Polk Power Station
Warm Gas Clean-up
&
Carbon Capture and Sequestration Demonstration

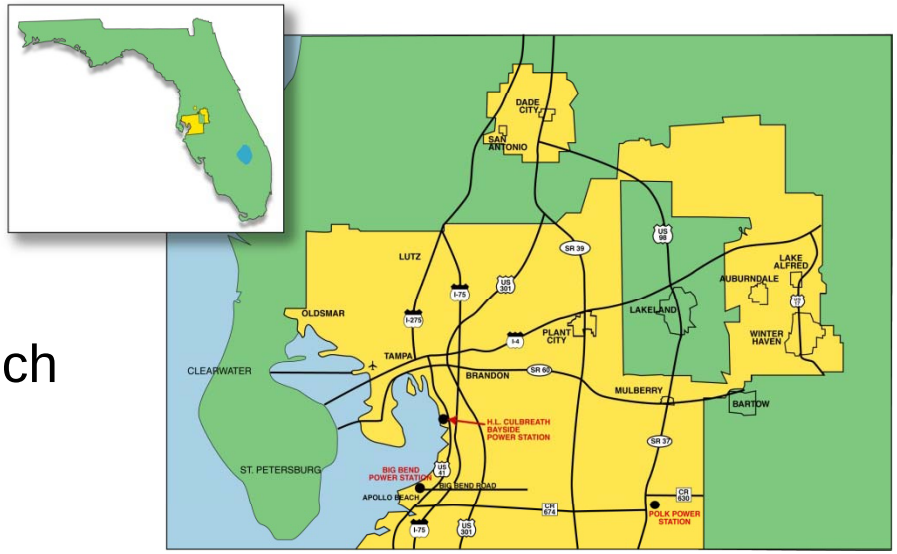
March 10, 2011

Sixth Annual Stakeholders' Briefing
Hilton Atlanta Airport Hotel
Atlanta, Georgia

SECARB
Southeast Regional Carbon Sequestration Partnership

Tampa Electric

- Supplied Tampa area with electricity since 1899
- West Central Florida: 2,000 square miles, all of Hillsborough and parts of Polk, Pasco and Pinellas counties
- 4,800 MWs
- Over 660,000 residential, commercial and industrial customers
- First utility in the U.S. to launch and complete a 10-year, $1.2 billion program to reduce emissions



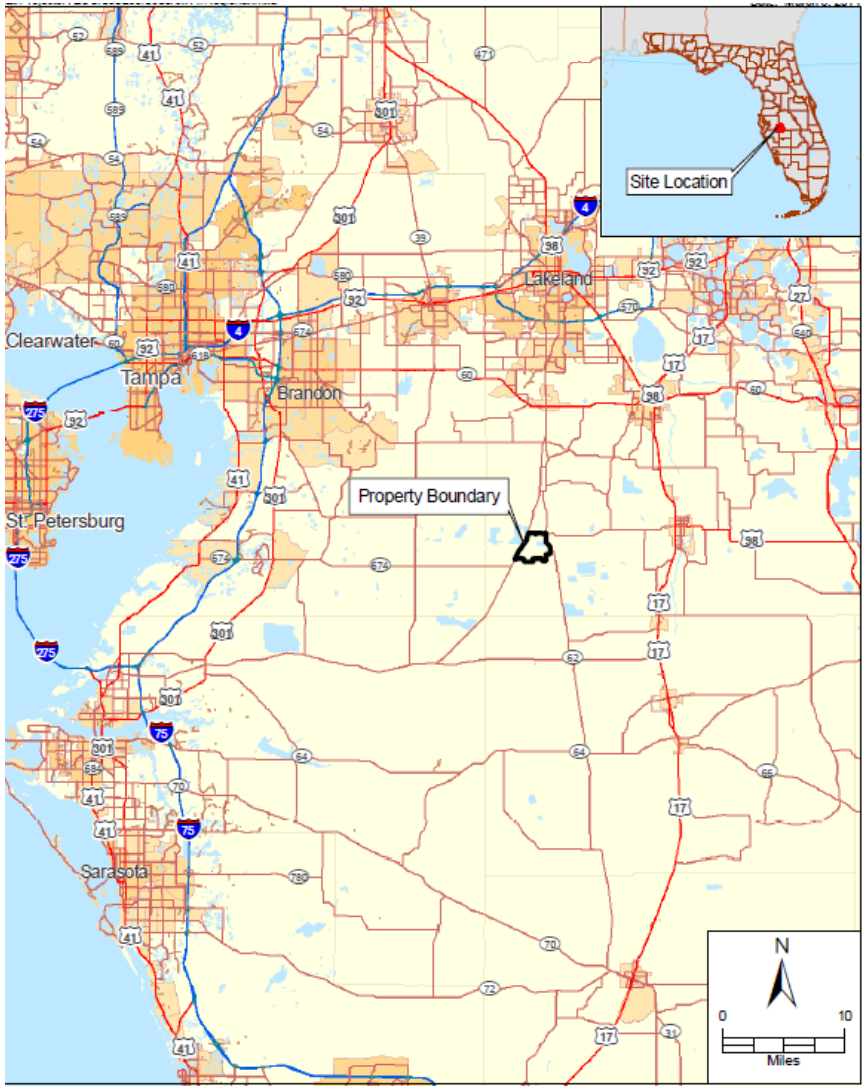
tampaelectric.com

Polk Power Station Overview

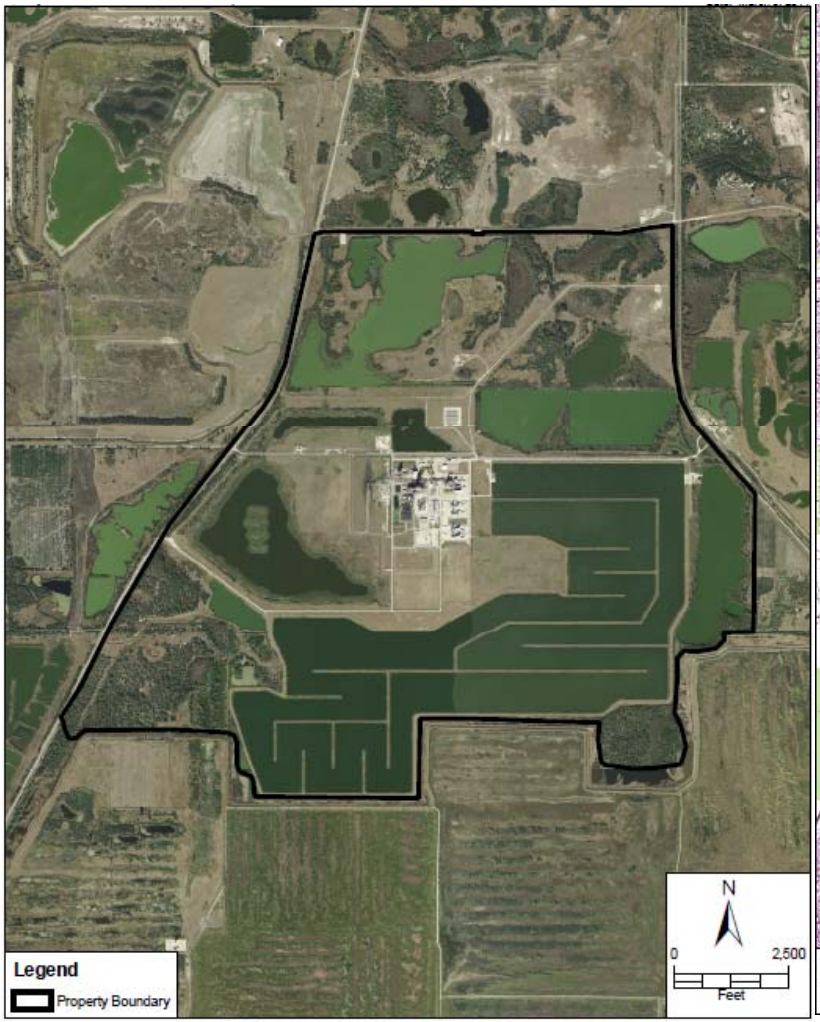
- 5000+ visitors from more than 20 countries
- UNIT 1 IGCC, Base load on syngas, intermediate on oil
  - Combined cycle, GE 7F, 7221 192MW
    GE D11, steam 120MW
  - Dual fuel, Syngas/Distillate Oil
  - In service 1996
- Units 2, 3, 4, & 5 Simple Cycle CT, Peaking
  - Simple cycle GE 7FA+E, 7241 165 MW each
  - Units 2 & 3 Dual fuel, Natural gas/Distillate Oil
  - Units 4 & 5 Natural Gas only
  - In service: Unit 2-2000, Unit 3-2002, Units 4 and 5-2007
- Total site over 4000 acres
  - 150+ acres available for generation expansion
  - 750 acre cooling pond
  - Natural gas pipeline, FGT
  - 230KV transmission, 4 circuits

