BRUNSWICK STEAM ELECTRIC PLANT

Status of Tritium Contamination

As a result of past operations, residual plumes of tritiated water having concentrations exceeding the EPA drinking water limits [20,000 picoCuries per liter (pCi/l)] exist in the shallow aquifer within the owner controlled areas.

The ultimate source of the elevated tritium (H-3) was the discharge of turbine building (TB) chiller condensate which contained H-3 resulting from extensive steam leaks to the TB atmosphere. Condensate released from the TB chillers contained H-3 concentrations exceeding 1 E+6 pCi/l. The chiller condensate was routed through storm drain piping (non-radioactive waste piping) to a storm drain stabilization basin and ultimately to the storm drain stabilization pond (SDSP). In CY 2007, the licensee stopped TB chiller condensate releases to the storm drain piping by routing the equipment discharge to the onsite radioactive waste (radwaste) system. The majority of sources for unmonitored tritium release to the subsurface aquifer currently appear to be addressed. However, residual water pumped from onsite seismic structural gaps continue to have quantifiable tritium which continues to be discharged through the storm drain system.

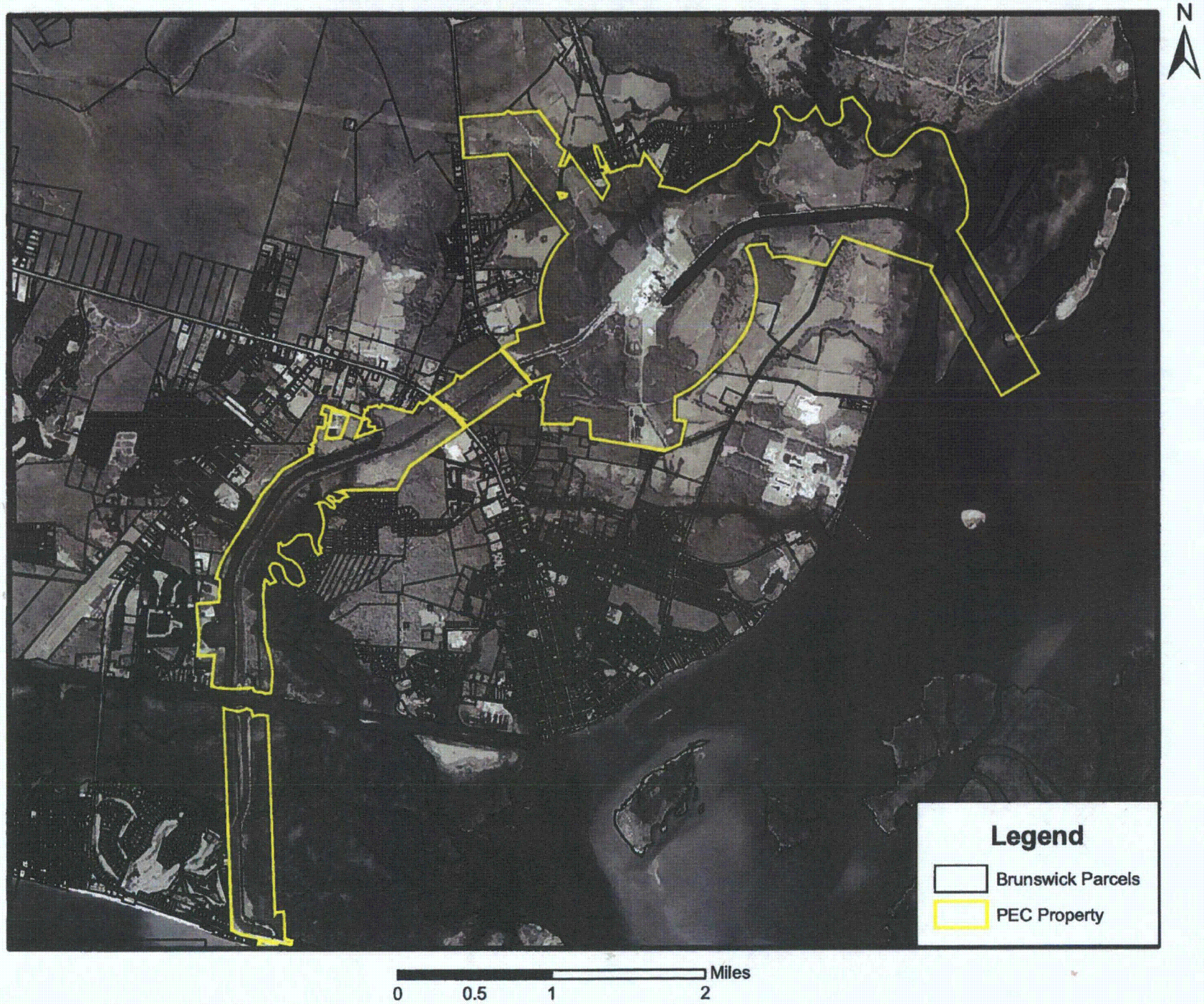
Batch releases from the SDSP are described in the ODCM as part of the licensee's normal effluent pathways with those discharges made to the intake canal. However, until calendar year (CY) 2007, the licensee failed to recognize the potential unmonitored movement/discharge of tritiated water to the subsurface aquifer from the storm drain piping, from downward migration of SDSP water, or through evaporative processes to the surrounding environs. The licensee currently is monitoring and continuing to evaluate offsite doses from all of those pathways. To date, calculated release concentrations and resultant doses to offsite locations are significantly less than 10 CFR Part 20 Appendix B or 10 CFR Part 50 Appendix I criteria.

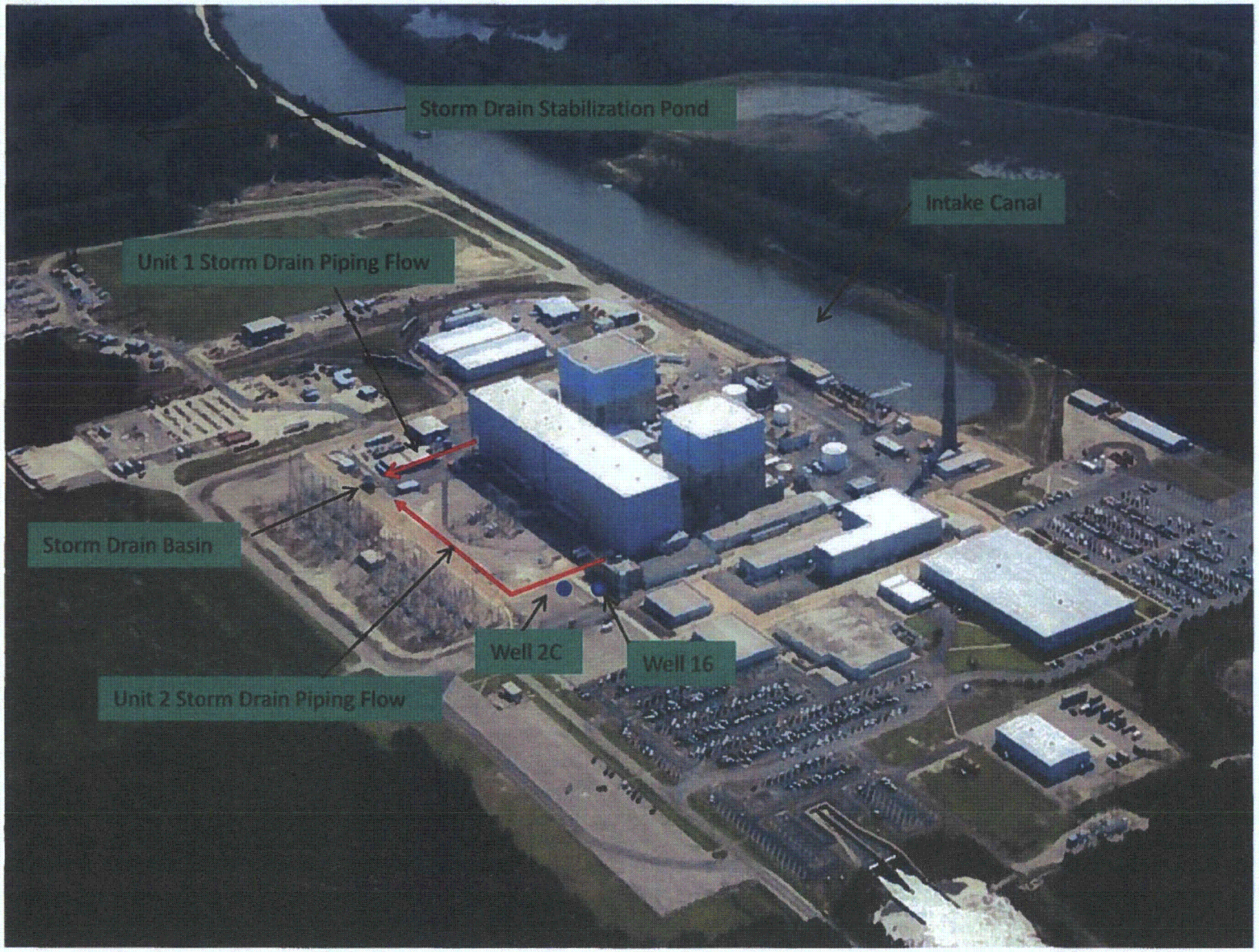
As a result of many years of direct releases of TB chiller effluents ultimately to the SDSP, the licensee has identified two distinct areas, beneath the SDSP and beneath the switch yard. where subsurface (shallow) plumes of tritiated water exceeding the EPA drinking water limit exist. Sampling wells in the shallow, intermediate, and deep aquifer established to monitor discharges from the SDSP have confirmed that all tritium concentrations exceeding EPA drinking water limits remain confined to the shallow aquifer within the owner controlled property and are not currently having a significant impact on offsite locations, or on the drinking water supply for the local population. However, to mitigate any potential future problems from the SDSP, the licensee is moving forward with extensive active remediation activities including construction of a new double-lined stabilization pond, recovery of the contaminated water beneath the SDSP, and subsequent release of the resultant liquid through normal liquid effluent process pathways. The effort is planned for the next several years and currently is awaiting approval from the State of North Carolina to construct a new stabilization pond.

