TECHNICAL MEMORANDUM

Date: August 5, 2011 **Project No.:** 083-82671.1

To: Bob Stafford **Company:** Progress Energy Florida

From: Ken Karably
Sam Stafford

RE: COAL COMBUSTION PRODUCT STORAGE/DISPOSAL AREA OPERATIONS, CLOSURE, AND GROUNDWATER MONITORING DATA COAL COMBUSTION PRODUCT STORAGE/DISPOSAL AREA VERTICAL EXPANSION PROGRESS ENERGY FLORIDA - CRYSTAL RIVER ENERGY COMPLEX

At the request of Progress Energy Florida, Inc. (PEF), Golder Associates Inc. (Golder) has prepared this technical memorandum documenting the Coal Combustion Product (CCP) Storage/Disposal Area current operations, proposed closure sequencing, and summary of groundwater monitoring data.

BACKGROUND

The Progress Energy Florida (PEF) Crystal River Energy Complex (CREC) CCP Storage/Disposal Area comprises a total footprint of approximately 62 acres and is located in the northeastern corner of the main portion of the CREC site (see Figure 1). Currently, the footprint is approved to a crest elevation of 80-feet above grade with side slopes of 4 horizontal to 1 vertical (4H:1V). It has a projected remaining airspace volume of approximately 1.2 million cubic yards (CY) which, at the current disposal rates (which currently net about 275,000 CY of CCPs per year taking into account CCP beneficial use), equates to about 4 years of remaining airspace. Given the extent of the downturn in the construction industry and current and anticipated general economic conditions, it is not expected that within the next 4 years that CCP beneficial use will significantly increase. However, it is possible that the CCP disposal rates may increase due to air pollution control equipment that produces less marketable ammoniated fly ash.

As a result, PEF requested that the Florida Department of Environmental Protection (FDEP) approve a vertical expansion (to 120-feet above grade) and a modified slope angle (to 3H:1V) for the CCP Storage/Disposal Area which would extend the remaining airspace by approximately 3½ years. An evaluation of the geotechnical design, stormwater management, and effect on groundwater quality of the vertical expansion and modified slope angle was included in *Supporting Technical Information, Ash Disposal Area, Proposed Vertical Expansion, Crystal River, Florida (Golder, August 25, 2010).* The evaluations performed indicate that the proposed vertical expansion is sound from a structural safety and environmental protection technical standpoint, provides optimal utilization of the current footprint, and allows PEF the time needed to site, permit, and construct a new CCP storage/disposal area, which is underway. In conjunction with this request, PEF also requested a horizontal expansion of the CCP Storage/Disposal Area along its eastern boundary, referred to as the "east sliver." FDEP approved PEF's request on June 3, 2010.

CURRENT OPERATIONS

CCPs are hauled to the CCP Storage/Disposal Area by truck then spread and compacted in-place. Within the CCP Storage/Disposal Area footprint, approximately 2 acres at the southern tip of the footprint were closed in 2008 (see Figure 2 and photographs below). Other areas on the western and northern slopes have received temporary cover in the form of soil with sod or hydroseed (grass) directly on CCPs (see photographs below). As of mid-2011, CCP disposal (consisting mostly of ammoniated fly ash) is primarily in the northern and eastern portions of the footprint. In addition, CCPs (primarily non-ammoniated fly ash) are being excavated and marketed for beneficial use from an area comprising approximately 14 acres in the south-central portion of the footprint (see Figure 3). Excavation work in this area began in 2010 and is ultimately targeting more than 500,000 CY of CCPs for beneficial use (equivalent to almost 2 years of disposal volume) and is estimated to be completed in about 2013.[1]

Southern Slope – June 2009

Northern Slope – February 2011

Western Slope – February 2011

CLOSURE PLANNING

As previously noted, current CCP disposal rates (consisting primarily of ammoniated ash)[2] are on the order of about 275,000 CY per year. At this rate, it is estimated that the eastern and northern slopes (excluding the northwest corner which PEF intends to maintain as long as possible as a wet weather disposal area) will be approximately 60-feet above grade by Summer/Fall 2012. This elevation is equivalent to the 2nd bench in the proposed final cover design submitted to the FDEP[3] and comprises a total area of approximately 15 acres. It is expected that work could begin on closure of these slopes as early as Fall 2011, assuming agency approval of the proposed vertical expansion (elevation and slope angle) can be obtained in Summer 2011. The remainder of the north and east side slopes would be closed in increments of approximately 5 acres each in 2012 and 2013 (see Figure 4).

[1] Dependent on market demand for CCPs.

[2] Ammoniated ash is currently segregated from the older, non-ammoniated ash due to its limited marketability. It is noted that there is research being conducted by the University of Florida for the Florida Department of Transportation concerning potential beneficial use alternatives for ammoniated fly ash. If that research identifies a use for these materials, it is possible that they could be removed and utilized at some point in the future.

[3] See Drawing 3 – Final Cover Plan, Ash Storage/Disposal Area Vertical Expansion Drawings, 7/22/2010 included in *Supporting Technical Information, Ash Disposal Area, Proposed Vertical Expansion, Crystal River, Florida (Golder, August 25, 2010)*.

By 2013, the reclamation activities in the south-central portion of the footprint described above should be near completion and that area (totaling approximately 14 acres) would become available for backfilling. In 2014, 2015, and 2016, closure work would be focused on the southern tip (north of the 2008 closure area), the southwestern slopes, the northwestern slopes to approximately 60-feet above-grade, and the northern and eastern slopes to the 3rd and 4th benches (90-feet to 120-feet above-grade) with a total closure area of approximately 16 acres (see Figure 4). Active disposal areas will maintain a grade sloping to the west, thus keeping run-off diverted away from the closed slopes and towards the perimeter ditch and ponds on the western side of the footprint.

Work during the projected final three years of operation (2017 through 2019) would consist of bringing the crown and western slopes to final grade and then capping them, again in increments generally on the order of 5 to 6 acres each (see Figure 4). By 2020 (again, based on the current disposal rates), it is estimated that the entire 62-acre footprint will be to final grade and capped.[4]

SUMMARY OF GROUNDWATER MONITORING DATA

Monitoring Well Network

Groundwater monitoring at CREC began in March 1980.[5] The monitoring well network included wells distributed around the site, including the CCP Storage/Disposal Area (see map below). Currently, groundwater quality is monitored at CREC via a network of monitoring wells, some of which were in the original monitoring system (see Figure 5).

The TW-series intermediate wells positioned around the perimeter of the CCP Storage/Disposal Area were installed in 2009 as part of the geotechnical and hydrogeologic site evaluation performed for the "east sliver" horizontal expansion and the proposed vertical expansion (see Figure 5). As previously mentioned, on June 3, 2010, FDEP's Siting Coordination Office approved PEF's request for a post certification amendment (date March 19, 2010) to the Site Certification Application (PA77-09) for the horizontal expansion of the CCP Storage/Disposal Area. In part, the approval required the monitoring of additional groundwater monitoring wells, designated the TW-series wells. Following installation, the TW-series intermediate wells were baseline sampled in October 2009 (TW-5 in January 2010) and then again in March/April 2011 (except TW-2 which is now a piezometer). The results of these sampling events are summarized in Table 1.