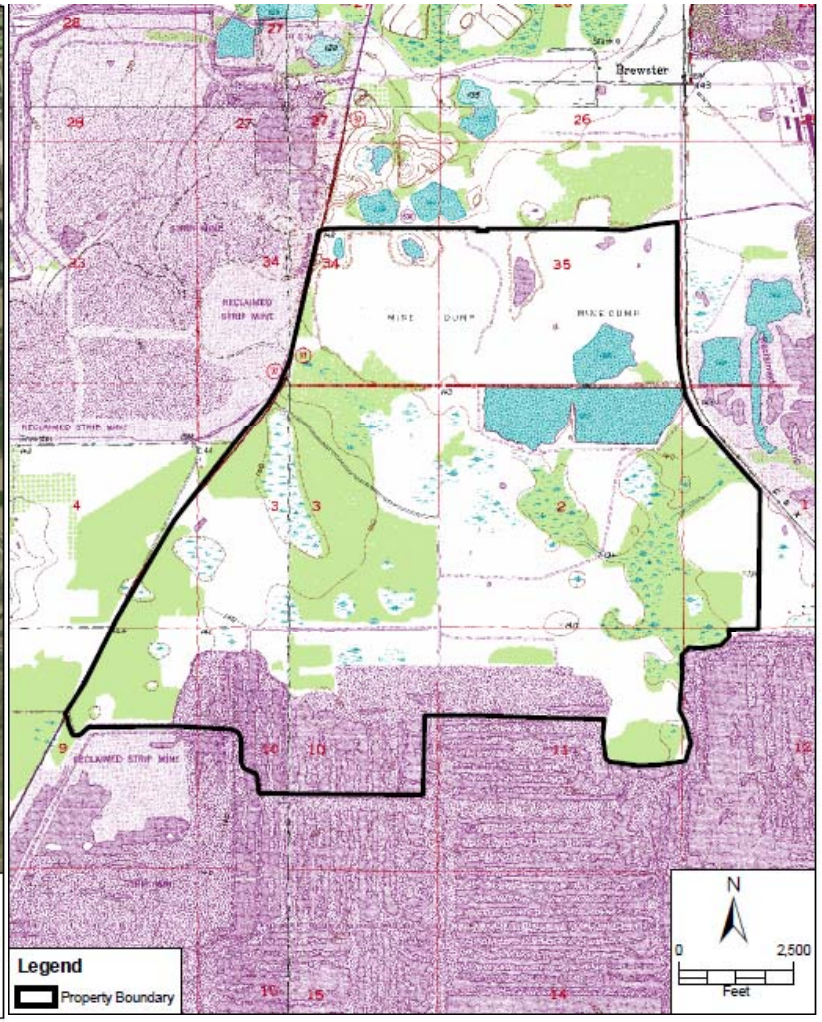
WGC & CCS Demonstration

Polk Power Station Location

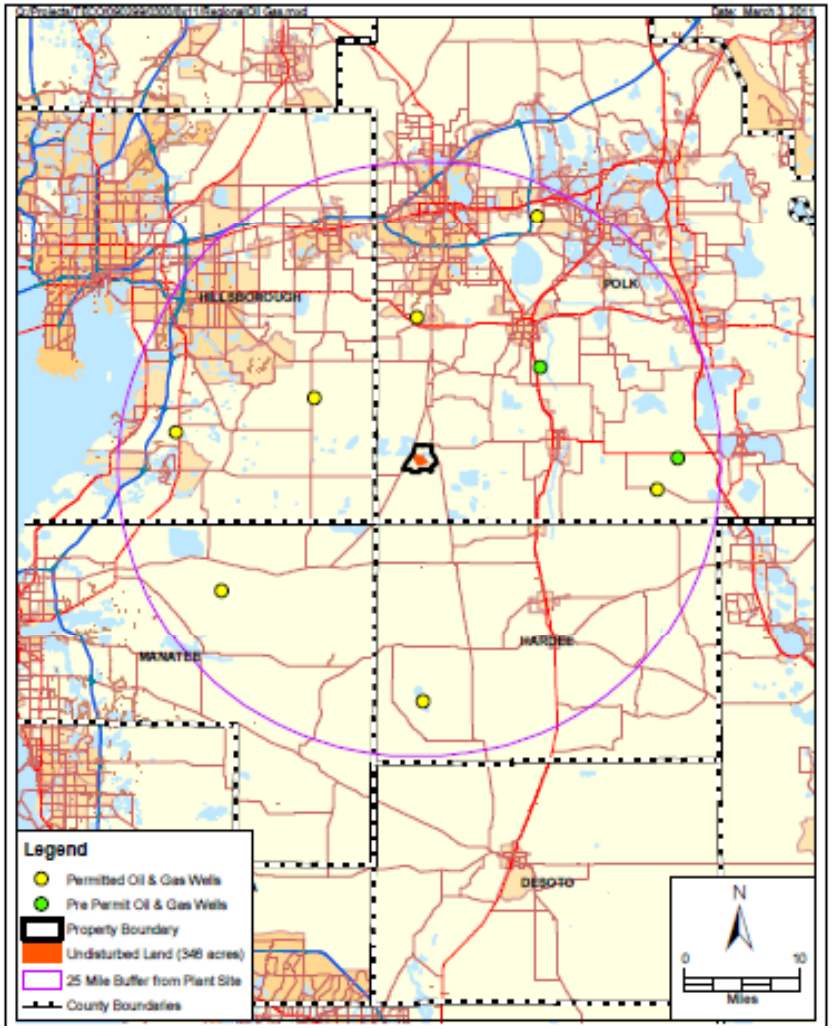


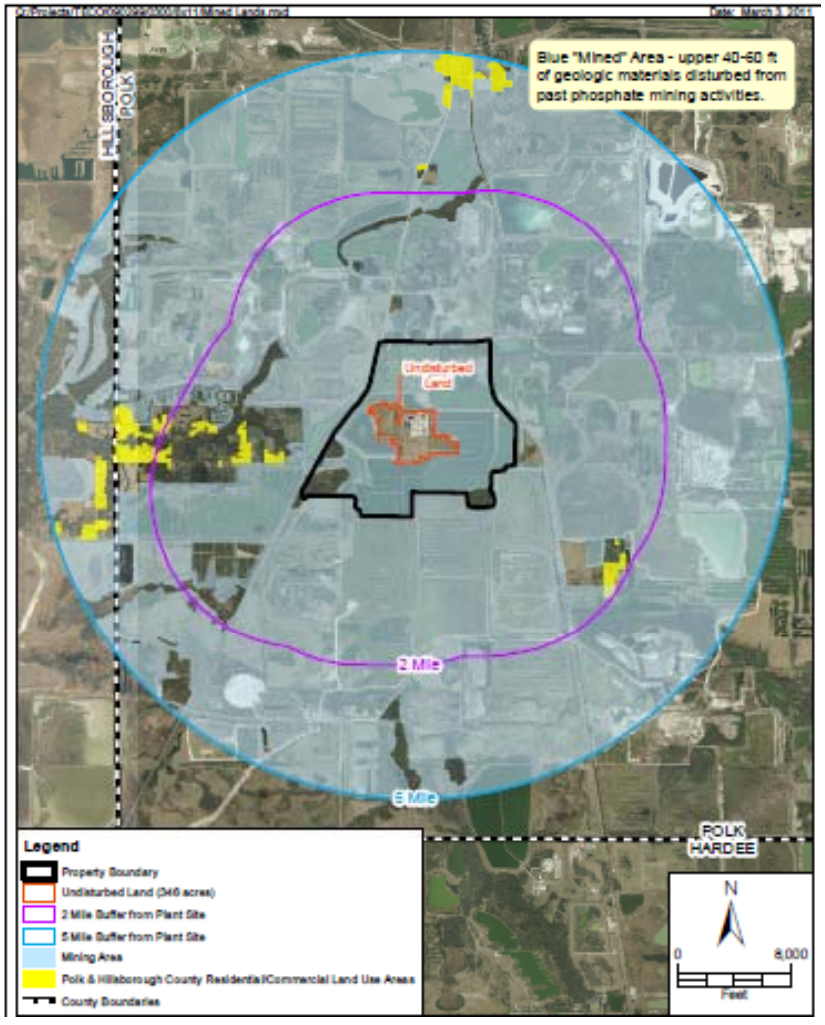
Polk Power Station Boundaries





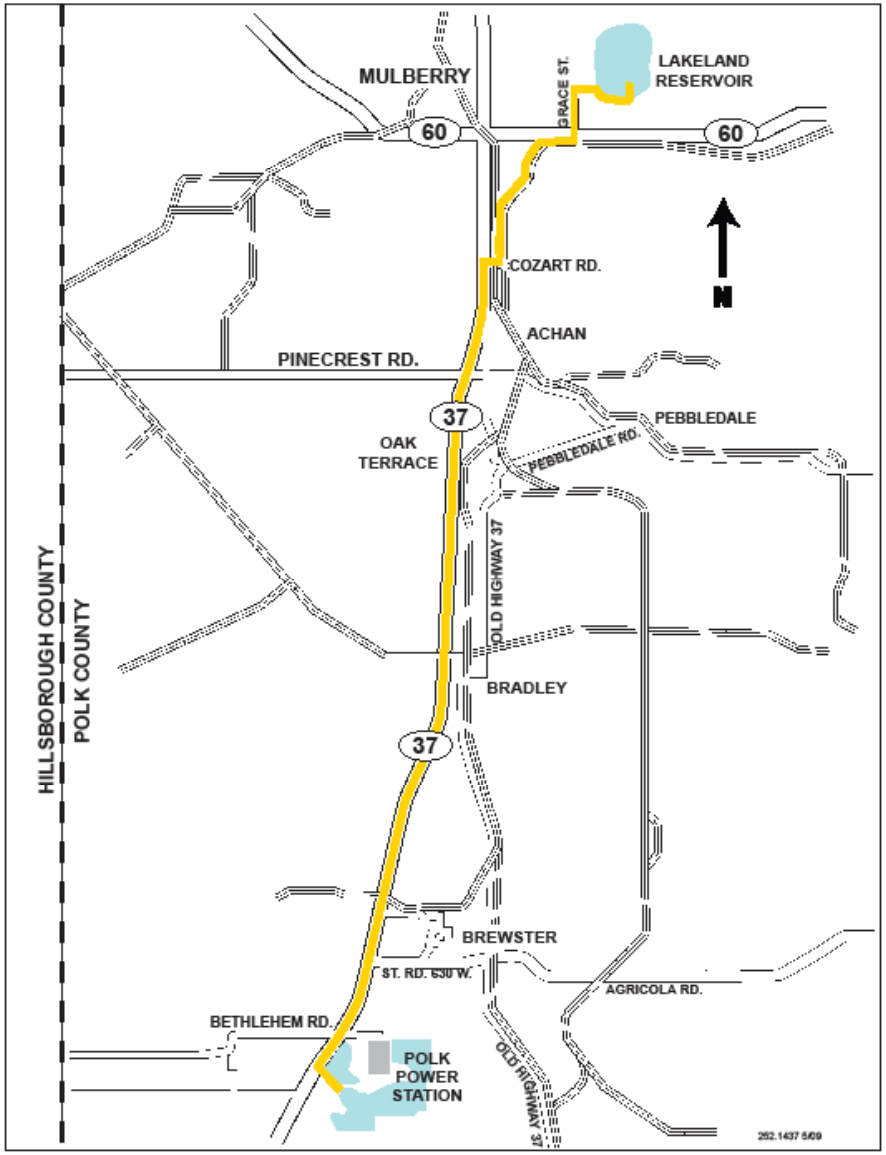
Regional Influences





Water Conservation

- Polk Reclaimed Water Project
  - City of Lakeland to Polk Power Station
  - SWFWMD funding
  - Treatment & Deep Well Injection of Reject
  - Future sources of reclaimed water possible



Regional Reclaimed Water Project

- Permitting and Design 2009
- First Well Construction - 2010
- Pipeline Construction – 2011
- Second Well – 2011
- Start Operation - 2013

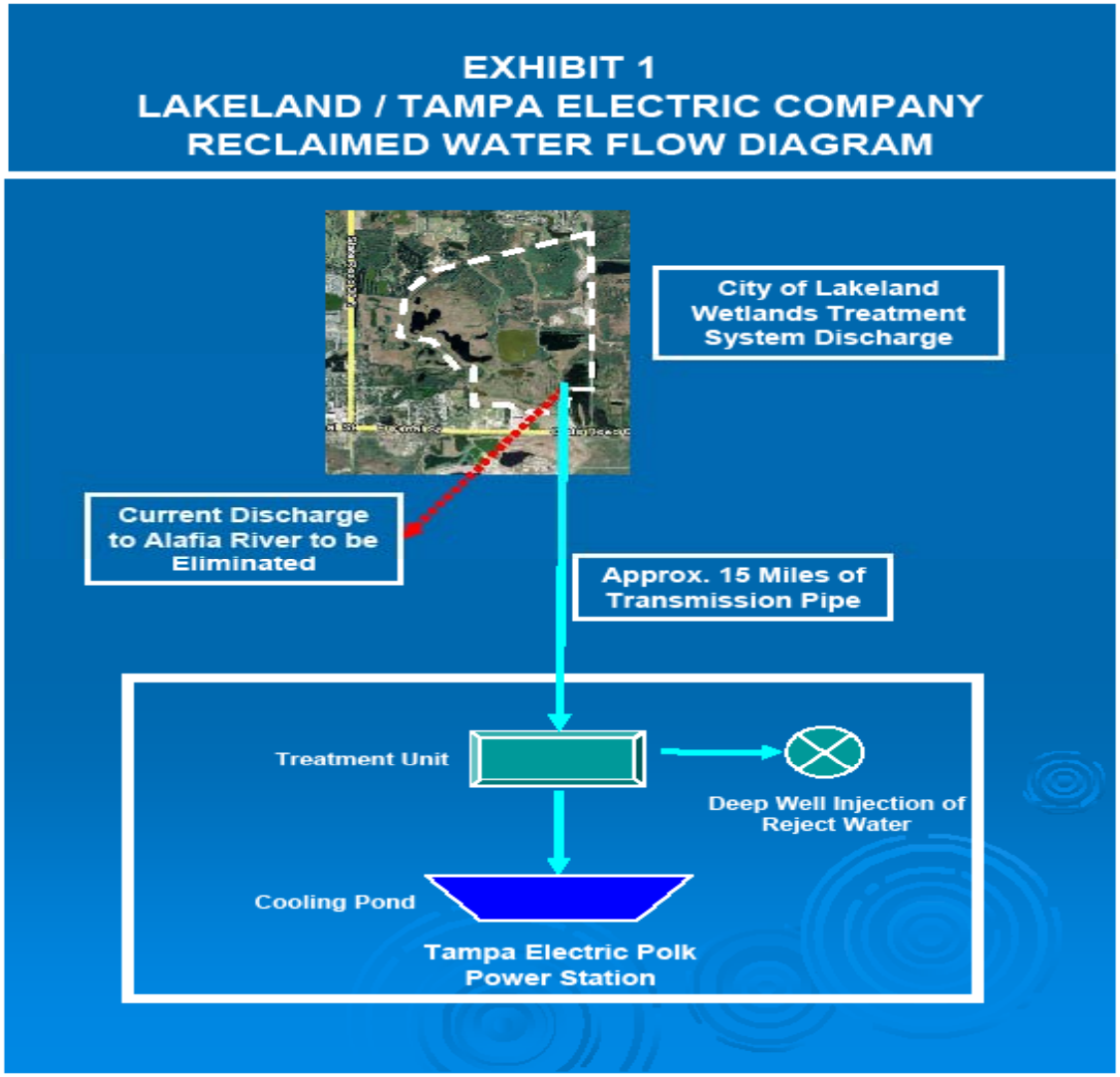


EXHIBIT 1
LAKELAND / TAMPA ELECTRIC COMPANY
RECLAIMED WATER FLOW DIAGRAM
City of Lakeland Wetlands Treatment System Discharge
Current Discharge to Alafia River to be Eliminated
Approx. 15 Miles of Transmission Pipe
Treatment Unit
Deep Well Injection of Reject Water
Cooling Pond
Tampa Electric Polk Power Station

PPS Water Project Update

- Construction of 1st UIC well continues at Polk Power Station.