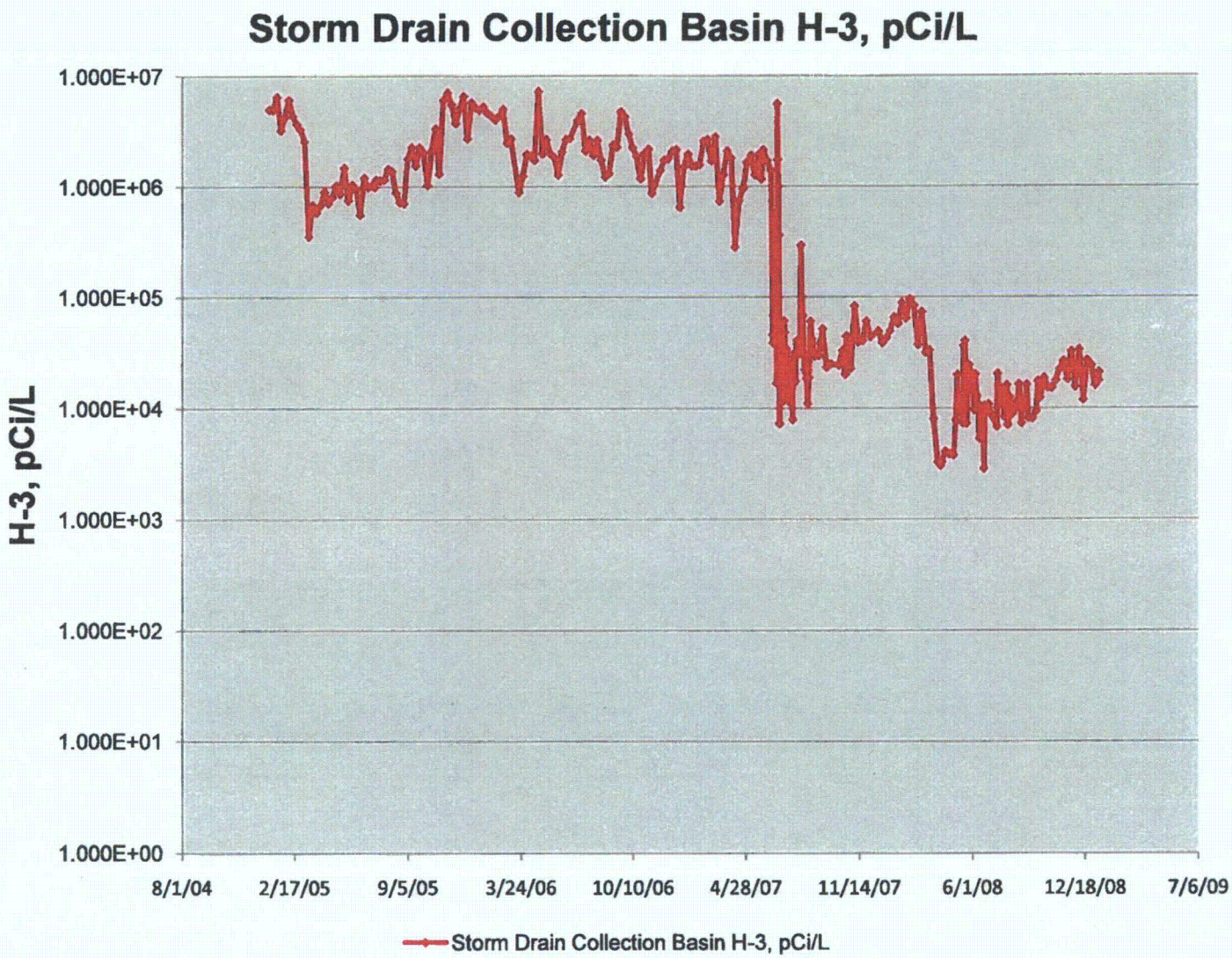
The licensee is exploring a second discrete plume located w/in the switchyard area but the investigation has just begun to map and determine the exact magnitude of this plume. Once additional data are available, the licensee decide any remediation activities for this plume.

J-63

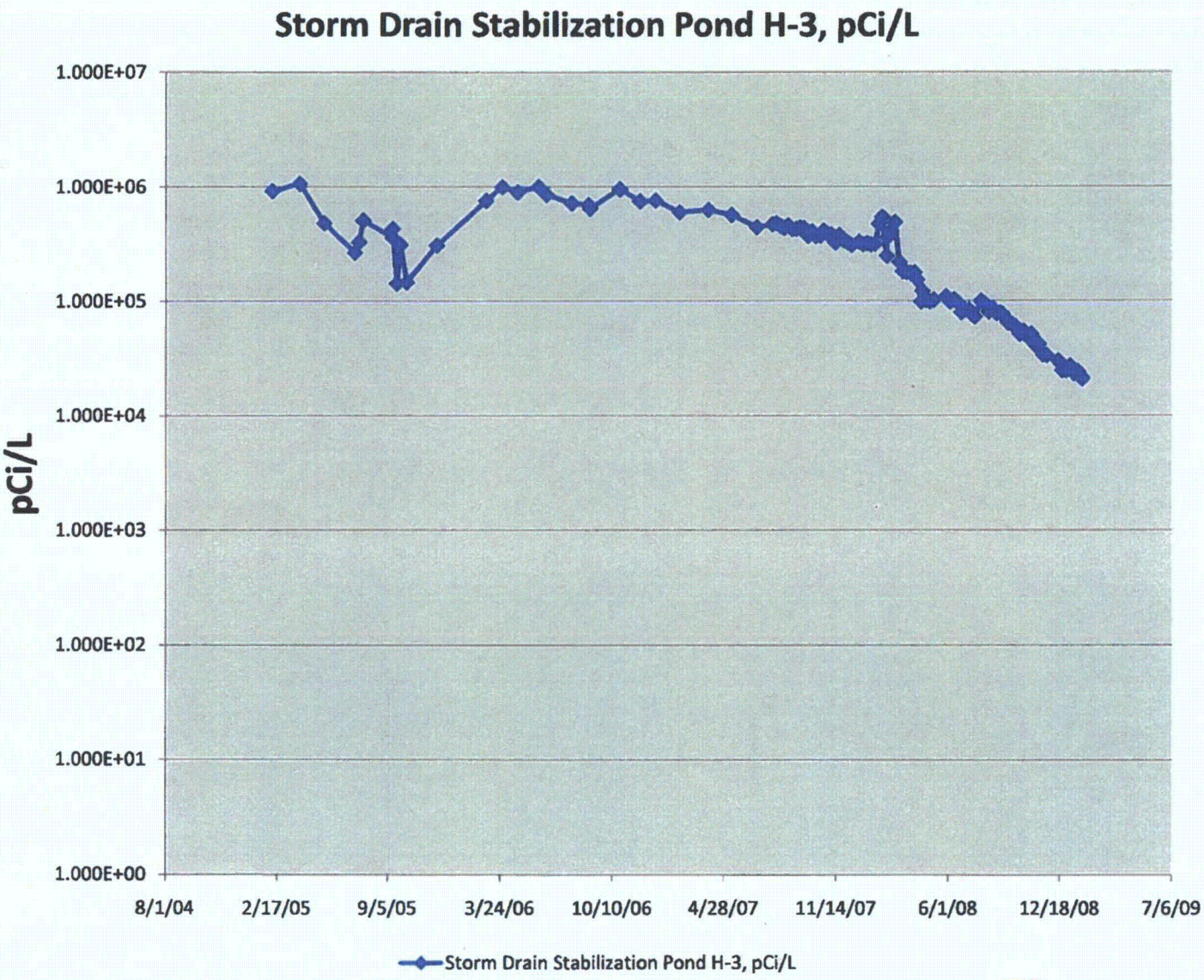
Brunswick Plant Lands




Storm Drain Stabilization Pond
Intake Canal
Unit 1 Storm Drain Piping Flow
Storm Drain Basin
Well 2C
Well 16
Unit 2 Storm Drain Piping Flow



Progress Energy



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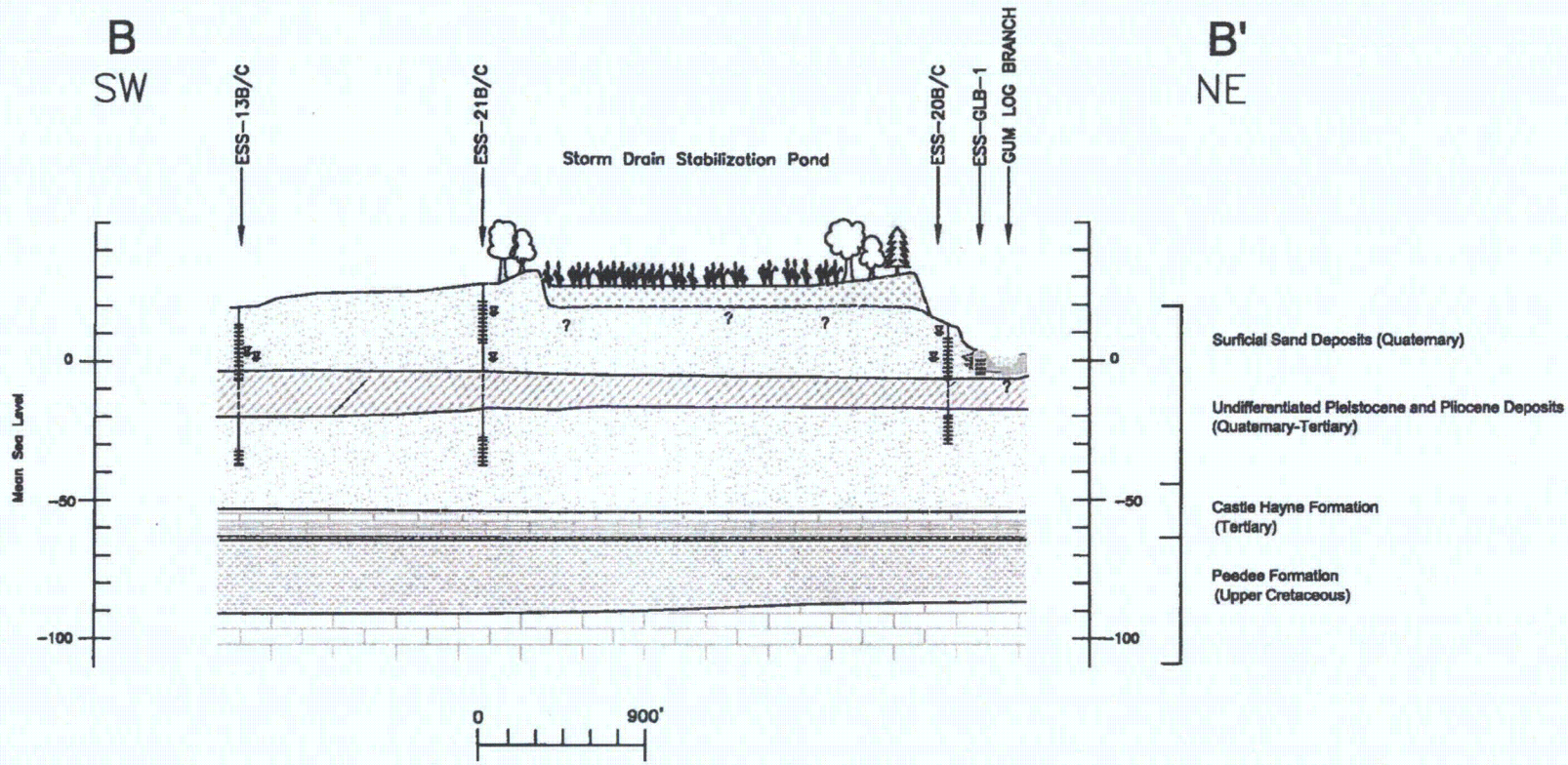