In accordance with FDEP groundwater rules, the CREC (including the CCP Storage/Disposal Area) is an "existing installation" as it was an installation reasonably expected to release contaminants into the groundwater on or before July 1, 1982, and it operated consistenly with statutes and rules relating to groundwater discharges in effect at the time. As an "existing installation", the CREC's zone of discharge (ZOD) extend's to the CREC's property boundary. Pursuant to Rule 62-520.420(4), F.A.C., primary and secondary drinking water standards do not apply within a ZOD. Moreover, as an "existing installation", the CREC is exempt from having to comply with secondary drinking water standards, unless FDEP determines that compliance with one or more secondary drinking water standards, is necessary to protect groundwater used or reasonably likely to be used as a possible water source. See Rule 62-520.520(1), F.A.C.

[4] The airspace consumption rates, closure timing, and remaining life estimates are based on current disposal (and CCP beneficial use marketing) rates. Actual disposal rates may vary. Via an Annual Report, PEF will keep the Department apprised of these variables. It is proposed that the Annual Report would summarize remaining and consumed airspace, closure work completed the previous year, closure planned for the coming year, a report on the condition and maintenance of the cover in the closed areas, and the results of groundwater monitoring at the site.

[5] Reference Page 1-1, *Final Report – Zone of Discharge Analysis, Crystal River Units 4 and 5, Ash Storage Area (Environmental Science and Engineering, Inc., February 26, 1982)*.

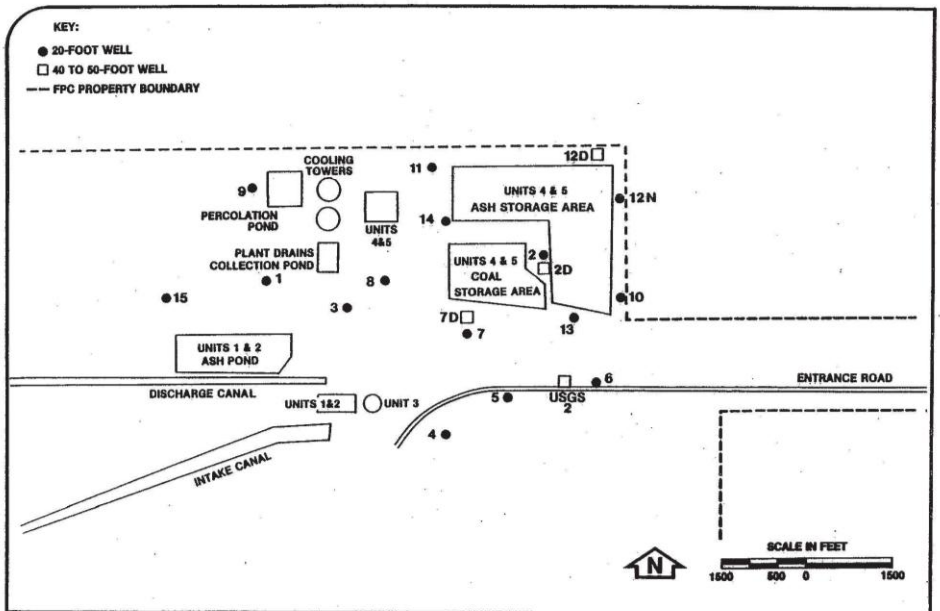


Figure 4-1
MONITOR WELL LOCATIONS

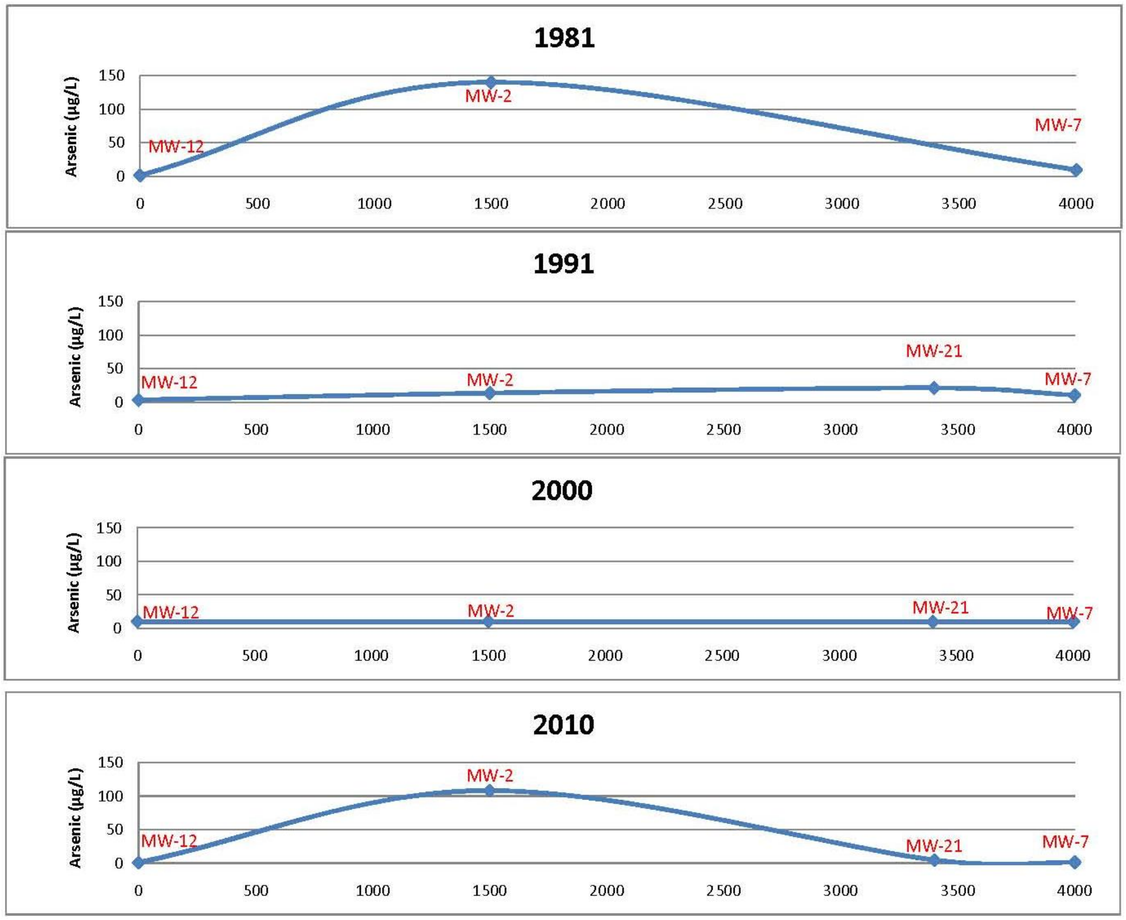
SOURCE: ESE, 1981.

