ❖ Leachate contains a wide variety of potential contaminants, including organics





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CASE HISTORY:

PERMIT, DESIGN AND CONSTRUCTION SUBTITLE D ASH LANDFILL CONFIDENTIAL UTILITY CLIENT



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PROJECT OVERVIEW

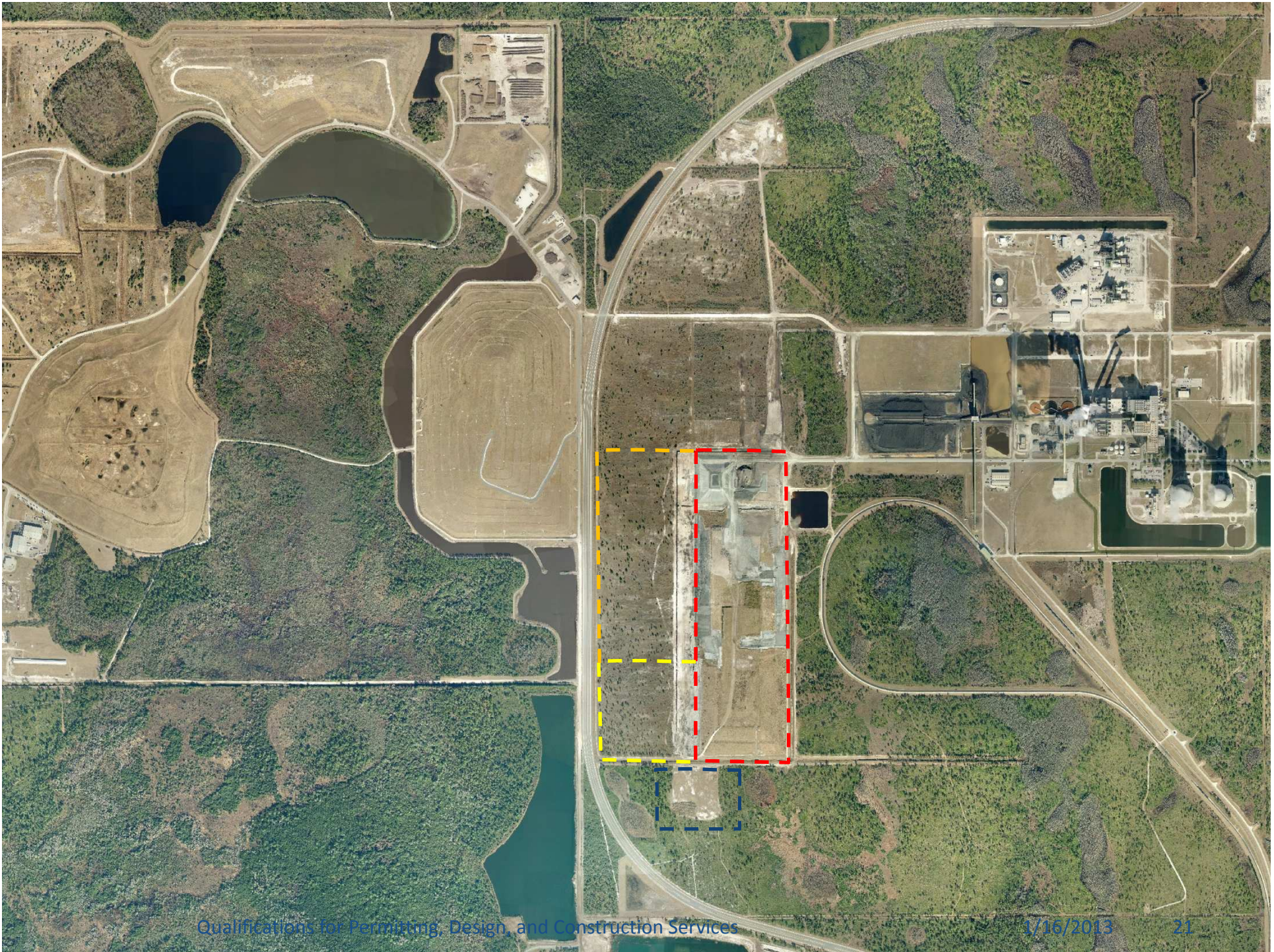
- Design/Permit:
 - 90-acre RCRA Subtitle D,
 - Double lined, 3 cell landfill with leachate collection system (LCS) with leak detection system (LDS);
 - 22-acre stormwater pond.
- Construct:
 - Cell 1 (~30 acres),
 - 22-acre SW Pond and associated MEP Systems and;
 - 2-acre decant cell