- Pilot hole complete to 6,000 feet below land surface (into Cedar Keys/Lawson formation)
- Reaming the 26” borehole now (currently at depth of ~4,000 ft)
- Next will continue pilot hole drilling to 8,000 feet
- Core samples collected from confining zone. Very good confinement.
- Permitting of the 2nd UIC that will include CCS capability is under way
- The pilot water treatment facility at the Lakeland wetlands is being commissioned

Warm Gas Cleanup & CCS Project

❑ Warm Syngas Clean-up Objectives

- Design, construct, commission, and operate a 50 MWe warm syngas cleaning demonstration system with real syngas
- Establish relevant commercial operating experience
- Establish RAM (reliability, availability and maintenance) targets
- Mitigate design and scale up risk for commercial plant
- Completion of the work by September 2015 (due to use of $168.8 M American Recovery and Reinvestment Act funds)

❑ Carbon Capture and Sequestration

- Sequester 300,000 tons of CO2/year
- Use of conventional capture technology

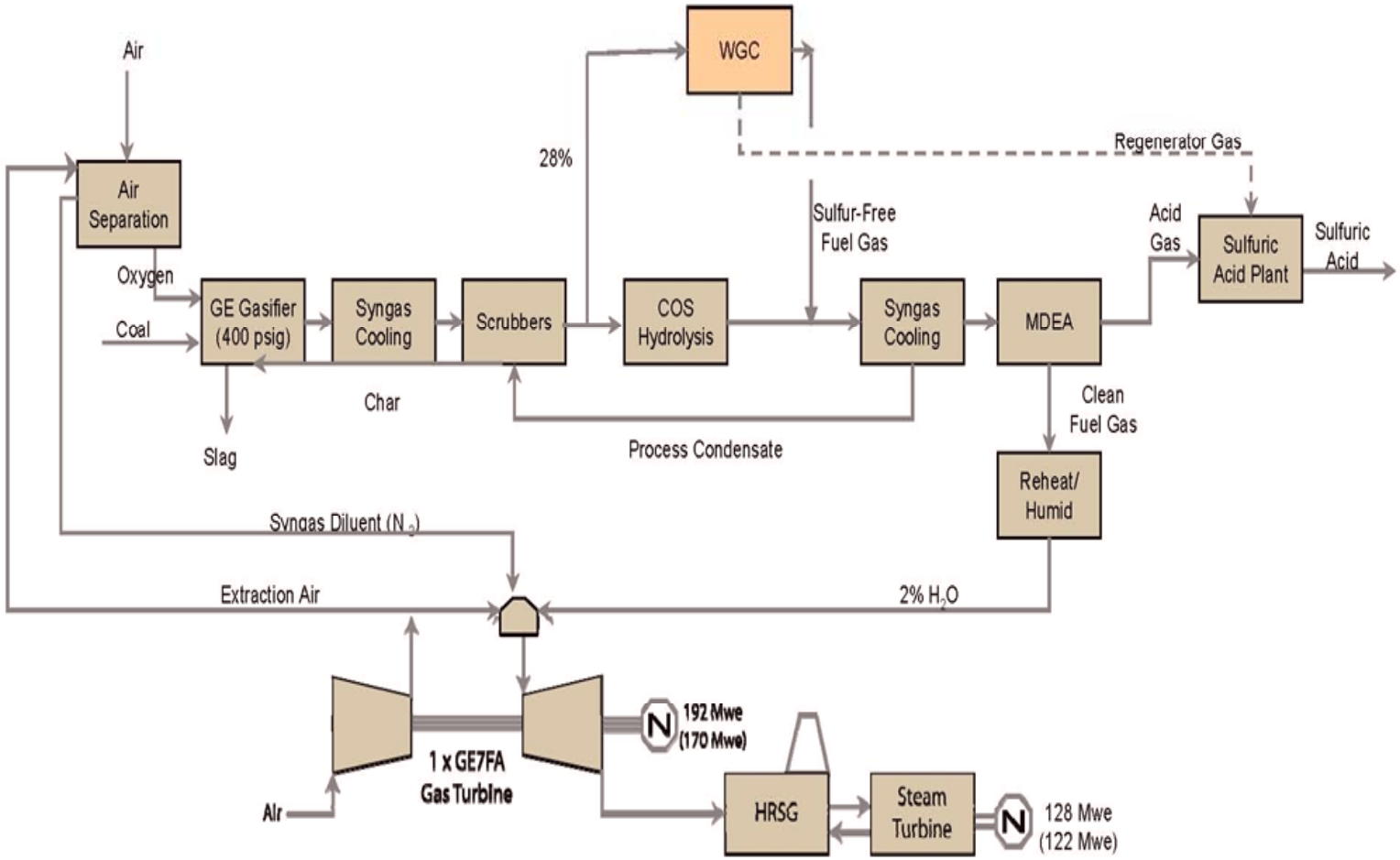
PRIMARY PARTICIPANTS:

- Funding/Support
- Technology Owner
- Engineer
- Site Host
- BASF Corporation, Süd-Chemie, Inc., and Eastman Chemical Company
- ECT, ASRus, Sandia, USF, SECARB

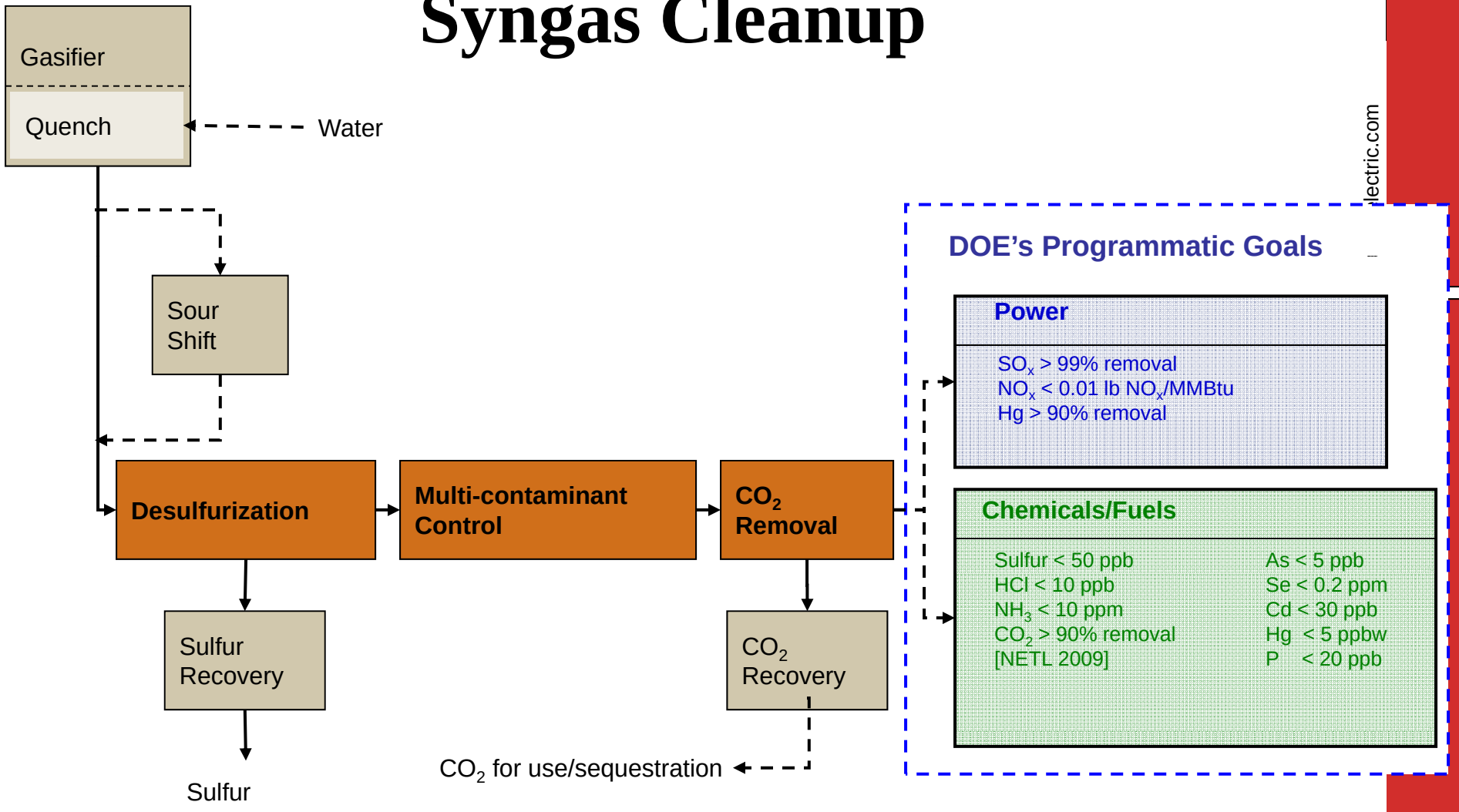
RTI Technology Benefits Overview

- The technology has been successfully demonstrated in a pre-commercial pilot phase at Eastman's Kingsport, Tennessee (USA), site using coal-derived syngas
- DOE-funded system study predicts a 2-3 percentage point increase in overall IGCC thermal efficiency and a six percent reduction in the cost of electricity by using the RTI contaminant removal process for an IGCC plant
- Continuous Regenerable Process (Fluid Beds)
- Sorbent Resistant to Attrition (Sud Chemie)
- Removes both H_2S and COS to Single Digit ppm Concentrations
- Operates equally well at any pressure
- Good Fit with Shift Conversion for Carbon Capture
- Potentially First Significant Advance in S Removal Technology in 35 years

IGCC & WGC Flow Diagram

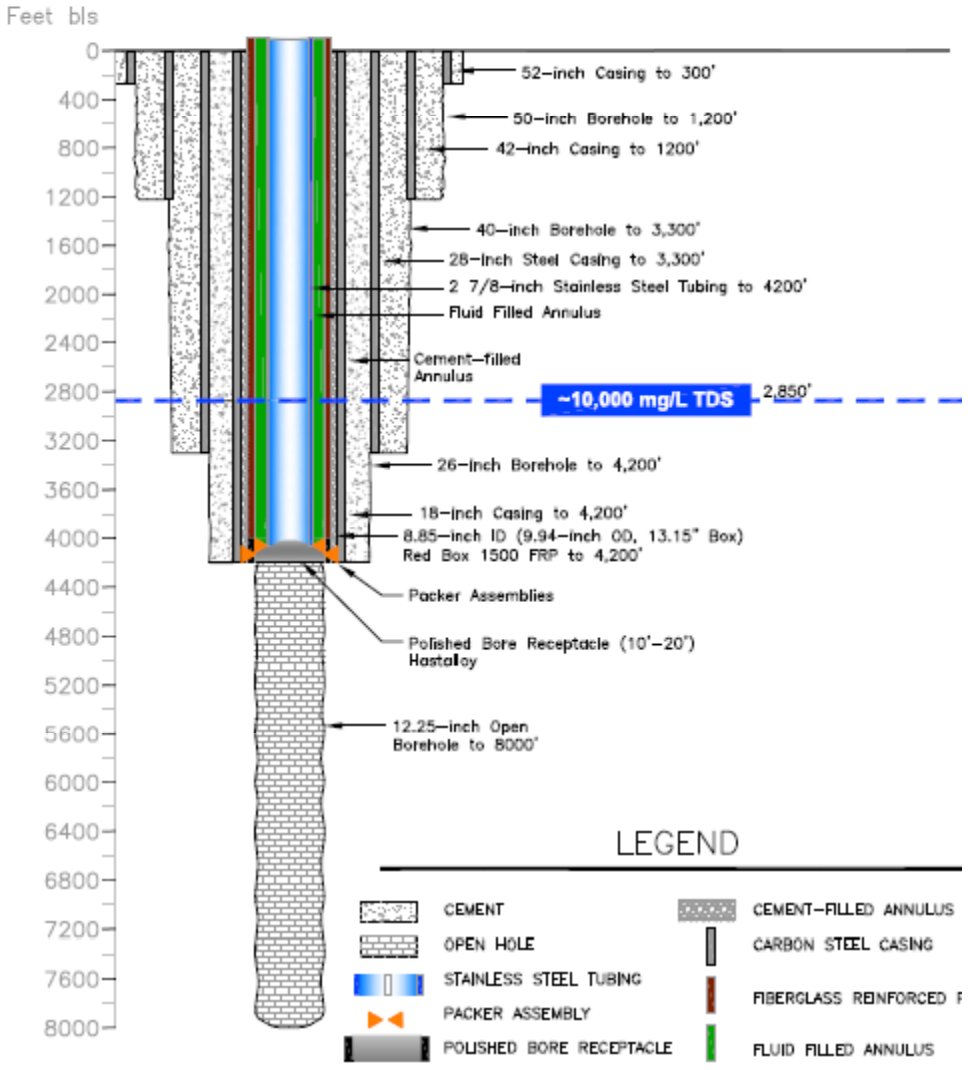


Syngas Cleanup



Injection Well IW-2 (CCS)