FLORIDA POWER CORPORATION
CRYSTAL RIVER UNITS 4 & 5
ZONE OF DISCHARGE ANALYSIS

Historical Arsenic Groundwater Data

As presented in the Supporting Technical Information, Ash Disposal Area, Proposed Vertical Expansion, Crystal River, Florida (Golder, August 25, 2010), arsenic was the constituent that had the most commonly reported exceedance of its primary drinking water standard (PDWS) in the historical groundwater monitoring data from on-site (MW-series) wells and from leach testing of CCPs (ECT, 2008). Historical concentrations of arsenic in the vicinity of the CCP Storage/Disposal Area in the MW-series wells has ranged from 0.5 to 310 µg/L with an average concentration of 17.0 µg/L (May 1997 to April 2011 data). The SPLP concentrations of arsenic in CCPs disposed of in the CCP Storage/Disposal Area ranged from 4.7 to 130 µg/L, with a geometric mean concentration of 21.5 µg/L (data from ECT, 2008 – see summary in attached Table 2).

In the baseline samples of the TW-series wells (2009 and 2010), arsenic was not detected above concentrations of 0.0085 mg/L. In the March 2011 sampling event (following installation of TW-1R and TW2R), arsenic was detected above the PDWS in TW-1R (0.043 mg/L), TW-3 (0.021 mg/L), TW-4 (0.019 mg/L), and TW-5 (0.054 mg/L). In April 2011, the TW-series wells were added to the routine quarterly sampling program at the site and arsenic was detected above the PDWS in TW-1R (0.026 mg/L), TW-5 (0.029 mg/L), and MW-2R2 (0.076 mg/L). It is noted that these concentrations are all within the historical range observed at the site. A plot of arsenic concentrations vs. distance in approximately 10-year intervals across the footprint of the CCP Storage/Disposal Area and downgradient (MW-12, MW-2, MW-21, and MW-7 - see Figure 5 for locations) illustrates this variability of arsenic values, with the 1981 (pre-disposal) profile being very similar to the 2010 profile.



Given that the historical data indicate that elevated arsenic levels were present in the area prior to the initiation of CCP storage/disposal and that the concentrations of arsenic in groundwater are higher than those observed in the CCPs that were SPLP tested, there does not appear to be a discernable impact to groundwater quality at the site from the operation of the CCP Storage/Disposal Area. As outlined in the Response to FDEP's RAI No. 1 dated October 11, 2010 (Golder, December 2010), HELP modeling predicts that the proposed modified configuration with steeper side-slopes and a smaller crown area should have a lower pre-closure infiltration rate than the currently permitted configuration. Thus, the proposed modified configuration could actually provide some benefit from a groundwater quality standpoint. In either case, the rate of infiltration through the waste predicted by the HELP model is very low, only about 34,000 cubic feet per year (0.5 gallons per minute).

Historical Gross Alpha Groundwater Data

Historically, gross alpha concentrations in groundwater appear erratic and have exceeded the PDWS at times in MWI-2R2, MWC-12R (background well), and MWC-21R. It is noted that the SPLP results of CCPs did not exceed PDWS for gross alpha and that the concentrations of gross alpha observed in the groundwater data have been higher than those observed in SPLP results for the CCPs. As such, the elevated levels of gross alpha in groundwater do not appear to correlate with the operation of the CCP Storage/Disposal Area.

Historical Sodium Groundwater Data

Besides arsenic and gross alpha, the other PDWS constituent that has been detected in excess of its standard in the vicinity of the CCP Storage/Disposal area has been sodium. Site studies conducted prior to the initiation of CCP storage/disposal (ESE, 1982) indicated that the saltwater interface extends onto the site[6] resulting in poor groundwater quality conditions. Given these conditions, there are no current or planned consumptive use wells at the site or areas downgradient of the site that could be used for drinking water. PEF obtains the majority of its supply water from a production well field located approximately 3.5 miles inland of the site. Information reviewed from Citrus County and the Southwest Florida Water Management District indicates that no future groundwater supply development is planned in the vicinity of the site (Geosyntec, August 2010). As a result of the foregoing and pursuant to Chapter 62-520, F.A.C., PEF requested and FDEP subsequently granted a facility-wide exemption for the CREC from the primary water quality standard for sodium on January 28, 2011.

Other Groundwater Constituents

During a conference call between PEF and FDEP on June 16, 2011, ammonia, boron, chloride, iron, molybdenum, and total dissolved solids (TDS) were mentioned by FDEP as possibly being additional constituents of concern. The following summarizes our observations about the available data for each of these constituents.

<u>Ammonia</u> - Ammonia has not been sampled for MW-series wells other than in 2011 and ammonia has exceeded the Groundwater Guidance Concentration (GWGC) of 2.8 mg/L only on two occasions, once in TW-4 and once in TW-5. There is not any SPLP data for ammonia and it has not been identified as a routine groundwater monitoring parameter.

<u>Boron</u> - Boron has been sampled for in TW-series wells and only in MW-series wells since 2010. Boron has exceeded the Groundwater Guidance Concentration (GWGC) of 1.4 mg/L in samples collected from TW-5 and MWI-2R2. Boron concentrations in groundwater samples collected from both TW-5 and MWI-2R2 exceeded the maximum SPLP result for CCPs (Fly Ash) of 1.7 mg/L. As the groundwater concentrations were greater than SPLP results, it is possible that the boron detected in groundwater may be reflective of other factors (such as natural ambient (background) groundwater conditions).

<u>Chloride</u> – Average SPLP results for chloride did not exceed the SDWS. The only exceedances of the SDWS for chloride in the SPLP testing were for samples of the chloride ash from the Inactive North Ash Pond. As the surficial aquifer is tidally influenced at CREC, the presence of chloride in groundwater is not unexpected (also see discussion regarding sodium above).

<u>Iron</u> – There is only limited SPLP data for iron in fly ash (one sample). However, average concentrations for iron in the other CCPs analyzed were all less than0.6 mg/L whereas, the groundwater concentrations noted in the groundwater samples collected in 2010-2011 (see Table 1) were mostly greater than 1 mg/L. We note that iron concentrations were reported as being greater than 1 mg/L in sampling that predated the CCP Storage/Disposal area (24.4 mg/L in MW-2)[7] and that iron is a common constituent in surficial aquifer systems in Florida.