Sandy Fill Material

Wetlands

Upper Sand Unit / Lower Sand Unit

Low Permeability Unit (Unnamed)

Limestone (Castle Hayne Formation)

Low Permeability Unit (Peedee Confining Unit)

Peedee Formation

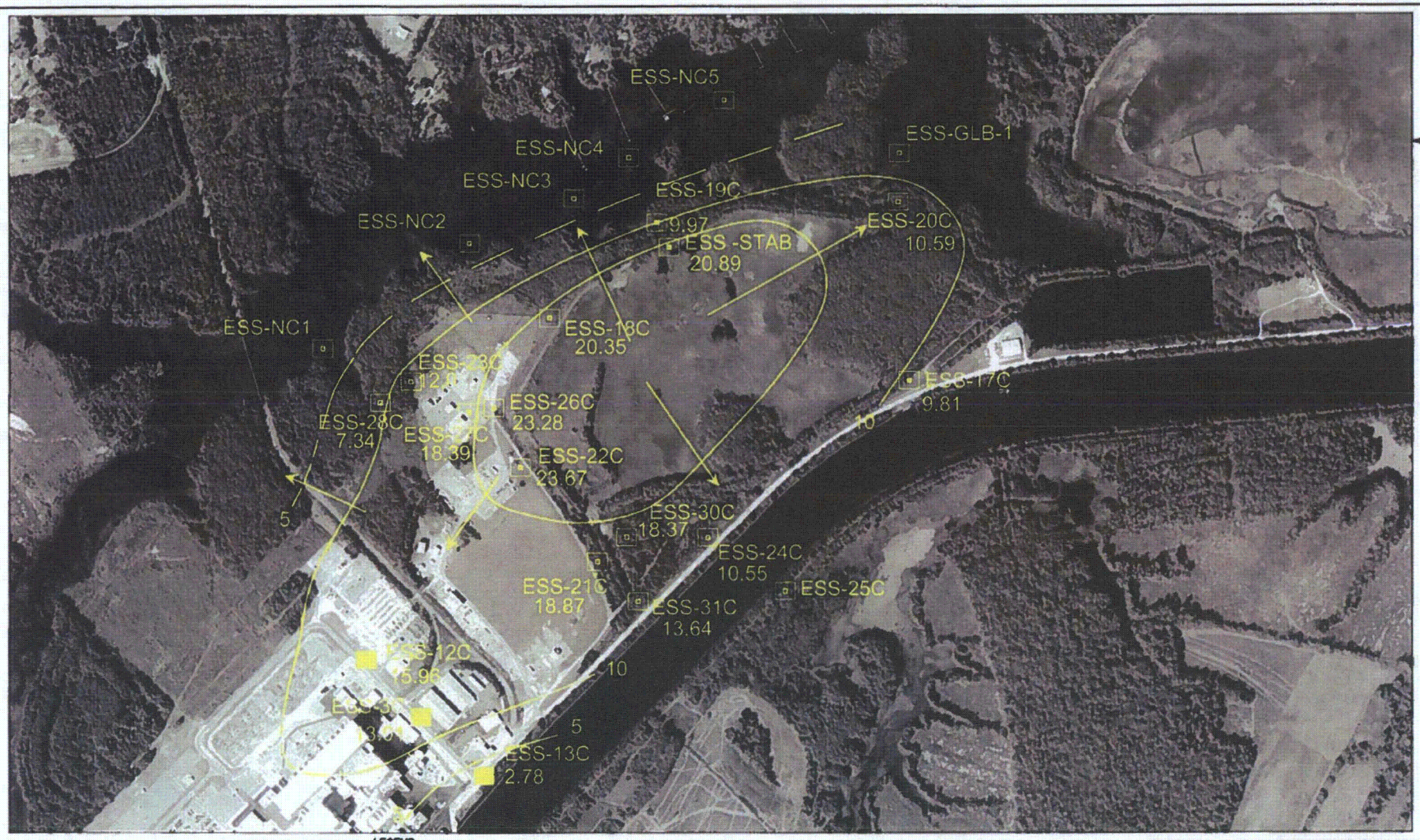
Shallow Surficial Aquifer

Intermediate Surficial Aquifer

Progress Energy
Brunswick Nuclear Plant
Southport, NC

Figure 3-5
Cross Section B-B'

SS, Silar Services Inc.



LEGEND:

- SHALLOW WELL – NEW
- SHALLOW WELL – EXISTING
- GROUNDWATER FLOW DIRECTION
- GROUNDWATER CONTOUR LINE (DASHED WHERE INFERRED)
- 2.1 ELEVATION MEAN SEA LEVEL

SOURCE:
McKim & Creed, June 15, 2007.

NOTES:
1. COORDINATES ARE BASED ON NC GRID NAD83
2. ELEVATIONS ARE BASED ON NGVD29.

SCALE 1" = 500'

0 250 500 1000 1500

Progress Energy
Brunswick Nuclear Plant
Southport, NC

Figure 3-8
Potentiometric Surface Map
Shallow Aquifer– October 16, 2007

Silar Services Inc.

SOURCE:
McKim & Creed, June 15, 2007.

NOTES:
1. COORDINATES ARE BASED ON NC GRID NAD83
2. ELEVATIONS ARE BASED ON NGVD29.

LEGEND:

INTERMEDIATE WELL – NEW

INTERMEDIATE WELL – EXISTING

GROUNDWATER FLOW DIRECTION

GROUNDWATER CONTOUR LINE (DASHED WHERE INFERRED)

2.1 ELEVATION MEAN SEA LEVEL

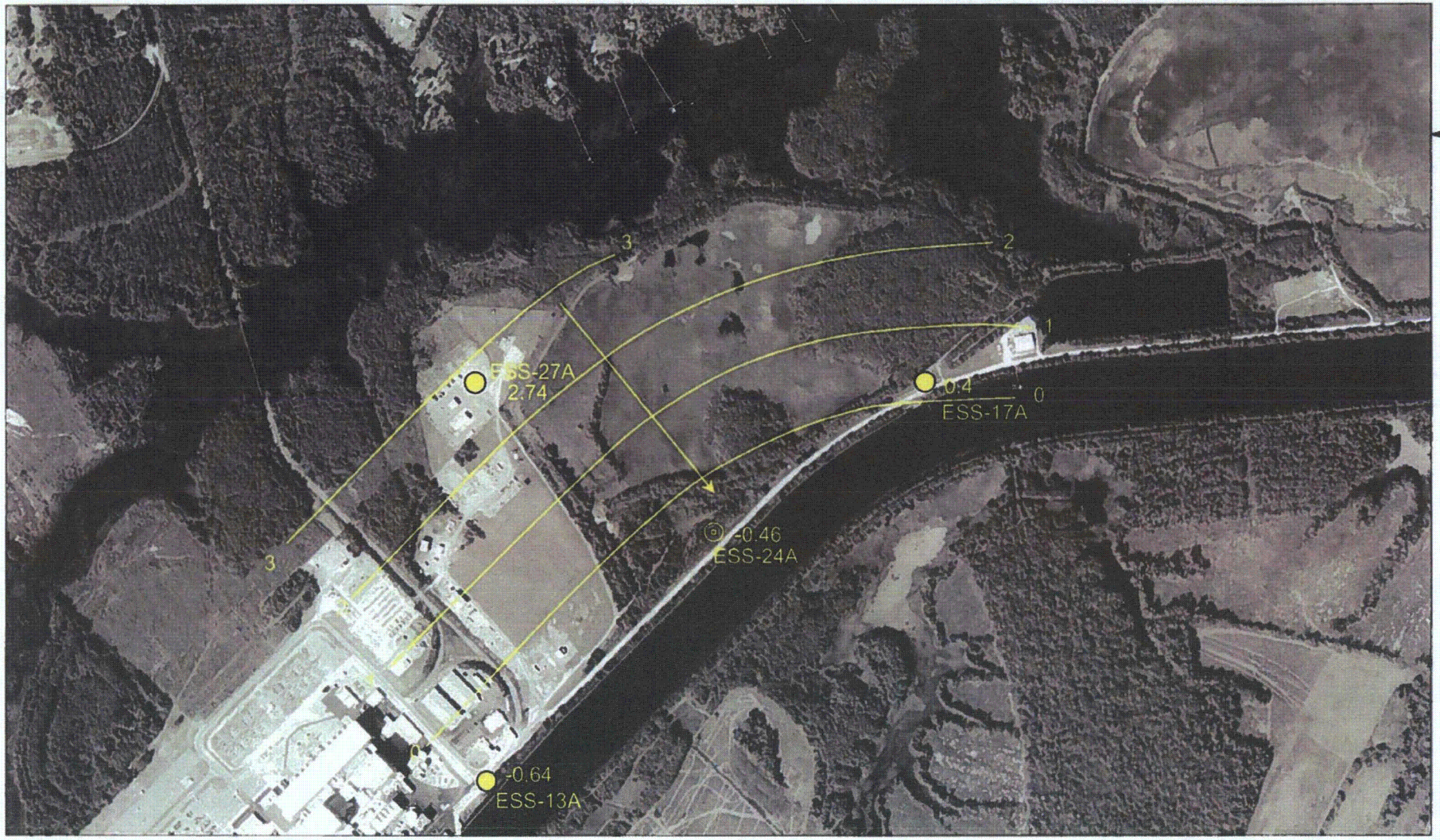
SCALE 1" = 500'

0 250 500 1000 1500

Progress Energy
Brunswick Nuclear Plant
Southport, NC

Figure 3-9
Potentiometric Surface Map
Intermediate Aquifer– October 2, 2007

Silar Services Inc.



SOURCE:
McKim & Creed, June 15, 2007.

NOTES:
1. COORDINATES ARE BASED ON NC GRID NAD83
2. ELEVATIONS ARE BASED ON NGVD29.