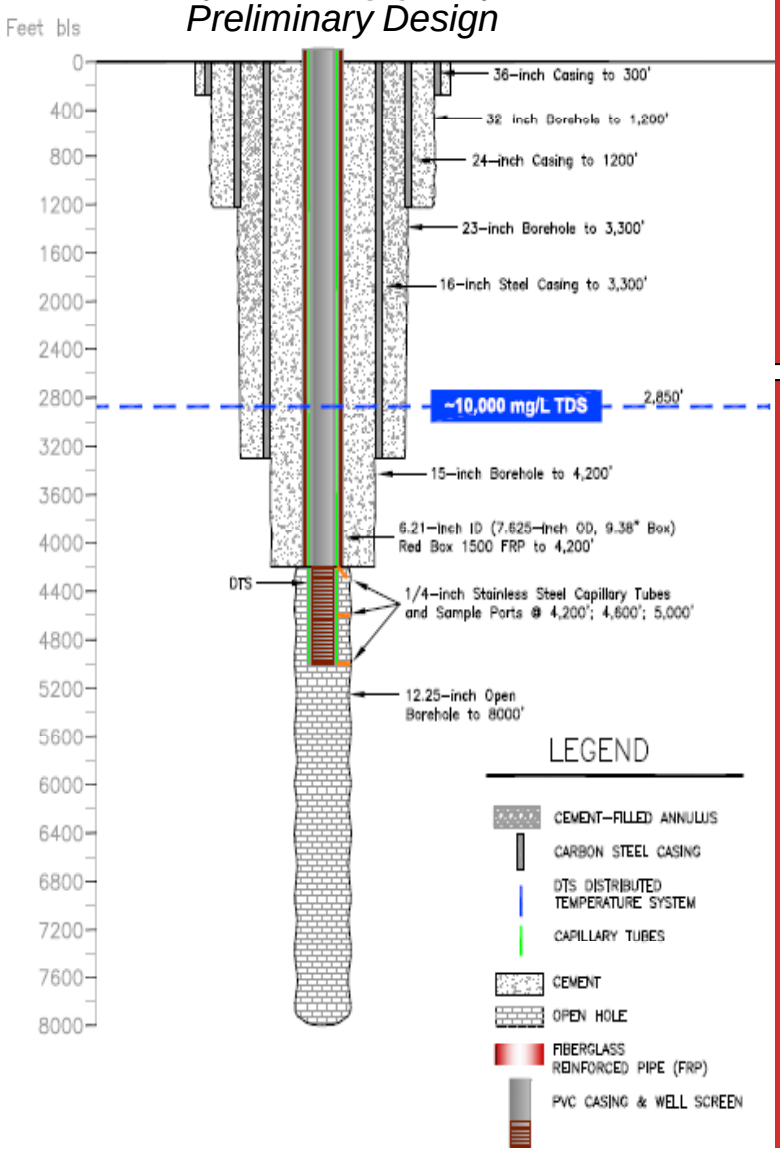
Preliminary Design



Injection-Zone Monitoring Well

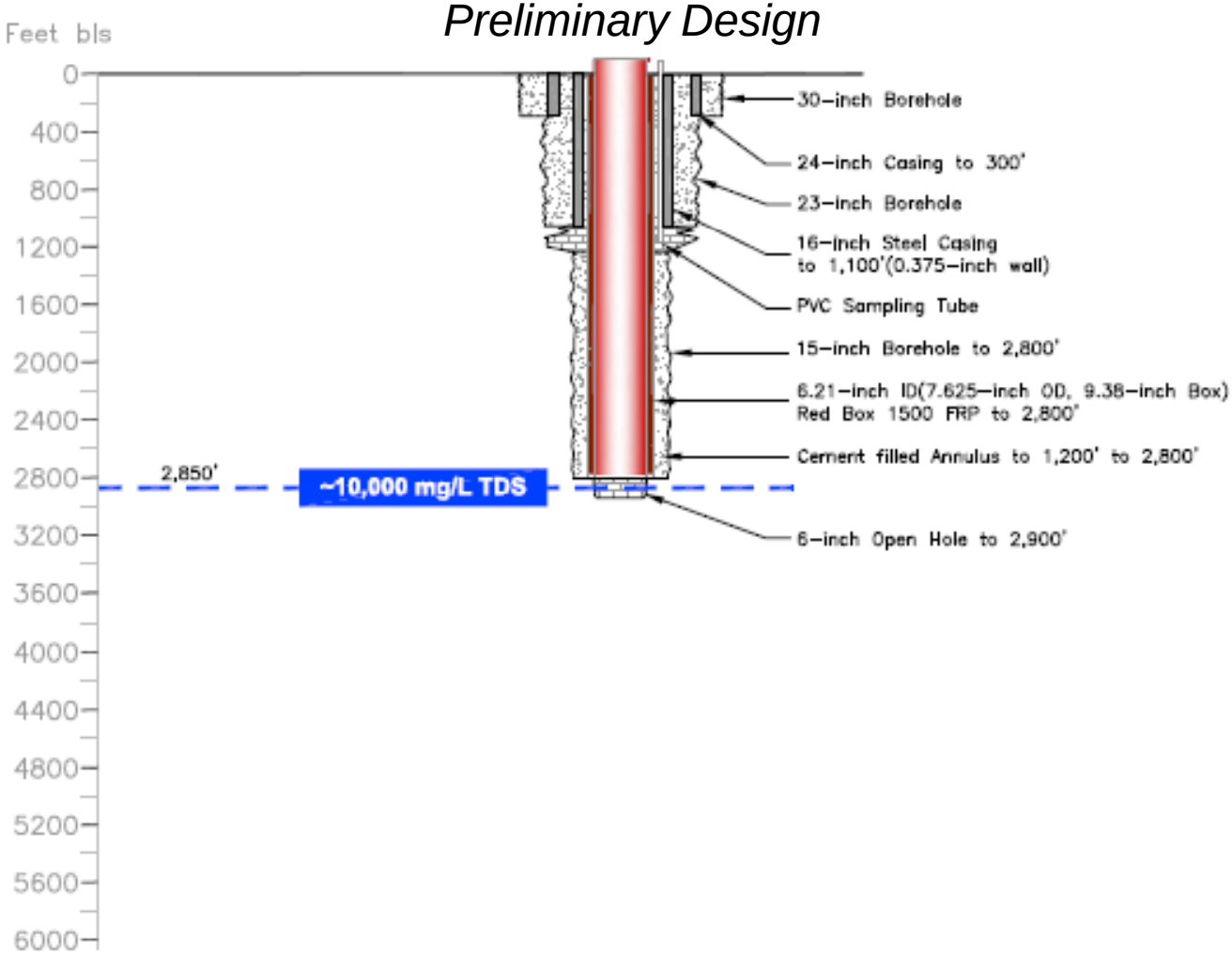
(with CCS Equipment)

Preliminary Design



Dual-Zone Monitoring Well

Preliminary Design



Permitting

- Environmental Assessment: Questionnaire submitted
- UIC Class V Permit for 1st Industrial Wastewater Well (IW-1) in place, with modifications pending;
- UIC Class V Permit for 2nd Well (IW-2) will include provisions for CCS project and is in development
- Air Permitting
- NPDES Permitting
- Hazardous waste?

Proposed MVA

- Atmospheric Monitoring
  - CO_2 Detectors
  - Tracers
- Near Surface Monitoring
  - Geochemical/advanced groundwater monitoring
  - Soil-vadose zone gas monitoring
  - Tracers (isotopes/injected compounds such as PFTs)
  - Remote sensing - Interferometric synthetic aperture radar (InSAR) monitoring (test for viability prior to deployment)

Proposed MVA (continued)

- Subsurface Monitoring
  - Physical monitoring of injection pressures, volumes, rates, and temperatures
  - Caprock integrity (via cores and geo-mechanical analysis)
  - Wireline geophysical logging (including some specialty logs)
  - Water quality, geochemistry, and fluid level/pressure monitoring
  - Vertical seismic profiling
  - Tracer injection monitoring (both water and gas)