<u>Molybdenum</u> – Average SPLP results for molybdenum in the fly ash samples did exceed the GWGC. Molybdenum has been analyzed for in groundwater samples collected from MW-series wells from May 1997 to January 2007 (with no exceedances of the GWGC) and in 2011 as well as in groundwater samples collected from TW-series wells from 2009 to 2011. Molybdenum has exceeded the GWGC of 35 micrograms per liter (μg/L) in groundwater samples collected from TW-3 (March 2011 and April 2011), TW-5 (April 2011), and MW-2R2 (April 2011).

<u>Total Dissolved Solids (TDS)</u> – Average SPLP results for TDS did not exceed the SDWS. As the surficial aquifer is tidally influenced at CREC, the presence of TDS in groundwater is not unexpected (also see discussion regarding sodium above).

[6] Sodium Evaluation for a Water Quality Criteria Exemption, Crystal River Energy Complex, Crystal River, Florida, Geosyntec Consultants, August 2010 and Proposed Ground Water Monitoring Plan for Crystal River Power Plant, Florida Power Corporation, Environmental Science and Engineering, Inc., February 1984.

[7] Reference: Baseline Hydrology Study for Crystal River Units 4 and 5 Ash Landfill (ESE, 1981).

There is only a limited amount of data (both recent and historical) available for molybdenum, boron, and ammonia. Additional groundwater monitoring data would be needed to identify groundwater concentration trends for these constituents. However as stated previously, given: (1) the generally poor quality of groundwater found at the site (groundwater transitions to brackish and saltwater downgradient of the CCP Storage/Disposal Area); and (2) that there are no areas downgradient from the CCP Storage/Disposal Area that will be developed for drinking water purposes, we do not feel these groundwater constituents warrant additional consideration.

SUMMARY

PEF is requesting that FDEP approve its application for a vertical expansion of the CCP Storage/Disposal Area at the CREC without an interface liner, with increased slope angle from 4H:1V to 3H:1V and increased height from 80 to 120 feet above grade. The requested vertical expansion will provide approximately 3½ years of additional airspace at the current consumption rate. This additional airspace (approximately 1 million cubic yards) equates to an average of approximately 10 feet of additional byproduct over the 60-acre footprint.

Groundwater monitoring data collected over a period of about 30 years indicates that the most common significant exceedances of PDWS constituents at the site have been arsenic and sodium. As outlined above, the presence of elevated arsenic concentrations pre-dates the CCP storage/disposal. In addition, extensive leach testing of the CCPs managed at the site did not detect any constituents that both: (a) leached in excess of the primary drinking water standard and (b) were not also naturally present in the aquifer (such as arsenic) above PDWS.

The HELP model runs included in the December 2010 response to FDEP's request for additional information indicated that: (1) HELP model estimates of post-closure infiltration through the CCPs over the entire footprint are very low (about 0.5 gallons per minute) and (2) that infiltration will actually be slightly lower (by about 2.5%) with the vertical expansion configuration as compared to the currently approved configuration.

Given the historical groundwater quality data and CCP leach data, the estimated very low post-closure infiltration rates, and the expected short timeframe of operation for the proposed vertical expansion (approximately 3½ years), the benefit of an interface liner would be limited while the associated cost would be significant. The cost of a composite interface liner with leachate collection system and associated enhanced cap system (required to be less than or equal to the permeability of the interface liner) could be on the order of $30M over the 60-acre footprint[8] as compared to a total capital cost of approximately $6M to $9M to cap the footprint with a single liner cap as approved by FDEP for closure at the south end of the footprint. Additionally, the installation of an interface liner with leachate collection layer, would consume 2 feet of the roughly 10 feet average (over 60-acres) of additional airspace gained from the proposed vertical expansion, effectively reducing the amount of airspace gained from the vertical expansion by approximately 20%.

For the aforementioned technical reasons coupled with the facility's closure sequencing plan, Golder is of the opinion that the installation of an interface liner is unnecessary and that the environmental benefit of an interface liner would be minimal and not proportional to the cost of installation and the loss of the associated storage space.

[8] Not including re-grading work that would be required to establish the leachate collection system or the loss of airspace associated with the construction of the leachate collection system itself (equivalent to approximately 2 feet over the 60-acre footprint or about 20% of the gross airspace that would be gained by the vertical expansion).

GOLDER ASSOCIATES INC.

Samuel F. Stafford
Project Engineer

Kenneth B. Karably, PE
Principal
Florida Professional Engineer No. 42366

Date: 8/5/2011

KENNETH B. KARABLY
LICENSE
No. 42366
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

Attachments: Table 1 - Summary of TW-Wells Sampling Results
Table 2 - Summary of Ash Storage/Disposal Area SPLP Data
Figure 1 - Site Location Map
Figure 2 - Site Layout
Figure 3 - CCP Excavation Area
Figure 4 - Preliminary Closure Sequencing
Figure 5 - Ash Storage/Disposal Area Monitoring Well Location Map

KBK/SFS

FN: G:\Projects\083\083-82\083-82671\083-82671.1 (Vertical Expansion)\RAI #2\Technical Memo - CREC Narrative (08.05.2011).docx