LEGEND:

- DEEP WELL – NEW
- DEEP WELL – EXISTING
- GROUNDWATER FLOW DIRECTION
- GROUNDWATER CONTOUR LINE (DASHED WHERE INFERRED)
- 2.1 ELEVATION MEAN SEA LEVEL

SCALE 1" = 500'

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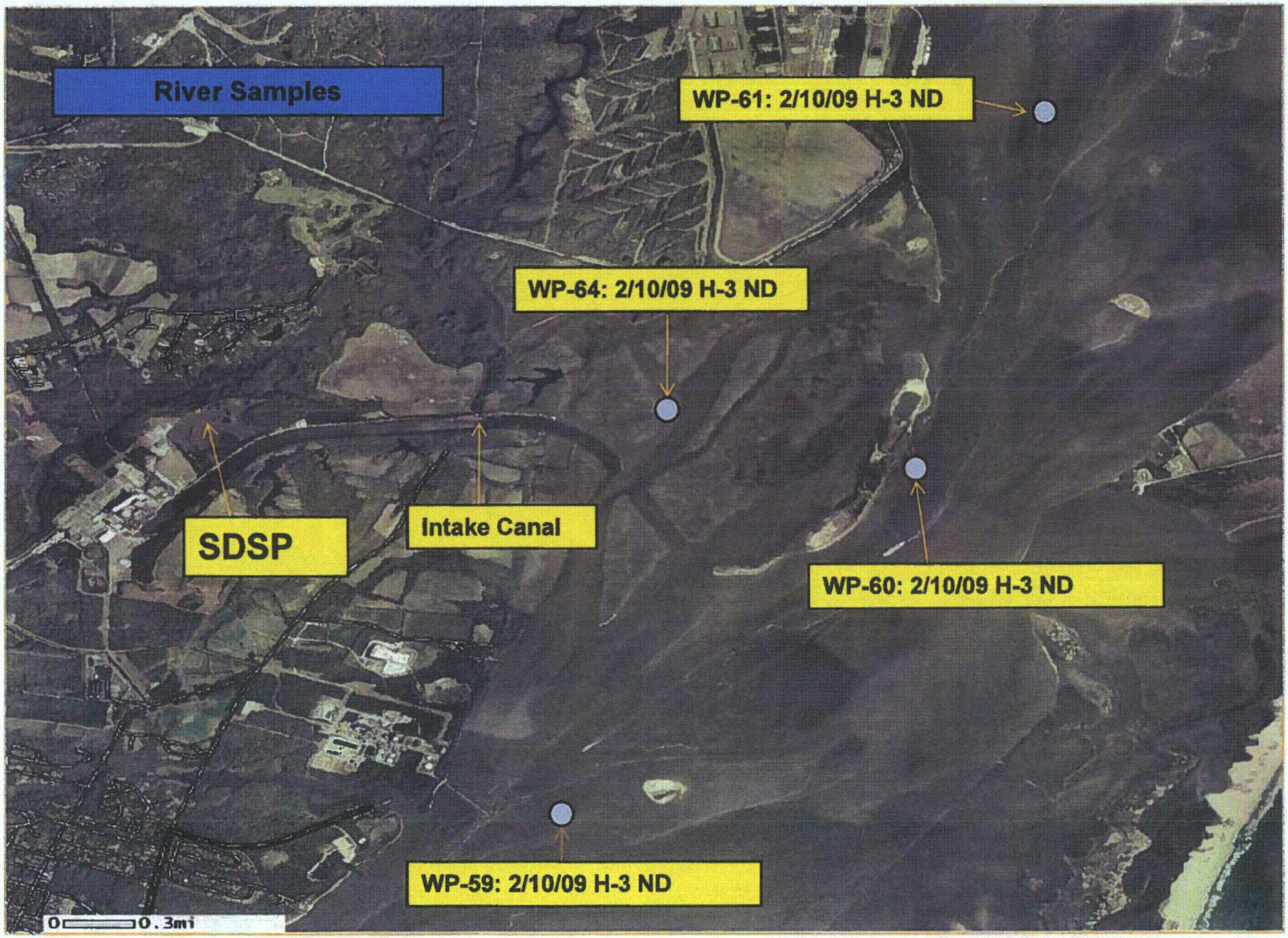
Progress Energy
Brunswick Nuclear Plant
Southport, NC

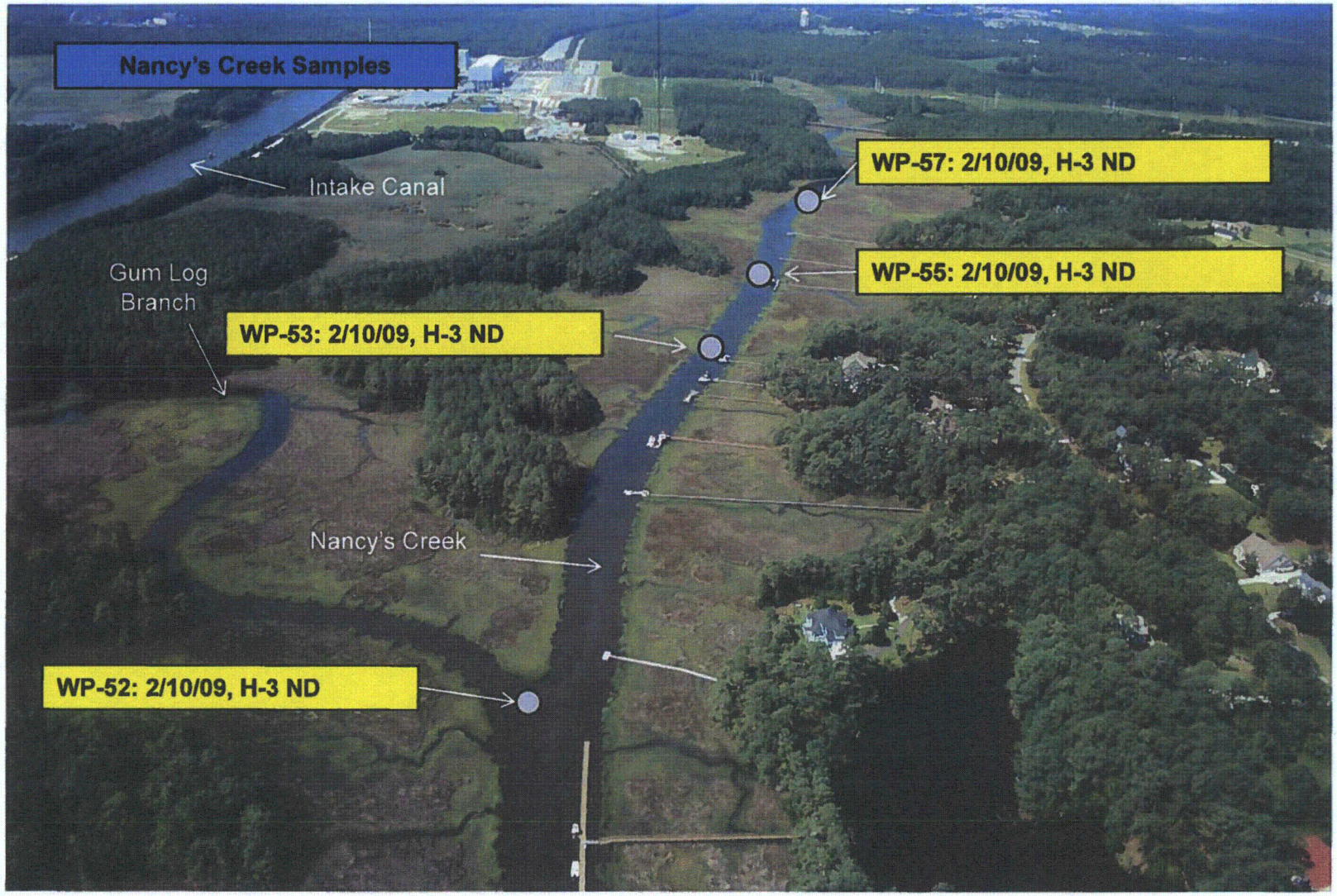
Figure 3-11
Potentiometric Surface Map
Deep Aquifer– October 2, 2007

Silar Services Inc.