PROPOSED MVA LOCATIONS-PRELIMINARY

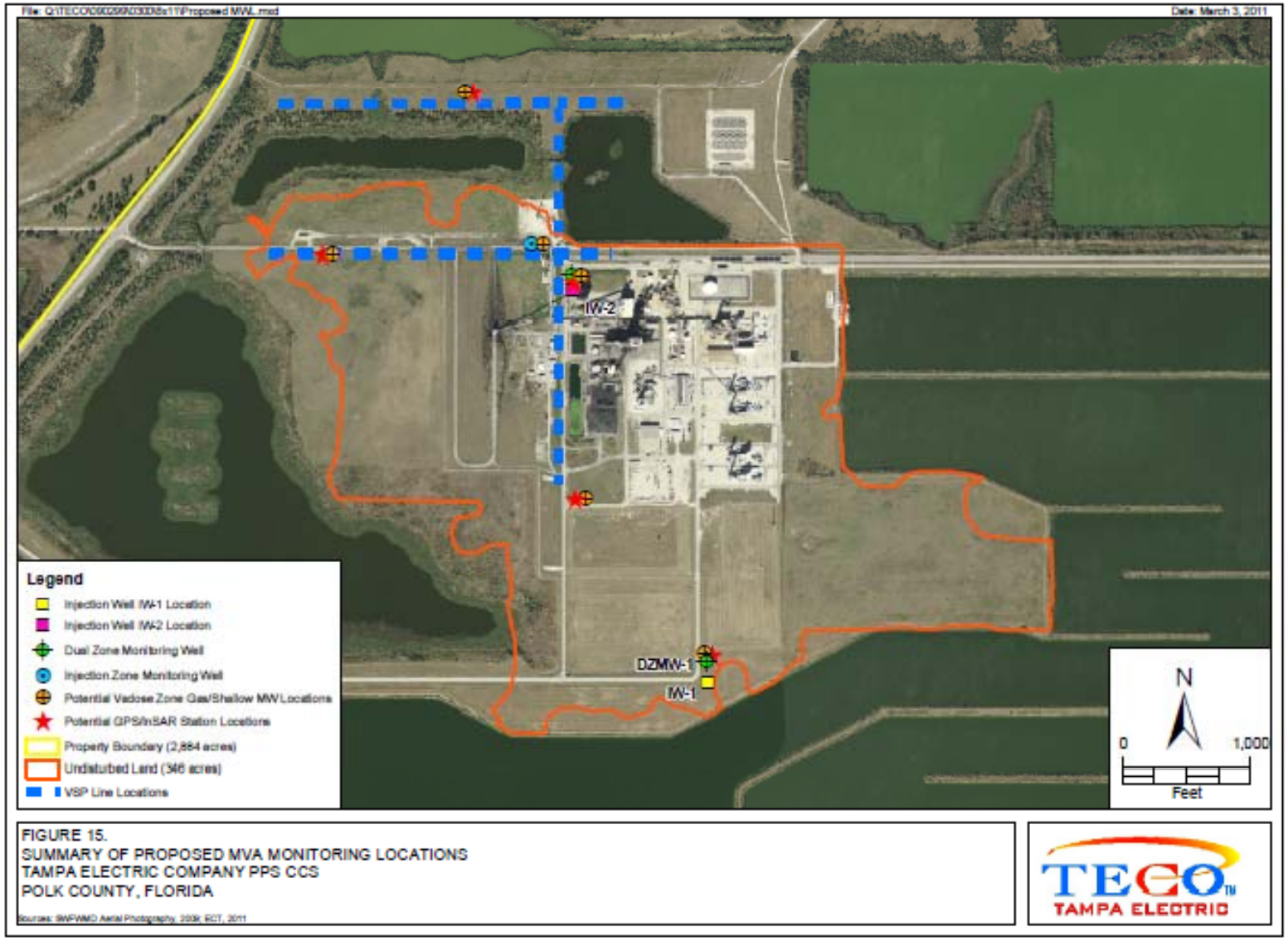


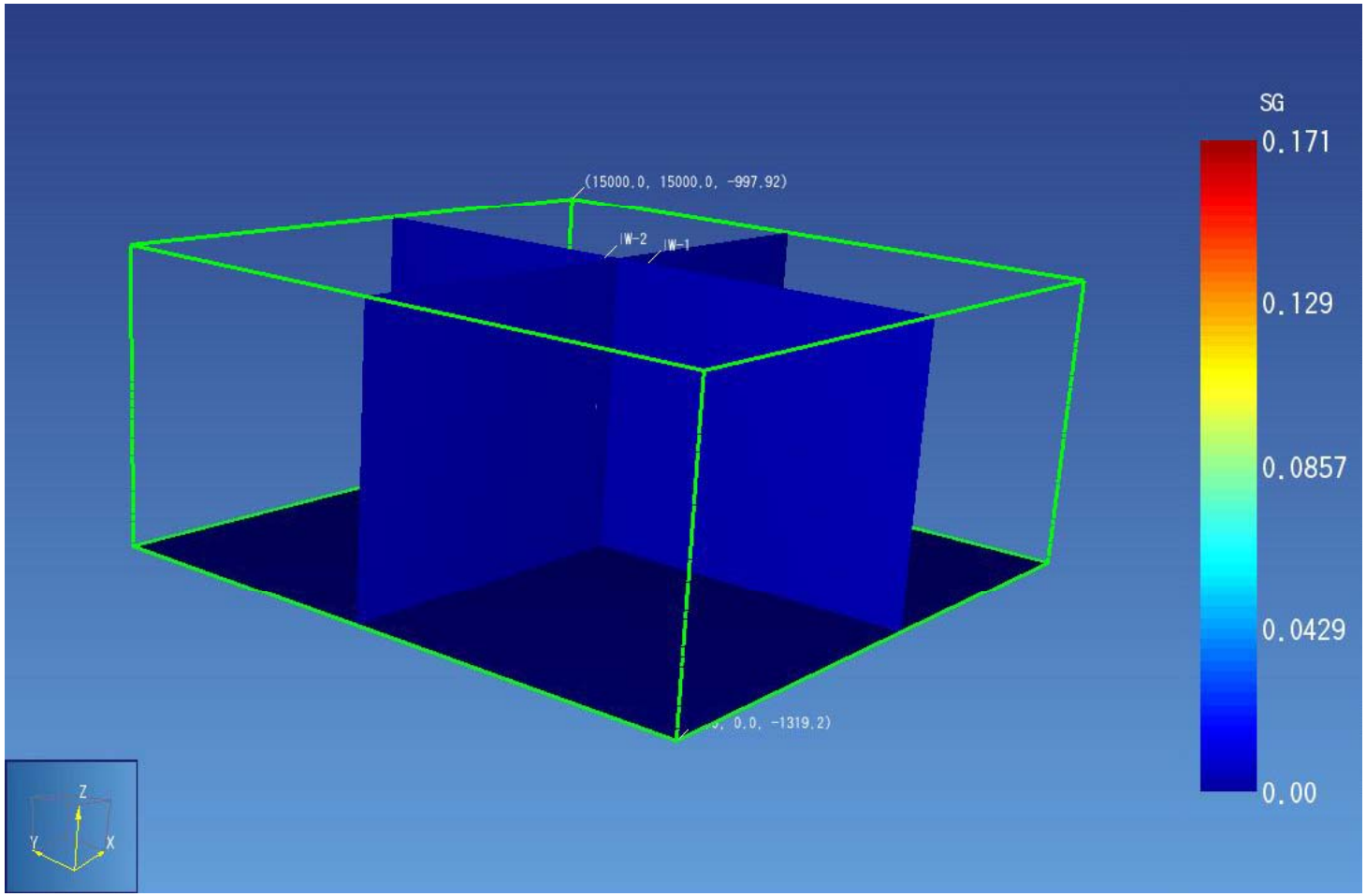
FIGURE 15.
SUMMARY OF PROPOSED MVA MONITORING LOCATIONS
TAMPA ELECTRIC COMPANY PPS CCS
POLK COUNTY, FLORIDA

Sources: SWFWMD Aerial Photography, 2009; ECT, 2011

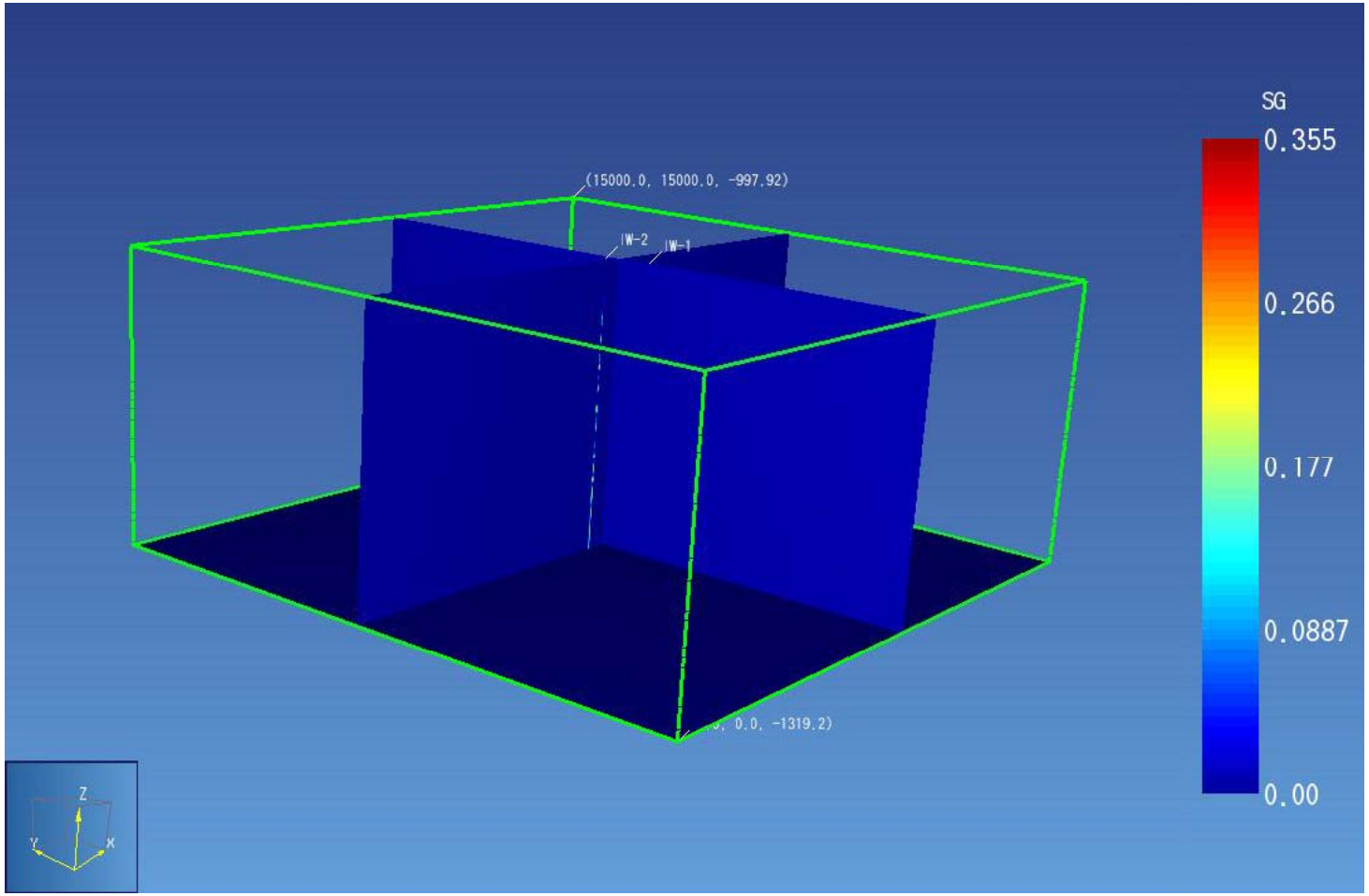
Modeling

- University of South Florida has been evaluating PPS deep saline aquifer suitability in various phases for years
- Models and evaluations indicate that it is feasible to inject a significant amount of CO2 into the aquifer below the plant site without significant adverse impacts
- Simulations based on TOUGH2 model (Lawrence Berkley National Laboratories)
- Injection of up to 8 million tons per year results in reasonable pressure impacts