Table 1

Summary of CCP Storage/Disposal Area Wells Sampling Results

Crystal River Energy Complex
Crystal River, Florida

Parameter	Units	Standard/ GWGC	TW-1	TW-1R		TW-2	TW-3			TW-4			TW-5			MWI-2R2		MWC-12R	
			10/22/09	03/28/11	04/12/11	10/22/09	10/22/09	03/28/11	04/12/11	10/22/09	03/28/11	04/12/11	01/19/10	03/28/11	04/12/11	03/28/11	04/12/11	03/28/11	04/12/11
Aluminum	mg/L	0.2 SDWS	0.061 U	0.061 U	0.11 I	0.061 U	0.061 U	0.061 U	0.13 I	0.061 U	0.061 U	0.10 I	0.061 U	0.061 U	0.14 I	0.061 U	0.11 I	0.061 U	0.070 I
Antimony	µg/L	6 PDWS	1.0	0.17 I	0.13 U	0.30 I	3.0	0.39 I	0.13 U	0.57 I	0.17 I	0.13 U	0.10 I	0.17 I	0.13 U	0.24 I	0.29 I	0.34 I	0.29 I
Arsenic	mg/L	0.010 PDWS	0.0085 U	0.043	0.026	0.0085 U	0.0085 U	0.021	0.0087	0.0085 U	0.019	0.0067	0.0085 U	0.0540	0.029	0.14	0.076	0.0085 U	0.00093 U
Barium	mg/L	2 PDWS	0.014	0.026	0.032 I	0.15	0.019	0.011	0.011 I	0.024	0.031	0.026 I	0.062	0.058	0.058 I	0.12	0.11	0.0067	0.0056 I
Beryllium	mg/L	0.004 PDWS	0.00013 U	0.00013 U	0.00010 U	0.00013 U	0.00013 U	0.00013 U	0.00010 U	0.00013 U	0.00013 U	0.00016 I	0.00013 U	0.00013 I	0.00010 U	0.00013 U	0.00010 U	0.00013 U	0.00011 I
Boron	mg/L	1.4 GWGC	0.99 V	1.0	1.0	1.1 V	0.90 V	0.99	1.0	0.31 V	0.33	0.35	7.5	2.3	2.2	1.5	1.5	0.080	0.092 I
Cadmium	mg/L	0.01 PDWS	0.00032 U	0.00032 U	0.00027 U	0.00032 U	0.00032 U	0.00032 U	0.00027 U	0.00032 U	0.00032 U	0.00027 U	0.00062	0.00032 U	0.00027 U	0.00032 U	0.00027 U	0.00032 U	0.00027 U
Chromium	mg/L	0.1 PDWS	0.00050 U	0.00050 U	0.00045 I	0.00050 U	0.00050 U	0.00055	0.0012 I	0.00050 U	0.00050 U	0.00067 I	0.00077 I	0.00050 U	0.00054 I	0.00050 U	0.00035 U	0.00050 U	0.00040 I
Copper	mg/L	1 SDWS	0.0025 U	0.0037 I	0.0005 I	0.0025 U	0.0025 U	0.0025 U	0.00071	0.0025 U	0.0025 U	0.00042 I	0.0025 U	0.0025 U	0.0012	0.0025 U	0.00066	0.0025 U	0.00029 I
Iron	mg/L	0.3 SDWS	0.038 U	1.1	1.0	2.9	0.19 I	0.60	1.2	0.045 I	2.2	2.1	11	7.5	6.6	2.2	2.1	0.038 U	0.020 U
Lead	mg/L	0.02 PDWS	0.0013 U	0.0013 U	0.0003 U	0.0013 U	0.0013 U	0.0013 U	0.00025 U	0.0013 U	0.0013 U	0.00025 U	0.0013 U	0.0013 U	0.00025 U	0.0013 U	0.0003 U	0.0013 U	0.00025 U
Manganese	mg/L	0.05 SDWS	NS	0.029	0.019	NS	NS	0.039	0.034	NS	0.031	0.028	NS	0.22	0.20	0.13	0.12	0.0035	0.0038 I
Mercury	mg/L	0.002 PDWS	0.000014 U	0.000014 U	0.000100 U	0.000014 U	0.000014 U	0.000014 U	0.000100 U	0.000014 U	0.000014 U	0.000100 U	0.000014 U	0.000014 U	0.000100 U	0.000014 U	0.000100 U	0.000014 U	0.000100 U
Molybdenum	mg/L	0.035 GWGC	0.0041 U	0.010	0.032	0.0041 U	0.027	0.051	0.091	0.0041 U	0.0041 U	0.020	0.0041 U	0.031	0.057	0.024	0.047	0.0041 U	0.020
Nickel	mg/L	0.1 PDWS	0.0011 U	0.0011 U	0.0045 I	0.0011 U	0.0011 U	0.0011 U	0.0052	0.0011 U	0.0011 U	0.0059	0.0011 U	0.0011 U	0.0061	0.0011 U	0.0038 I	0.0011 U	0.0034 I
Selenium	mg/L	0.05 PDWS	0.0068 U	0.0068 U	0.0069	0.0068 U	0.0068 U	0.0068 U	0.0013 I	0.0068 U	0.0068 U	0.0054	0.0068 U	0.0068 U	0.0026 I	0.0068 U	0.0028 I	0.0068 U	0.0014 I
Silver	mg/L	0.1 SDWS	NS	0.00044 U	0.000069 U	NS	NS	0.00044 U	0.000069 U	NS	0.00044 U	0.000069 U	NS	0.00044 U	0.000069 U	0.00044 U	0.000069 U	0.00044 U	0.000069 U
Sodium	mg/L	160 PDWS	170	170	170	120	53	24	21	100	120	120	130	67	72	60	63	36	29
Strontium	mg/L	4.2 GWGC	NS	0.56	0.55	NS	NS	0.44	0.37	NS	0.41	0.35	NS	0.98	0.86	0.91	0.76	0.13 I	0.12
Thallium	µg/L	2 PDWS	0.26	0.067 U	0.24 U	0.076 I	0.085 I	0.067 U	0.24 U	2.0	0.067 U	0.24 U	0.067 U	0.067 U	0.24 U	0.21	0.24 U	0.20	0.24 U
Vanadium	mg/L	0.049 GWGC	0.0023	0.00068 I	0.01 U	0.00081 I	0.0059	0.00018 U	0.010 U	0.0025	0.00025 I	0.010 U	0.0011 I	0.00042 I	0.010 U	0.00018 U	0.010 U	0.030	0.020
Zinc	mg/L	5 SDWS	0.016	0.0087 I	0.0032 I	0.015	0.015	0.011	0.013	0.016	0.0098 I	0.0059	0.014	0.0059 I	0.015	0.0090 I	0.0033 I	0.0087 I	0.0042 I
Gross Alpha	pCi/L	15.00 PDWS	3.5 U	6.4±1.3	13±4.3	5.1	4.6	4.5±0.8	15±5.3	3.4 U	4.0±1.2	14±3.6	9.9	20.9±1.3	25±6.2	11.6±1.3	20±5.1	2.8±0.6	5.9±3
Ammonia	mg/L	2.8 GWGC	0.010 U	0.39	NS	0.58	0.010 U	0.49	NS	1.0	5.7	NS	8.6	1.8	NS	0.14	NS	0.027 I	NS
Chloride	mg/L	250 SDWS	350	320	300	240	95	34	30	220	240	230	160	74	69	64	63	71	66
Fluoride	mg/L	4.0 PDWS	0.063 I	0.17 U	0.12	0.13 I	0.092 I	0.17 U	0.11	0.064 I	0.17 U	0.074 I	2.2	0.17 U	0.17	0.33	0.47	0.17 U	0.078 I
Nitrate	mg/L	10 PDWS	0.048 U	0.055 U	0.02 U	0.05 U	0.05 U	0.06 U	0.02 U	0.048 U	0.055 U	0.02 U	0.055 U	0.055 U	0.2 U	0.055 U	0.02 U	0.055 U	0.03 I
Sulfate	mg/L	250 SDWS	150	150	NS	81	130	170	NS	51	38	NS	210	370	NS	240	NS	15 U	NS
Total Dissolved Solids	mg/L	500 SDWS	810	1000	960	880	630	560	520	850	880	850	1100	1100	1000	810	750	380	360
pH	SU	6.5-8.5 SDWS	7.08	7.13	7.5	6.91	7.12	7.02	7.4	6.75	6.78	7.1	6.62	6.77	7.1	7.02	7.4	7.15	7.5
Conductivity	µS/cm		1673	1743	1651	1383	947	867	784	1426	1557	1480	1741	1463	1391	1148	1103	713	658
Dissolved Oxygen	mg/L		0.97	2.24	0.2	0.39	0.35	0.21	0.5	0.85	0.18	0.4	0.21	0.14	0.2	0.11	0.6	0.77	0.1
ORP	--		131.6	-30.1	NM	-305	63.1	-17.4	NM	125.4	-72.9	NM	1.4	-65.8	NM	-38.1	NM	209.3	NM
Temperature	°C		29.0	21.8	22.3	26.3	24.8	20.7	21.9	26.2	21.0	23.2	22.2	20.6	22.5	20.4	22.1	20.4	22.1
Turbidity	NTU		9.41	16.0	4.0	4.94	5.72	2.2	16	13.3	11.8	6.5	2.71	1.47	12	12.3	6.4	1.43	1.8

Notes:

Samples were collected on dates shown (except 4/12/11) by Golder Associates Inc. and were analyzed by Advanced Environmental Laboratories, Inc. (AEL) except for radionuclides which were analyzed for by Florida Radiochemistry Services, Inc.