Progress Energy

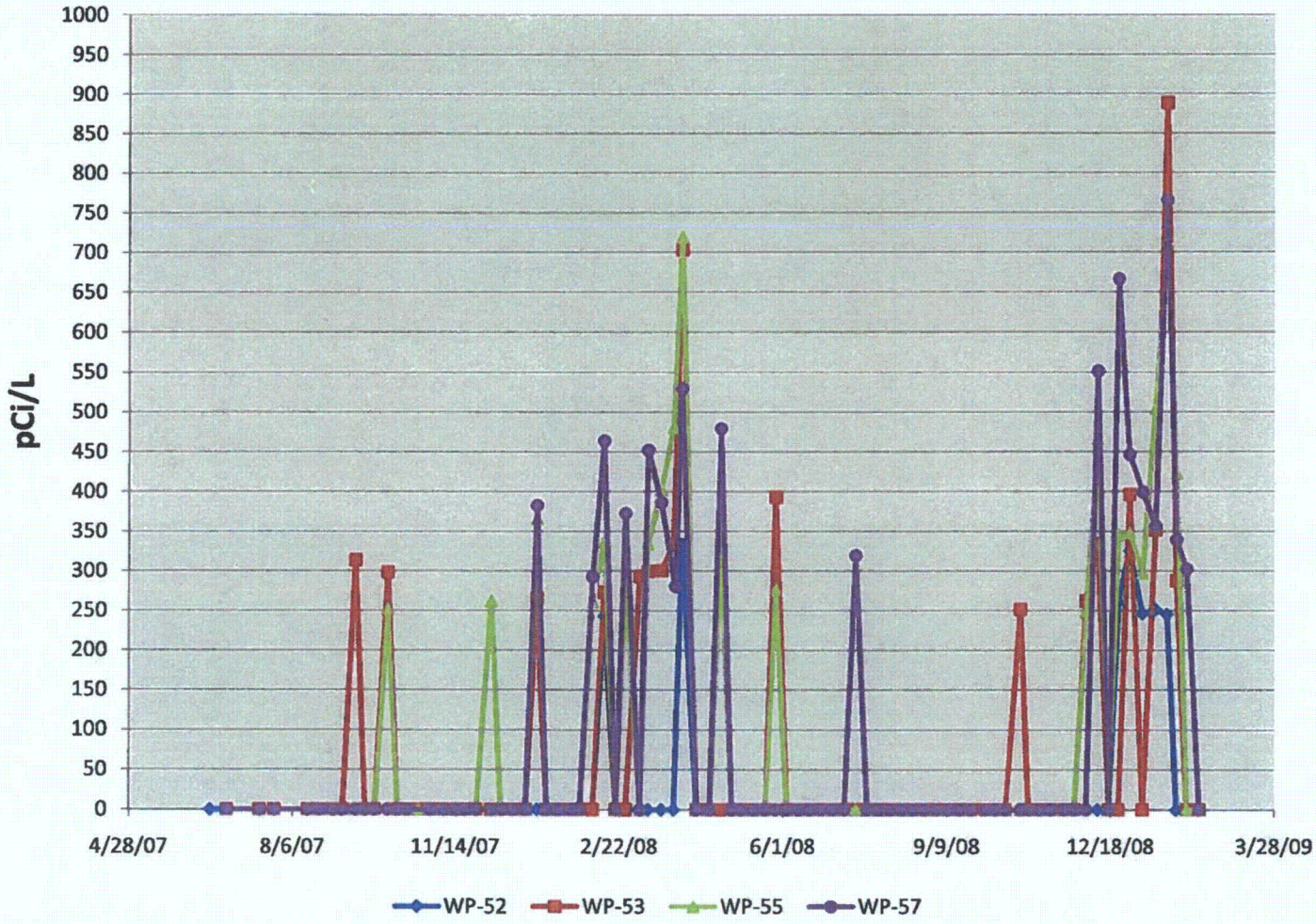
2 Marsh and River Samples



Marsh and River Samples

Progress Energy

Waypoints 52, 53, 55, and 57 in Nancy's Creek



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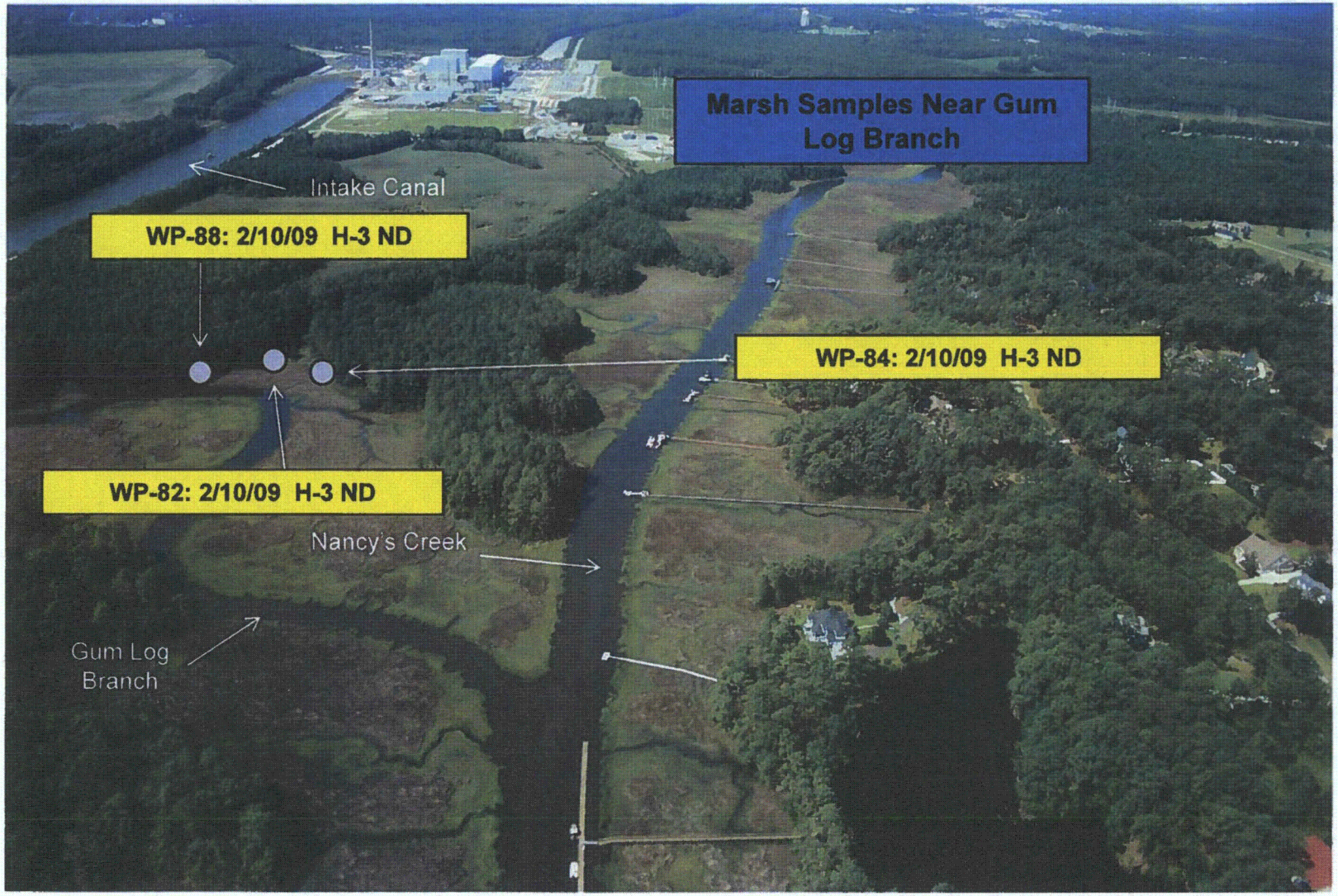

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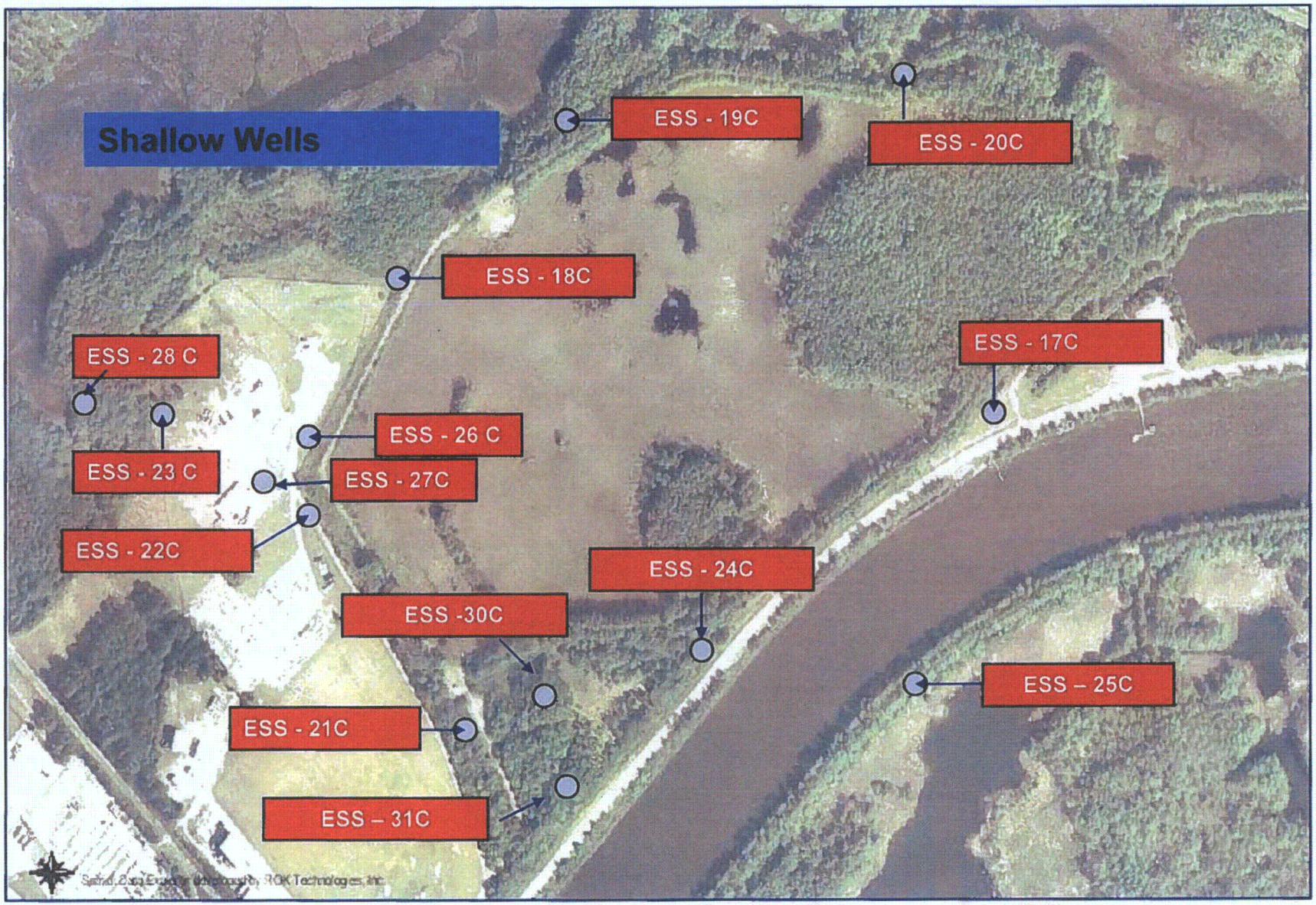

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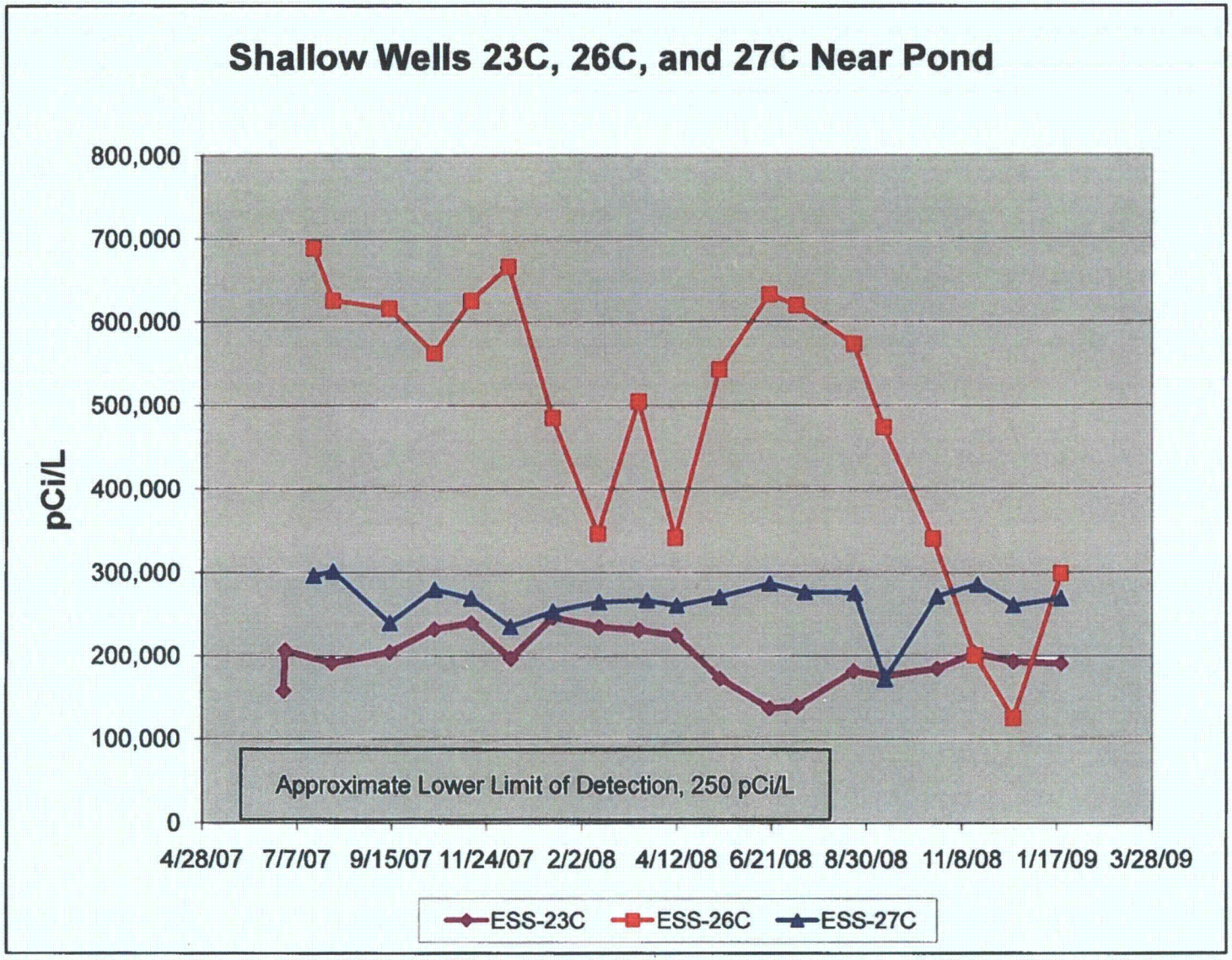