PROJECT OBJECTIVES

- Expedite and Satisfy Regulatory Permitting Requirements
- Optimize Air Space (\$\$\$)
- Meet Compressed Permitting and Construction Schedules
- Conduct all work safely
- Minimum or No Impact to Plant Operations
- High Quality End Product
- Protect Client's Investment without "Cutting Corners"
- No Change Orders (Firm Fixed Price)





Max Airspace - \$\$\$

\$\$\$

Proposed Extension

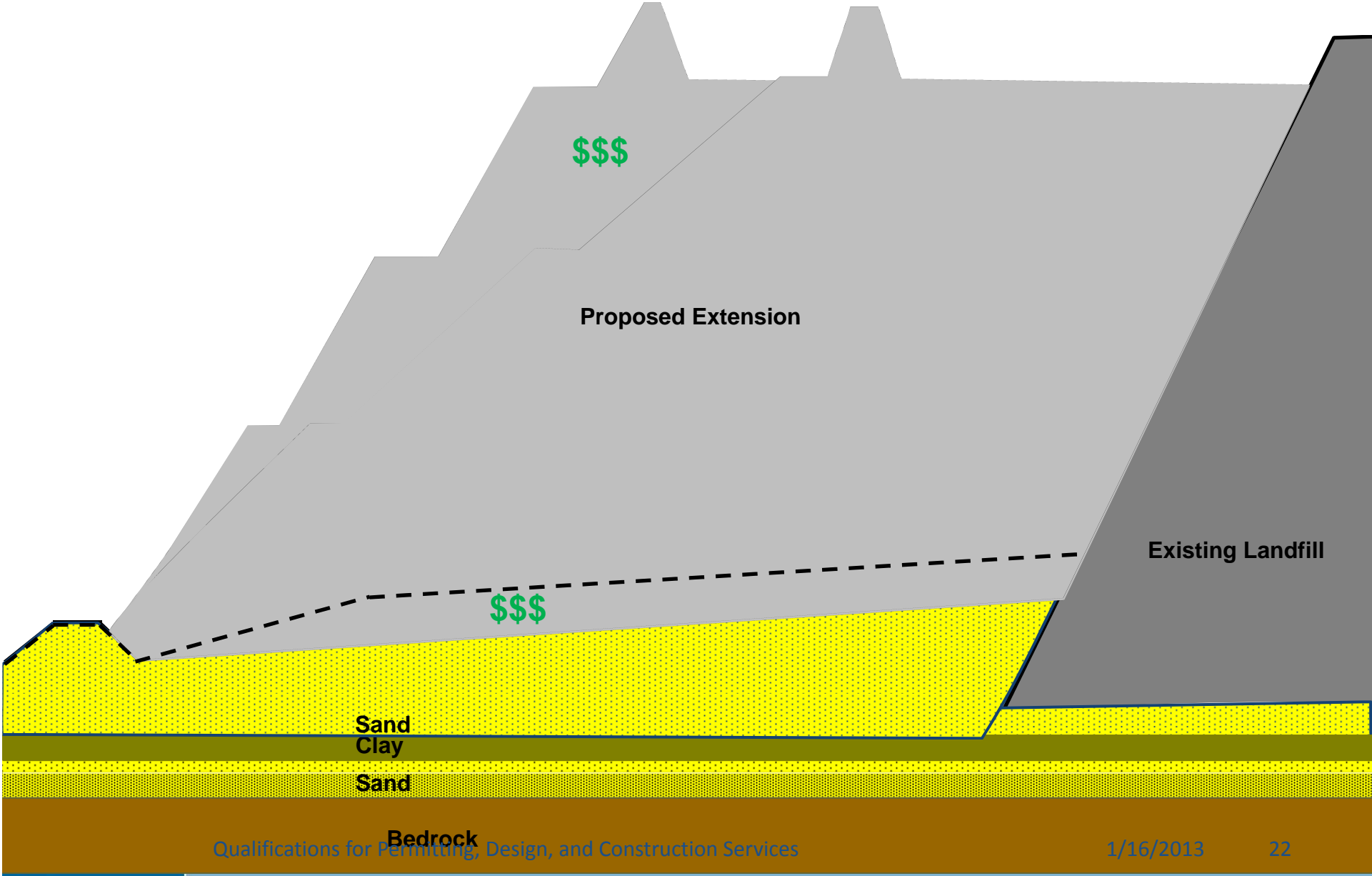
Existing Landfill

\$\$\$

Sand
Clay

Sand

Bedrock



CONSTRUCTION SCOPE OF SERVICES

- Clear and Grub (including burning of vegetation onsite)
- Top soil stripping/stockpiling – 40,000cy
- Stormwater Pond (22 acres) – earthwork – cut 400,000cy
- Pond drainage structures with 36” HDPE double-barrel pipes
- Landfill expansion (30 acres) – earthwork and culverts – Fill 400,000cy
- Clay placement and compaction – 24,500cy
- Piggyback tie-in at existing slope
- Leachate collection system (including laterals, sumps, collection, riser, and sumps)
- Top soil and permanent erosion



CONSTRUCTION HIGHLIGHTS

- Cut from Pond and fill/compact cell subgrade
- Protective sand layer (24") – landfill cell
- Leachate pads and forcemain (including cleanout and video inspection) – 6,000lf
- Decanting/General storage cell (2 acres) – earthwork
- Construct and fine grade perimeter berms
- Place, grade, compact, and finish clay subbase
- Install 6, 000 lf force main
- Substantial completion – November 2012