Samples collected on 4/12/11 by Southern Analytical Laboratories, Inc. (SAL) and were analyzed by SAL.

PDWS = Primary Drinking Water Standard per FAC 62-550

SDWS = Secondary Drinking Water Standardper FAC 62-550

GWGC = Groundwater Guidance Concentration per FAC 62-777

PDWS Exceedance =

SDWS Exceedance =

GWGC Exceedance =

Table 2

Summary of CCP Storage/Disposal Area SPLP Data

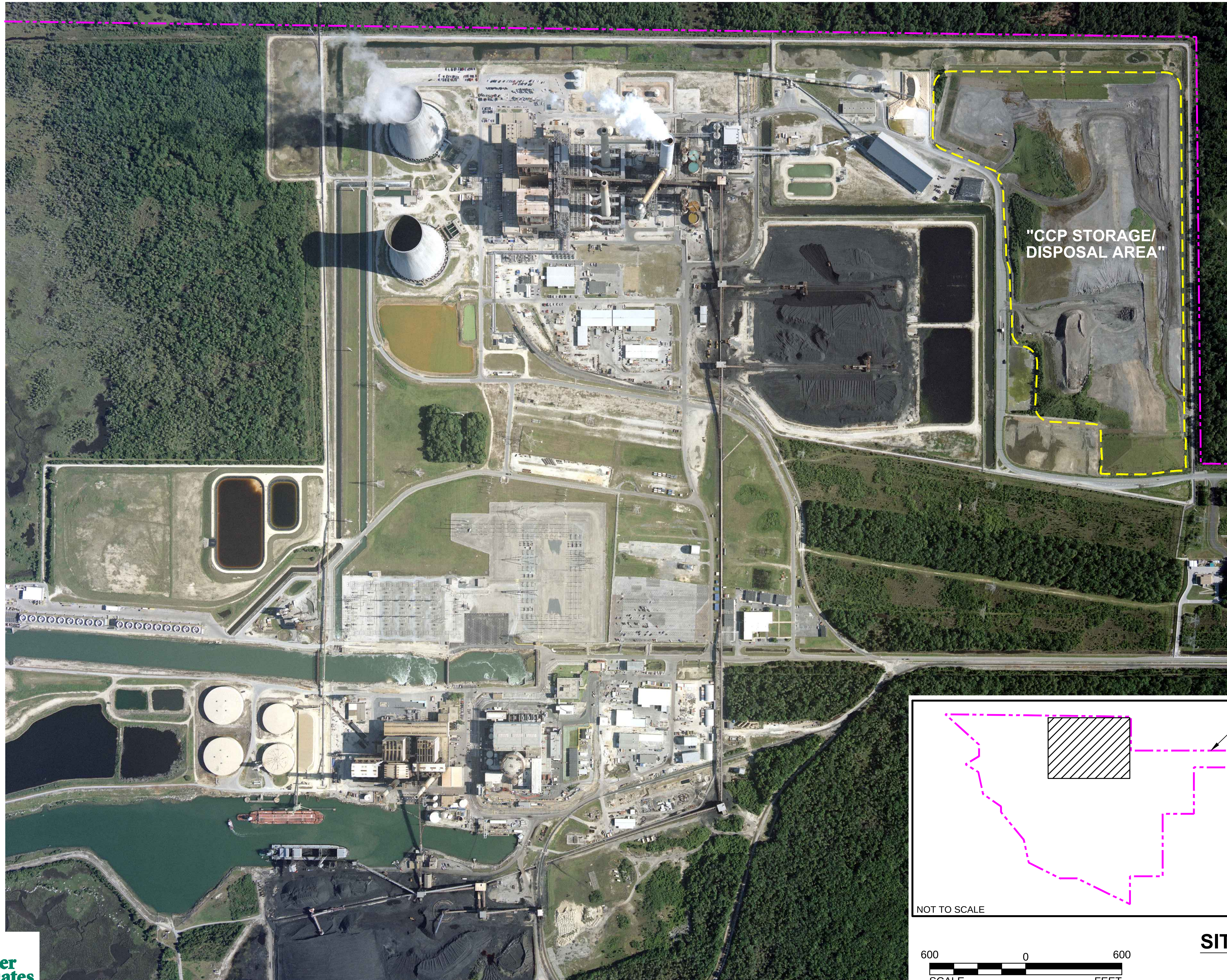
Crystal River Energy Complex
Crystal River, Florida