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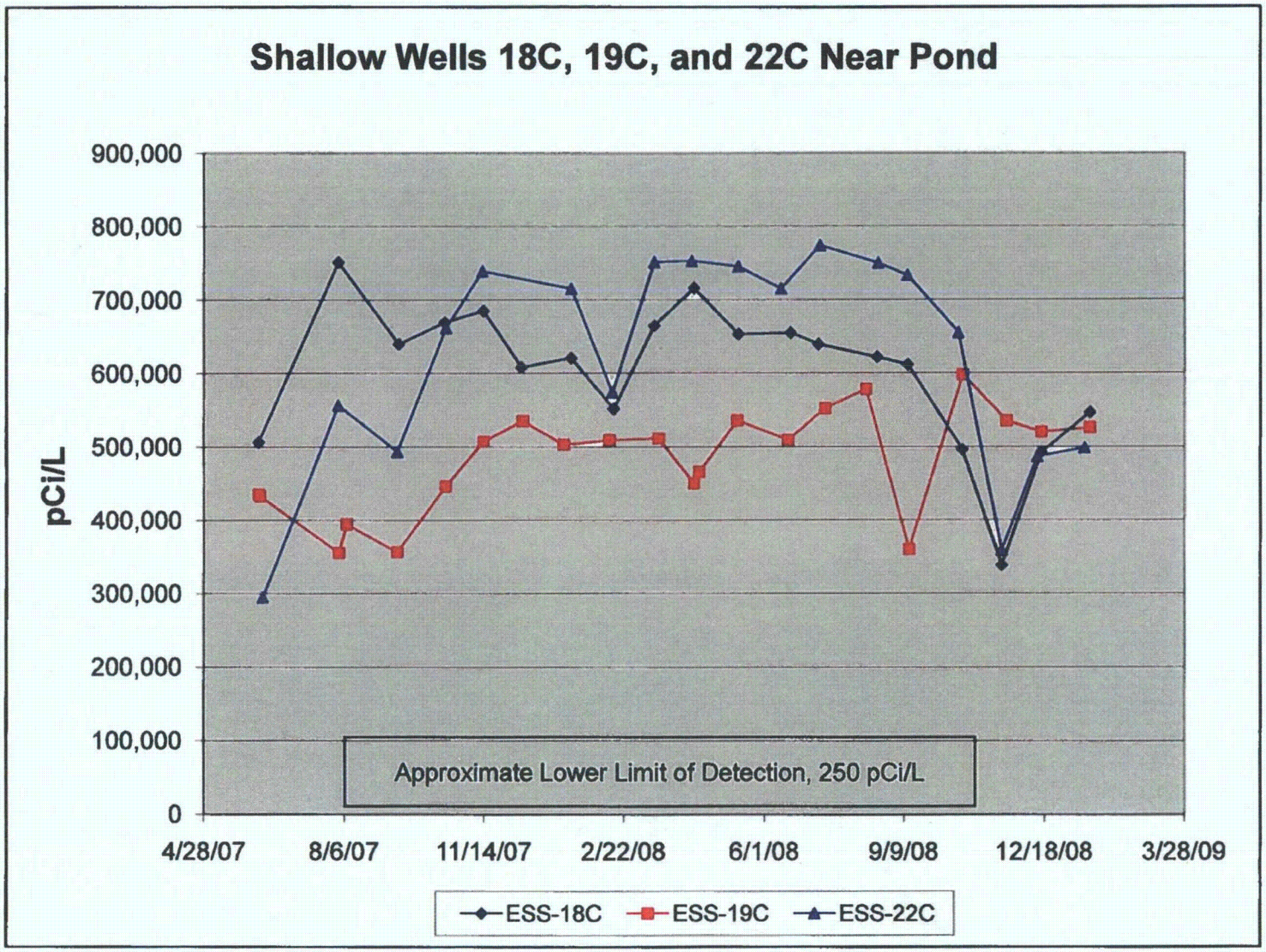

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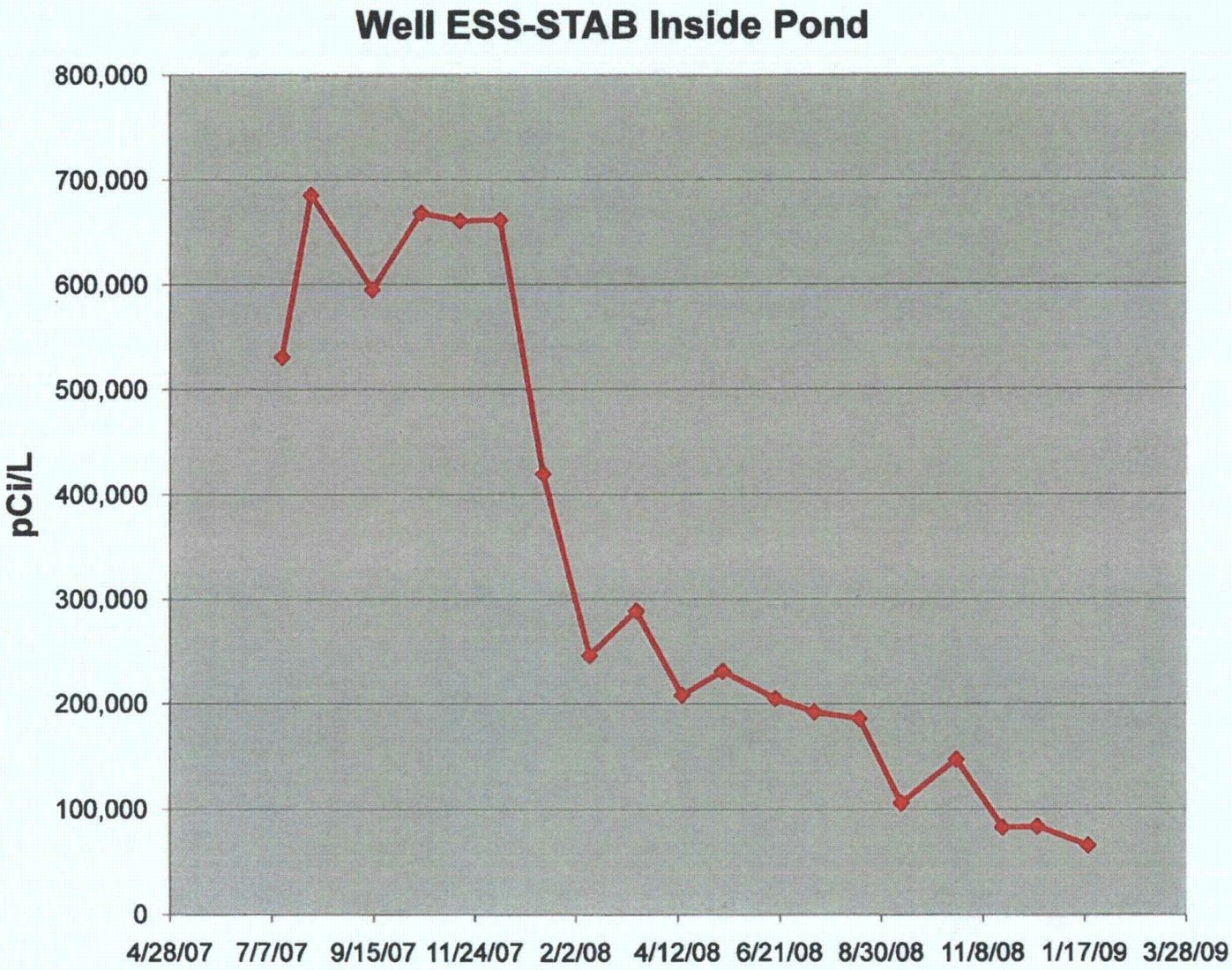
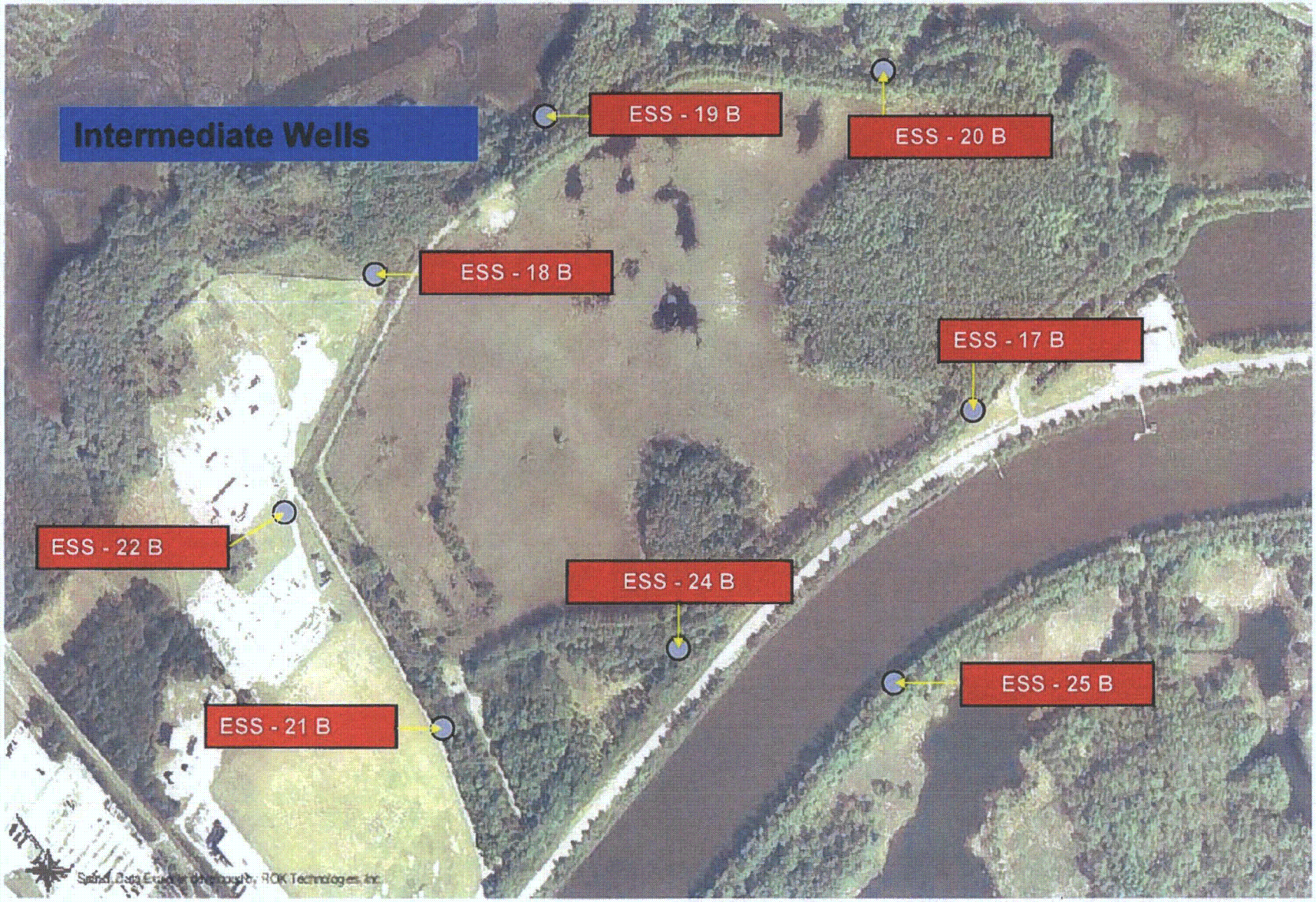