- **Total SAFE hours worked onsite incident free – >130,000 hrs (avg. crew 24 workers/over 9 months)**
- Successful Work led to new projects (D/B 10 Acre Ash Pond and 2,800lf S/B Cutoff Wall.





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PROJECT TIMELINE



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NOTICE TO PROCEED: MAY 2011



FIELD EXPLORATION: MAY – JULY 2011



Basic Engineering Design: June to December 2011

HYDROLOGIC AND HYDRAULIC REPORT
PROPOSED HORIZONTAL EXPANSION OF
COAL COMBUSTION WASTE LANDFILL

FILE NUMBER: 10-13-0249

Prepared for:



ORLANDO UTILITIES COMMISSION
STANTON ENERGY CENTER
ORANGE COUNTY, FLORIDA

November 03, 2011

Prepared by:



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Materials Consultants
A Tetra Tech Company
8008 S. Orange Ave. Orlando, FL 32809
TEL 407/855-3860 FAX 407/859-8121 C.A.N. 5950

HYDROGEOLOGICAL REPORT
PROPOSED HORIZONTAL EXPANSION OF
COMBUSTION WASTE STORAGE AREA

FILE NUMBER: 10-13-0249

Prepared for:



ORLANDO UTILITIES COMMISSION
STANTON ENERGY CENTER
ORANGE COUNTY, FLORIDA

December 2, 2011

Prepared by:



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ENGINEERING REPORT
PROPOSED HORIZONTAL EXPANSION OF
COMBUSTION WASTE STORAGE AREA

FILE NUMBER: 10-13-0249

Prepared for:



ORLANDO UTILITIES COMMISSION
STANTON ENERGY CENTER
ORANGE COUNTY, FLORIDA

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TECHNICAL SPECIFICATIONS AND
CONSTRUCTION QUALITY ASSURANCE PLAN
FOR HORIZONTAL EXPANSION OF
COMBUSTION WASTE STORAGE AREA