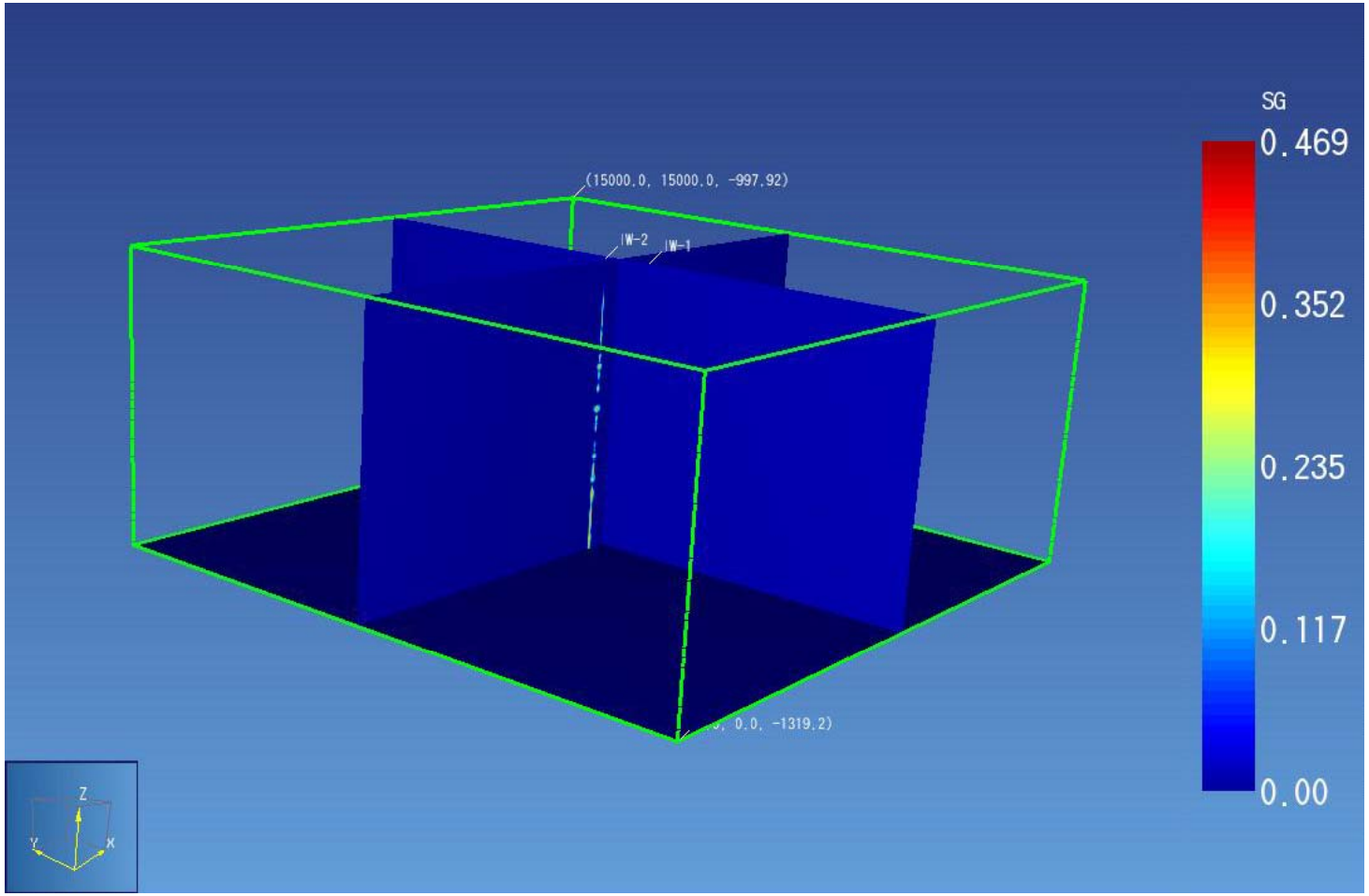
Gas saturation: 1 day



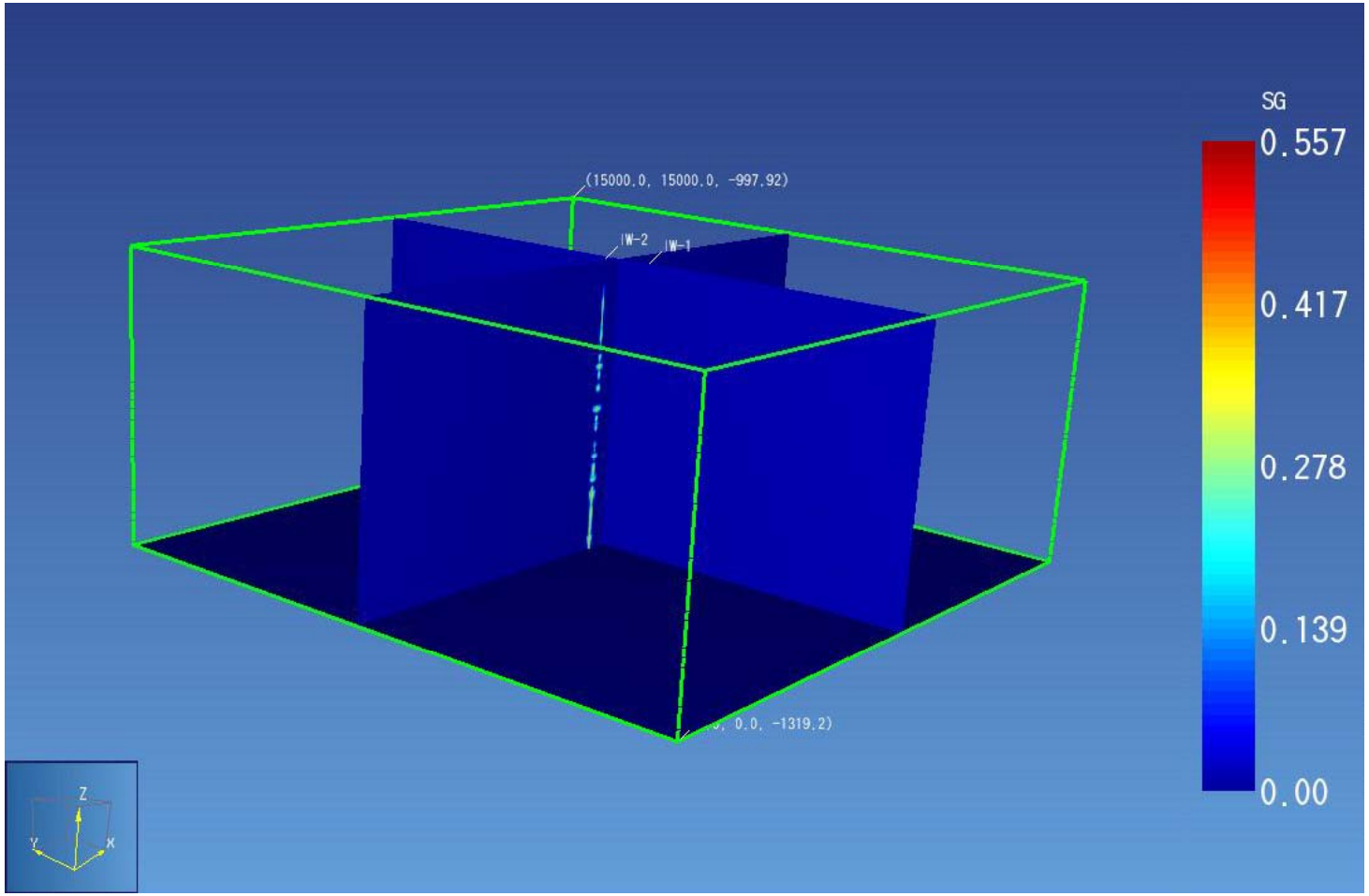
1 month


(15000.0, 15000.0, -997.92)
IW-2
IW-1
0.0, -1319.2)
SG
0.355
0.266
0.177
0.0887
0.00
Z
Y
X

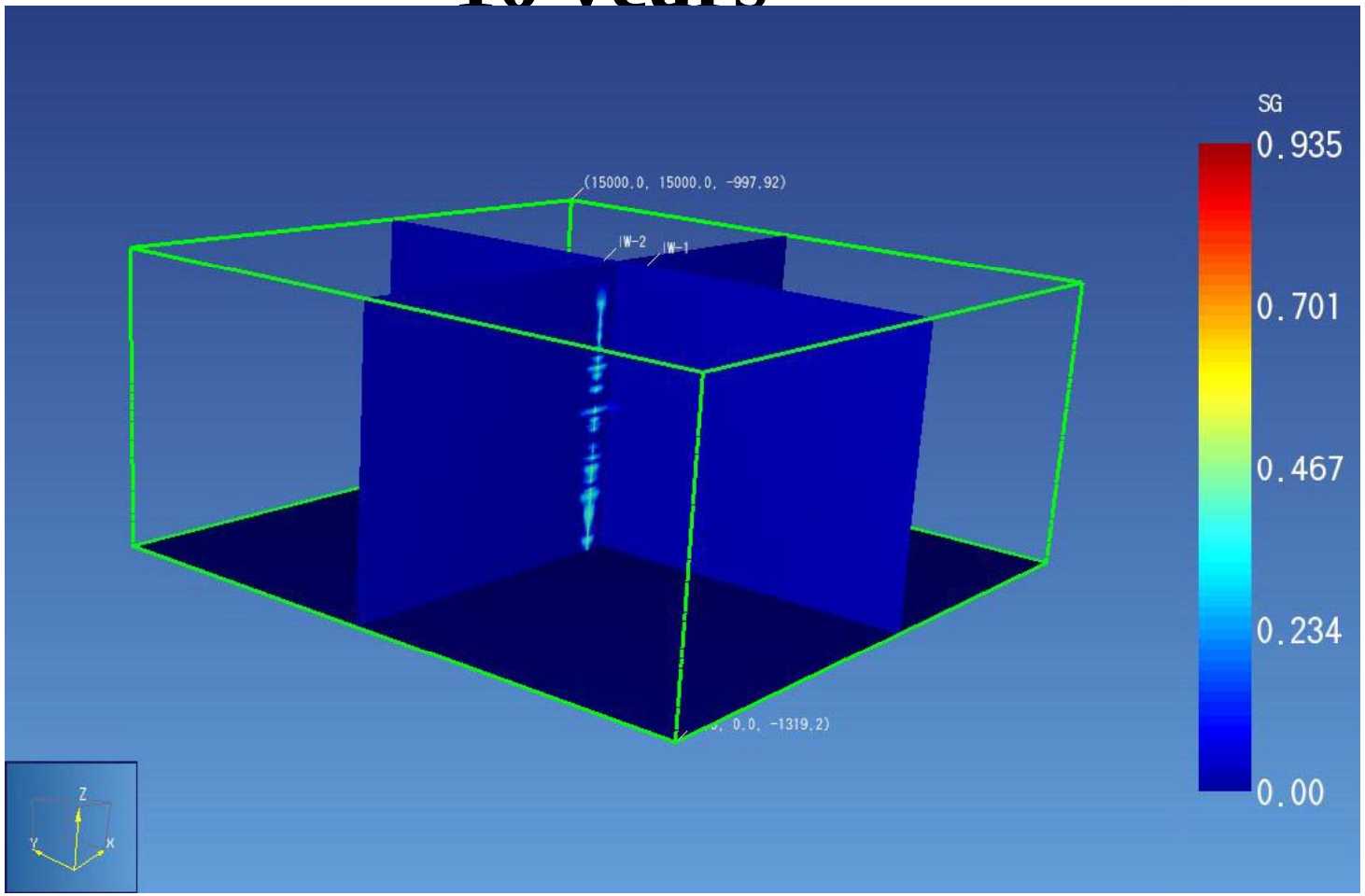