Progress Energy

Latest Shallow Well Data

Well	Well Depth (ft)	Sample Date	Sample Results (pCi/L)
ESS-17C	26	1/15/09	4,240
ESS-18C	20	1/19/09	546,400
ESS-19C	20	1/19/09	525,500
ESS-20C	20.5	1/19/09	19,000
ESS-21C	20	1/8/09	474
ESS-22C	20	1/15/09	498,400
ESS-23C	23	1/20/09	190,400
ESS-24C	18	1/15/09	4,571
ESS-25C	22	1/22/09	<LLD
ESS-26C	15	1/20/09	298,300
ESS-27C	15.5	1/20/09	268,600
ESS-28C	23	1/20/09	309
ESS-30C	15	1/15/09	1,473
ESS-31C	15	1/15/09	<LLD
ESS-STAB	31	1/19/09	65,777



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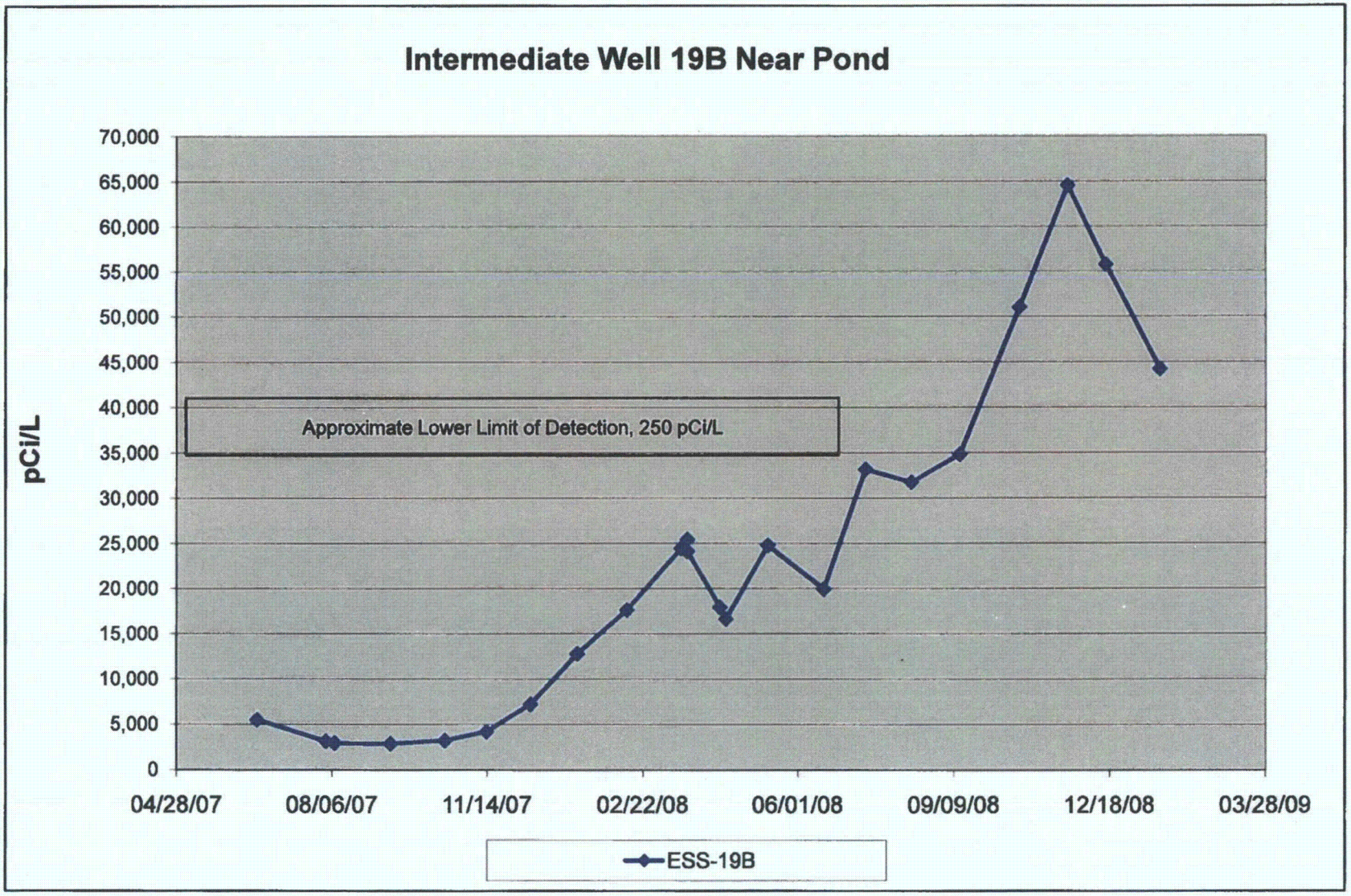
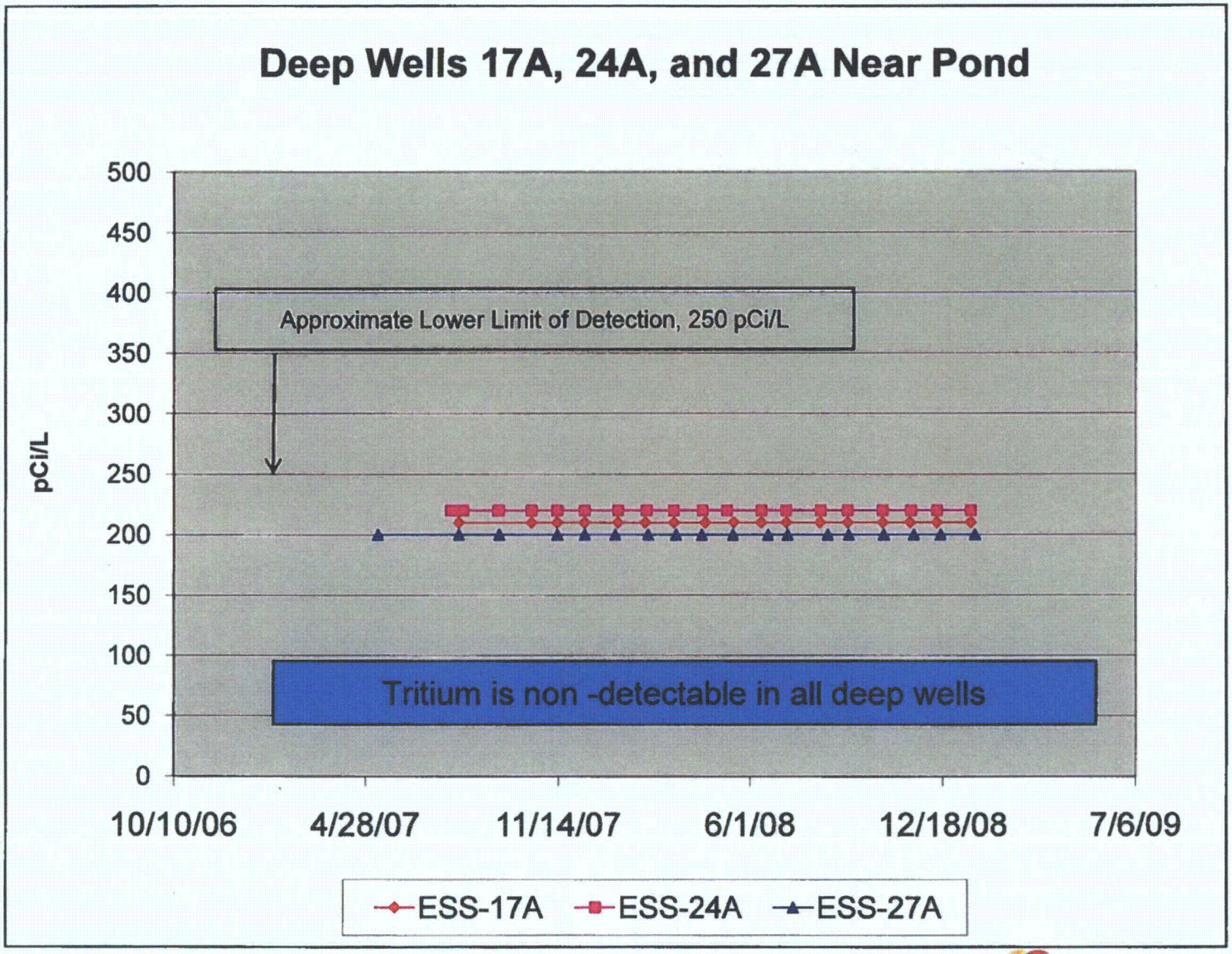


Progress Energy

Latest Intermediate Well Sample Data

Well	Well Depth (ft)	Sample Date	Sample Results (pCi/L)
ESS-17B	53	1/15/09	<LLD
ESS-18B	63	1/19/09	<LLD
ESS-19B	42	1/19/09	44,240
ESS-20B	43	11/19/09	<LLD
ESS-21B	67	1/15/09	<LLD
ESS-22B	76	1/15/09	<LLD
ESS-24B	53	1/15/09	<LLD
ESS-25B	43	1/22/09	<LLD