Analyte	Standard/ GWGC	Units	SPLP RESULTS OF ASH PILE (ECT, 2008)											
			(BAC) - Bottom Ash (1,2)		(BAMR) - Bottom Ash (4,5)		(DSP) - Dredge Spoils/ Comingled Materials		(FAC) - Fly Ash (1,2,4,5)		(INAP) - Inactive Ash Pond (Chloride Ash)		Aardelite Material	
			MAX	AVERAGE	MAX	AVERAGE	MAX	AVERAGE	MAX	AVERAGE	MAX	AVERAGE	MAX	AVERAGE
Aluminum	0.2 SDWS	mg/L	**0.547**	**0.433**	**5.49**	**1.293**	**3.85**	**0.416**	**7.39**	**2.208**	**2.49**	**0.596**	**1.68**	**1.27**
Antimony	0.006 PDWS	mg/L	0.001	0.001	0.002	0.0013	**0.011**	0.003	**0.027**	**0.014**	**0.036**	0.006	0.002	0.002
Arsenic	0.010 PDWS	mg/L	**0.050**	**0.020**	**0.0244**	**0.0119**	**0.0665**	**0.012**	**0.0861**	**0.0426**	**0.13**	**0.061**	**0.0273**	**0.023**
Barium	2.0 PDWS	mg/L	0.217	0.061	0.016	0.011	0.061	0.016	0.341	0.119	0.131	0.036	ND	ND
Beryllium	0.004 PDWS	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0.0017	0.0007	ND	ND
Boron	1.4 GWGC	mg/L	0.148	0.071	0.111	0.056	0.398	0.163	**1.7**	0.855	0.429	0.1088	0.439	0.375
Cadmium	0.005 PDWS	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloride	250 SDWS	mg/L	2.1	1.9	2.6	2.05	210	79.7	96	12.2	**1400**	77.7	2.2V	2.1V
Chromium	0.100 PDWS	mg/L	ND	ND	0.007	0.003	ND	ND	0.128	0.0638	0.0040	0.0030	ND	ND
Copper	1.0 SDWS	mg/L	ND	ND	0.0053	0.0041	0.115	0.011	ND	ND	ND	ND	ND	ND
Flouride	2.0 SDWS	mg/L	0.5	0.111	0.3	0.122	0.73	0.404	0.63	0.38	0.91	0.29	0.1	0.09
Gross Alpha	15 PDWS	pCi/L	0.5	0.4	2.3	0.7	4.6	1.6	6.4	1.2	5.0	1.3	0.4	0.3
Iron	0.3 SDWS	mg/L	0.258	0.1044	**1.29**	**0.53**	**3.55**	0.2308	0.0681	0.0681	**6.37**	**0.54**	ND	ND
Manganese	0.05 SDWS	mg/L	0.0027	0.00095	0.0046	0.0019	0.0116	0.0025	0.0051	0.0011	**0.72**	0.0446	0.0004	0.0003
Mercury	0.002 PDWS	mg/L	ND	ND	ND	ND	0.00002	0.00001	0.00002	0.00001	0.00010	0.00002	ND	ND
Molybdenum	0.035 GWGC	mg/L	0.0183	0.0072	0.01	0.0029	**0.0376**	0.0155	**0.738**	**0.239**	0.0277	0.0080	0.015	0.0118
Nickel	0.1 PDWS	mg/L	ND	ND	0.002	0.002	0.0226	0.0066	0.0029	0.0029	0.0229	0.0229	0.002U	0.002U
Nitrate as N	10 PDWS	mg/L	0.29	0.26	0.32	0.27	1.00	0.36	0.36	0.24	1.6	0.39	0.32	0.26
Selenium	0.05 PDWS	mg/L	0.02	0.011	0.008	0.006	0.043	0.011	**0.137**	**0.071**	**0.295**	**0.078**	0.010	0.009
Sodium	160 PDWS	mg/L	5.95	5.54	10.4	6.03	152	71.2	58.5	16.8	**823**	52.4	7	7.3
Strontium	4.2 GWGC	mg/L	0.279	0.115	0.205	0.057	0.452	0.189	1.52	0.659	0.369	0.1219	0.0684	0.0641
Sulfate	250 SDWS	mg/L	70	11.62	7.5	3.63	210	85.7	**1100**	141.2	210	21.6	10	8.4
Thallium	0.002 PDWS	mg/L	ND	ND	ND	ND	0.002	0.001	0.001	0.0005	**0.003**	0.002	0.0002U	0.0002U
Total Dissolved Solids	500 SDWS	mg/L	170	84	150	89	**590**	331	**1700**	298	**2300**	223	78	74
Vanadium	0.049 GWGC	mg/L	0.0453	0.0210	0.048	0.0170	0.18	0.034	**2.01**	**0.204**	**0.734**	**0.132**	0.0489	0.0413
Zinc	5.0 SDWS	mg/L	0.0273	0.0072	0.0077	0.0051	0.0153	0.0060	0.0052	0.0039	0.0357	0.00795	0.004	0.004

Notes:
ND = All samples for constituent were below the method detection limit (MDL).
Undetected constituents were calculated at 1/2 of MDL for SPLP result maximum and average calculations unless all results were undetected (ND).

Primary Drinking Water Standard (PDWS) (FAC 62-550) =
Secondary Drinking Water Standard (SDWS) (FAC 62-550) =
Groundwater Guidance Concentration (GWGC) (FAC 62-777) =

REFERENCE: Coal Combustion Product/Solid Materials Sampling Report, Crystal River Power Plant, Crystal River, Citrus County, Florida (ECT, March 2008)