6 months


(15000.0, 15000.0, -997.92)
IW-2
IW-1
0.0, -1319.2)
SG
0.469
0.352
0.235
0.117
0.00
Z
Y
X

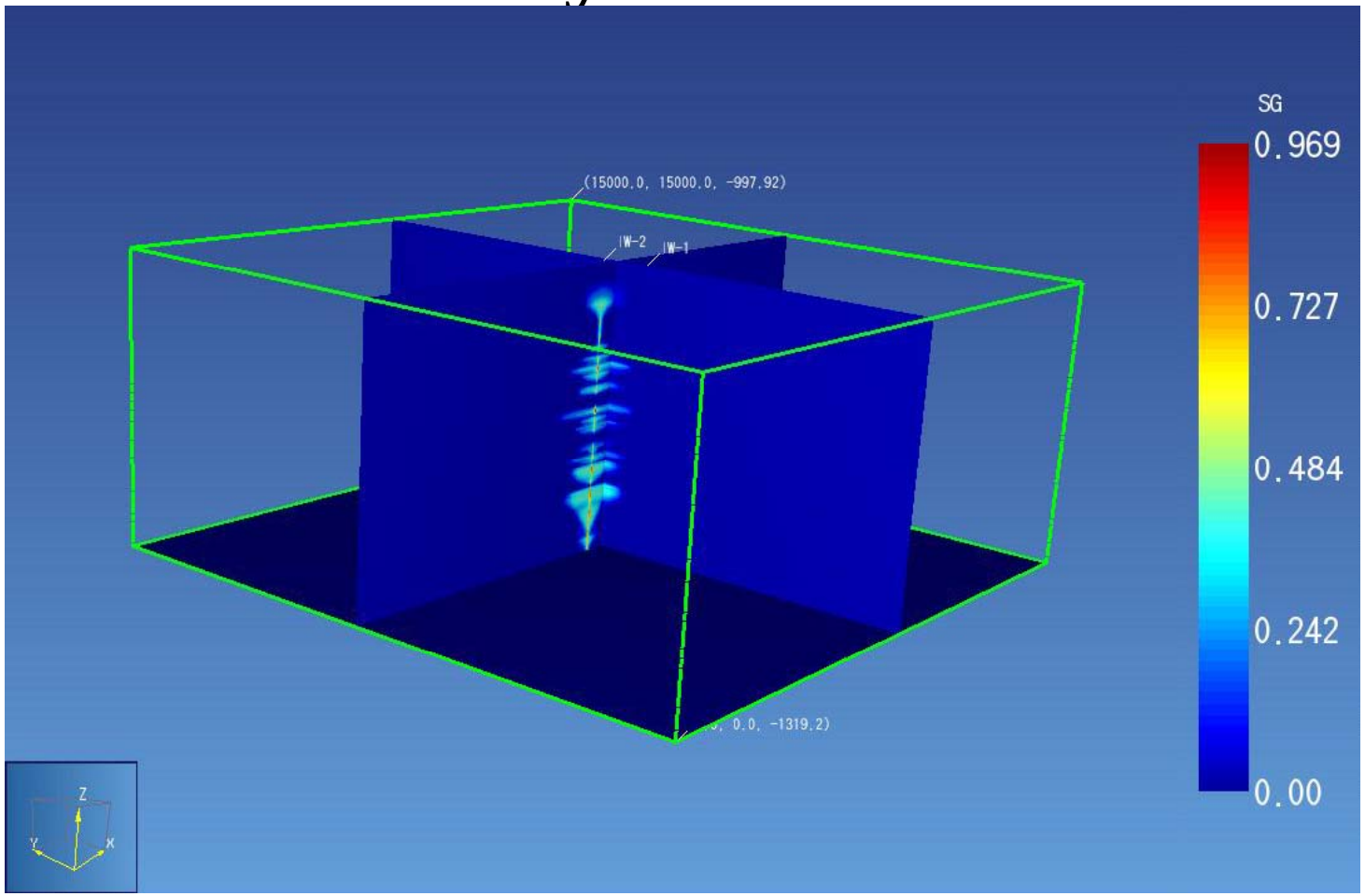
1 year



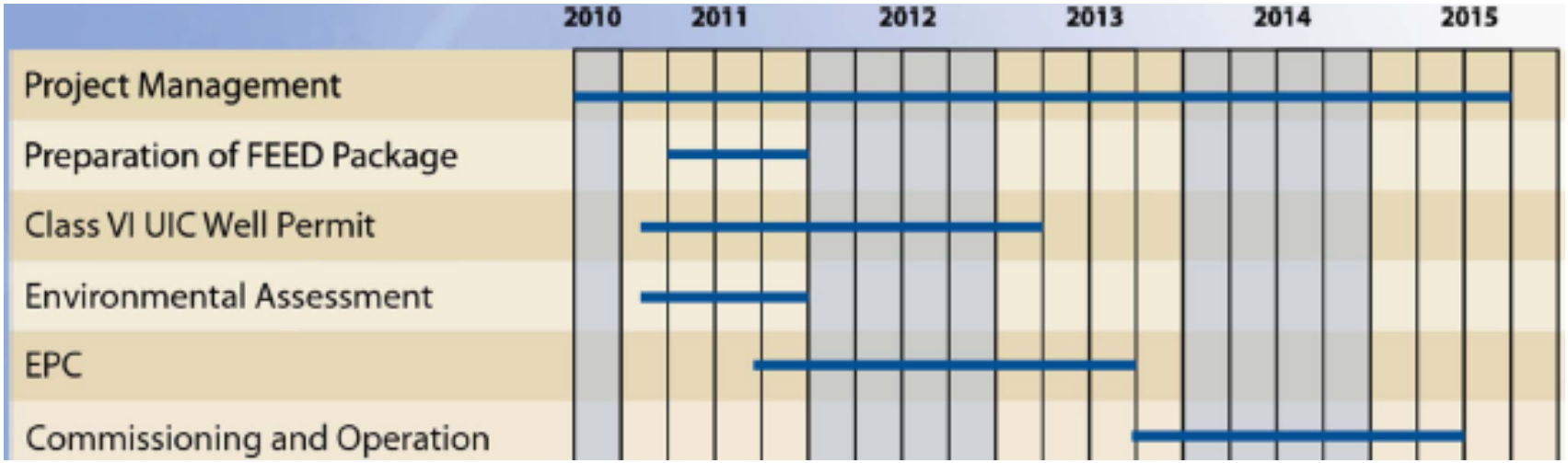
10 years



50 years



Schedule Summary



Schedule Summary-2011