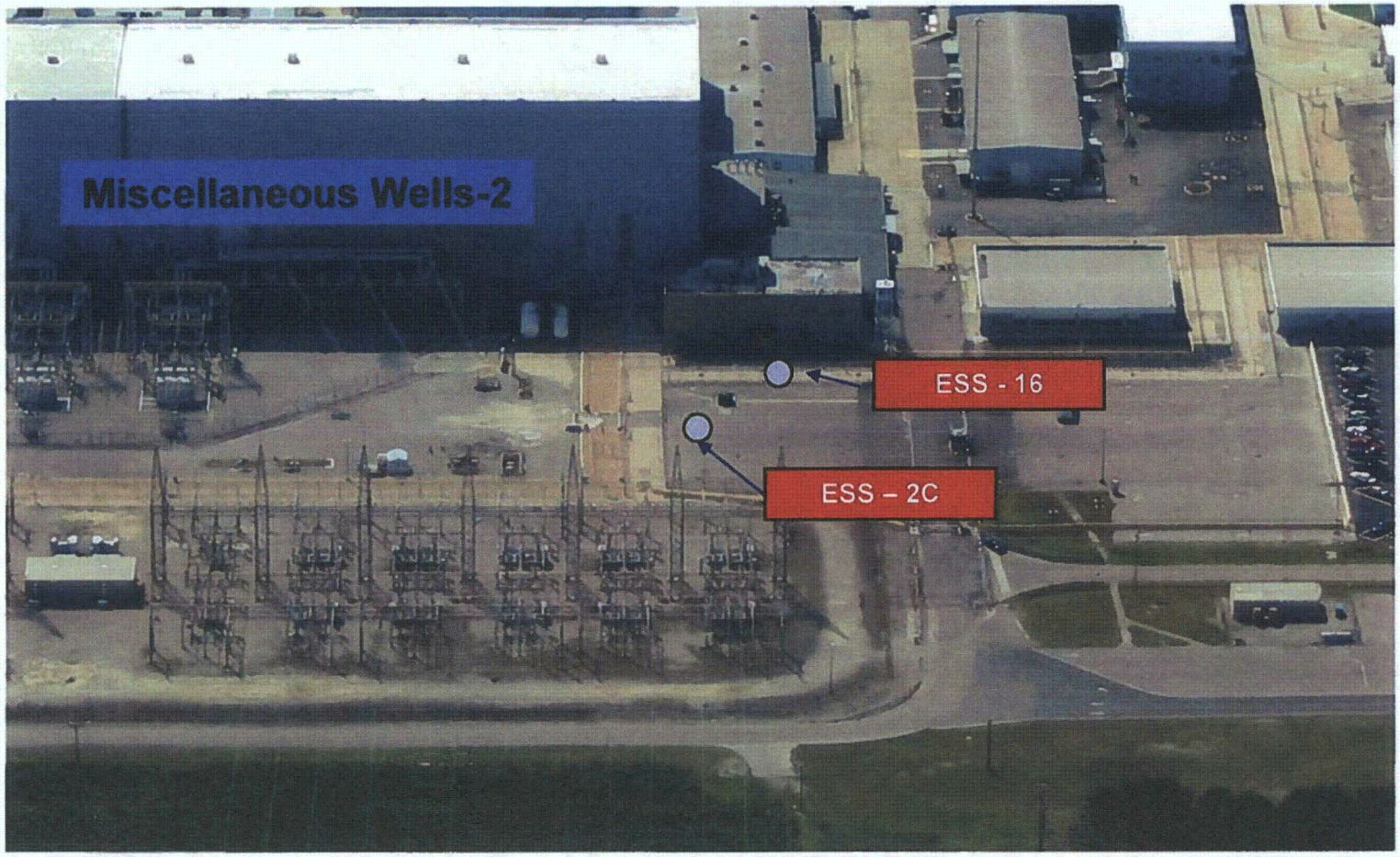
Progress Energy



Progress Energy

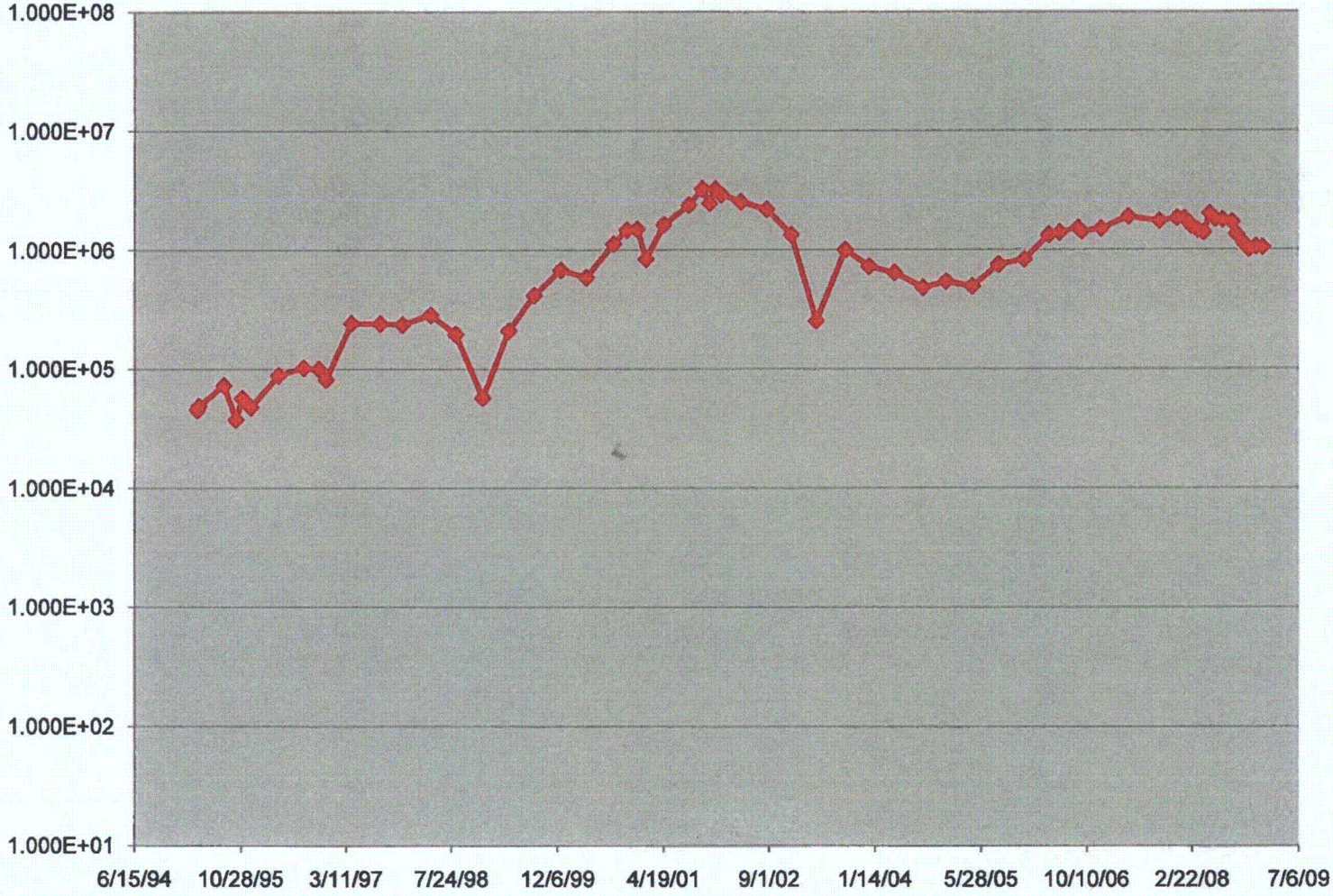
Latest Deep Well Sample Data

Well	Well Depth (ft)	Sample Date	Tritium Sample Results (pCi/L)
ESS-17A	150	1/15/09	<LLD
ESS-24A	140	1/15/09	<LLD
ESS-27A	140	1/19/09	<LLD



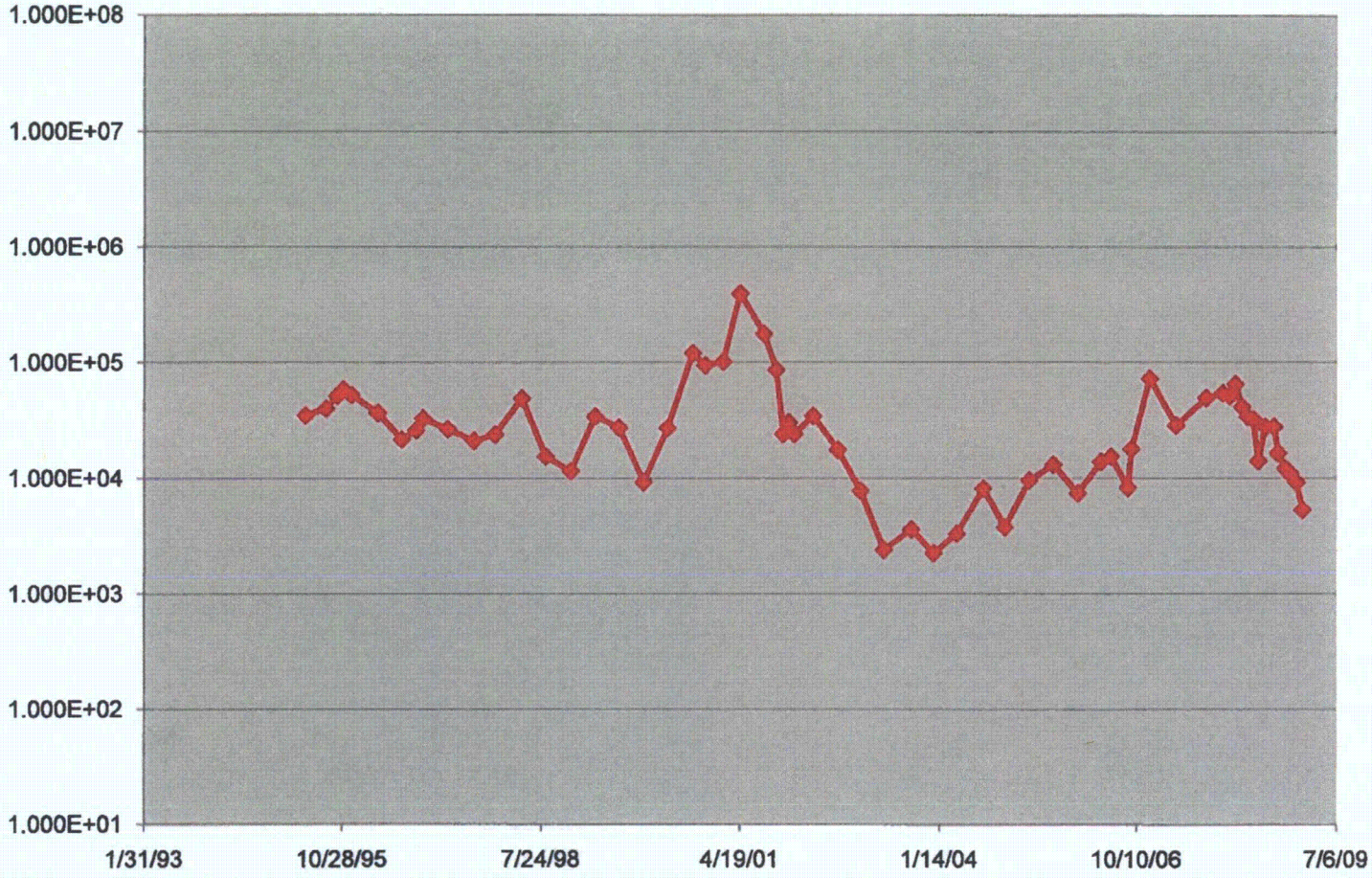
Progress Energy

Switchyard Area Wells from Historical Radwaste Line Leak, Well 2C



Progress Energy

Switchyard Area Wells from Historical Radwaste Line Leak, Well 16



Progress Energy