FILE NUMBER: 10-13-0249

Prepared for:



ORLANDO UTILITIES COMMISSION
STANTON ENERGY CENTER
ORANGE COUNTY, FLORIDA

December 2, 2011

Prepared by:



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Detailed Engineering Design: August to December 2011

CONSTRUCTION DRAWINGS
FOR
HORIZONTAL EXPANSION OF COMBUSTION
WASTE STORAGE AREA - CELL 1

OUC STANTON ENERGY CENTER
ORANGE COUNTY, FLORIDA



8008 S. Orange Ave.
TEL 407/855-3860

CONSTRUCTION DRAWINGS
FOR
HORIZONTAL EXPANSION OF COMBUSTION
WASTE STORAGE AREA- CELL 2

OUC STANTON ENERGY CENTER
ORANGE COUNTY, FLORIDA



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CONSTRUCTION DRAWINGS
FOR
HORIZONTAL EXPANSION OF COMBUSTION
WASTE STORAGE AREA - CELL 3

OUC STANTON ENERGY CENTER
ORANGE COUNTY, FLORIDA



DECEMBER 2011

Prepared By



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REGULATORY APPROVAL: JANUARY 2012



Florida Department of Environmental Protection

Central District
3319 Maguire Boulevard, Suite 252
Orlando, Florida 32803-3767

Rick Scott
Governor

Jennifer Carroll
Lt. Governor

Herschel T. Vinyard Jr.
Secretary

Environmental Resource Permitting Notice of Post Certification Compliance
Authorized Entity: Orlando Utilities Commission (OUC)
Siting No: PA81-14
Environmental Resource File No: 48-0308758-001

Approval Date: January 20, 2012

PROJECT LOCATION

The activities subject to this notice of post certification compliance are located at OUC Stanton Energy Center, in Orlando, 32831, in Section 13, Township 23 South, Range 31 East in Orange County.

As staff to the Board of Trustees, the Department has reviewed documents provided and has determined the activity is not on submerged lands owned by the State of Florida. Therefore, your project is not subject to the requirements of Chapter 253, Florida Statutes.

HISTORY

The Orlando Utilities Commission is certified pursuant to the Power Plant Siting Act (PPSA), ss. 403.501-518, Florida Statutes (F.S.). The original OUC site certification included the operation of a 930 MW facility consisting of two coal-fired Units No. 1 and No. 2, and ancillary equipment, the construction and operation of a 633 MW gas-fired combined cycle facility known as Combined Cycle Unit A, and the construction and operation of a 300 MW dual fueled (natural/gas/No.2 fuel oil) Combined Cycle unit known as Unit B.

On November 3, 2011, the Florida Department of Environmental Protection (DEP) Siting Coordination Office (Siting) and DEP Central District (CD) Submerged Lands and Environmental Resource Permitting (SLERP) section received a post-certification submittal from OUC in accordance with Section V.G. of the Conditions of Certification to construct and operate a stormwater management system to provide treatment and attenuation for the proposed lateral expansion of the OUC Stanton Energy Center combustion waste landfill. Stormwater runoff from proposed project will be treated and attenuated by a wet detention system. No impacts to wetlands or surface waters are authorized by this approval.

Pursuant to PPSA Rule 62-17.191, F.A.C., within 90 days after complete information is submitted for post-certification review, the Department shall give written notification to the licensee of its assessment of whether there is reasonable assurance of compliance with the conditions of certification. OUC is required to comply with the conditions of certification and applicable rules and regulations of the Department pursuant to Condition of Certification Section VII.

Authorized Entity: OUC
Siting No.: PA81-14
Page 1 of 6

Construction Phase Expiration: January 20, 2017
ERP Authorization No: 48-0308758-001

www.dep.state.fl.us

CONSTRUCTION START DATE: JANUARY 2012



MARCH 2012



MAY 2012



AUGUST 2012



OCTOBER 2012



Questions?