LEGEND

PROPERTY BOUNDARY

CCP STORAGE/ DISPOSAL AREA FOOTPRINT

REFERENCE

AERIAL PHOTOGRAPH FROM GEODETIC SERVICES SOUTH, INC, DATED APRIL 26, 2011

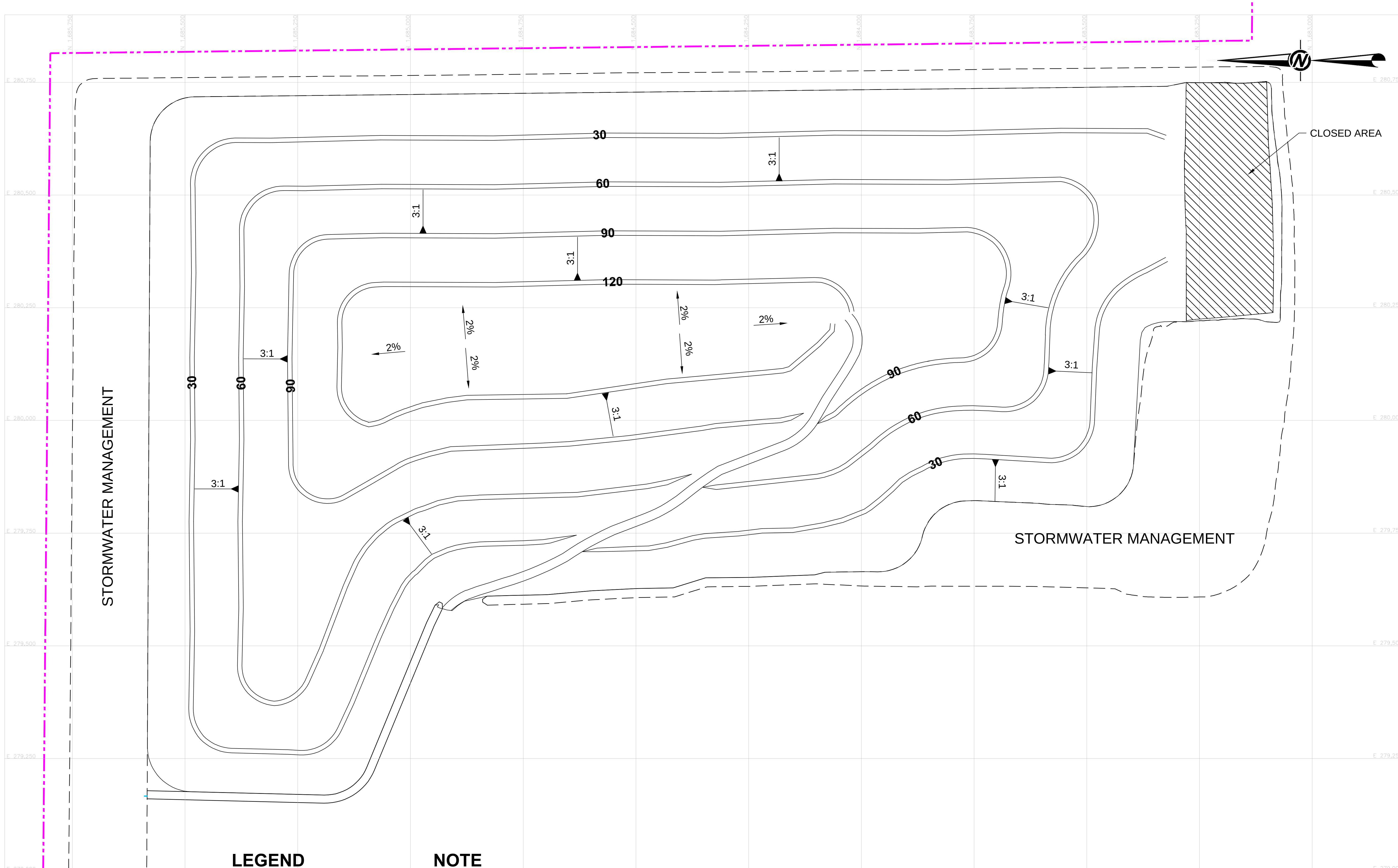
600 0 600
SCALE FEET

SITE LOCATION MAP

FIGURE 1

Golder Associates

N:\File\2008\083-82671   PEF Crystal River CCPIT - FDEP Presentation\Active Drawings\08382671-T001.dwg | Layout: TB-PS-B | Modified: blucero 8/4/2011 1:21 PM | Plotted: blucero 8/5/2011 2:21 PM | Jacksonville, FL



LEGEND

PROPERTY BOUNDARY

NOTE

FINAL COVER DESIGN BASED ON 3H:1V SIDESLOPES TO A CROWN ELEVATION OF 120 FEET ABOVE GRADE.

200 0 200
SCALE FEET

Golder Associates

SITE LAYOUT

FIGURE 2

N:\File\2008\083-82671 PEF Crystal River CCPIT - FDEP Presentation\Active Drawings\08382671-T001.dwg | Layout: TB-PS-B | Modified: Blucero 06/08/2011 1:30 PM | Plotted: blucero ---- | Jacksonville, FL

NOTE

FINAL COVER DESIGN BASED ON 3H:1V SIDESLOPES TO A CROWN ELEVATION OF 120 FEET ABOVE GRADE.

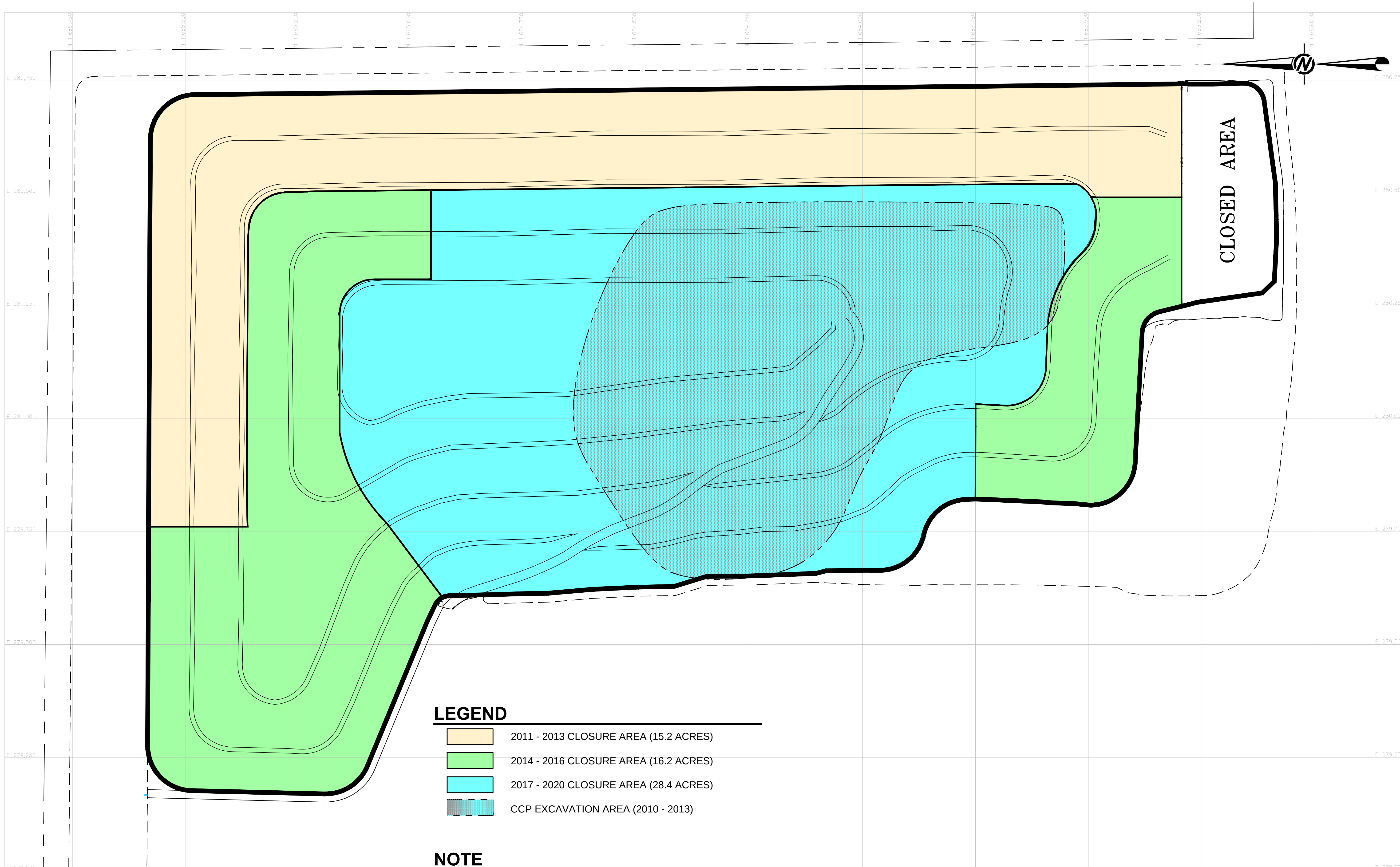
200 0 200
SCALE FEET

CCP EXCAVATION AREA

FIGURE 3

Golder Associates

N:\File\2008\083-82671 PEF Crystal River CCP\T - FDEP Presentation\Active Drawings\08382671-T001.dwg | Layout: TB-PS-B | Modified: Blucero 06/08/2011 1:30 PM | Plotted: blucero ---- | Jacksonville, FL



NOTE

FINAL COVER DESIGN BASED ON 3H:1V SIDESLOPES TO A CROWN ELEVATION OF 120 FEET ABOVE GRADE.

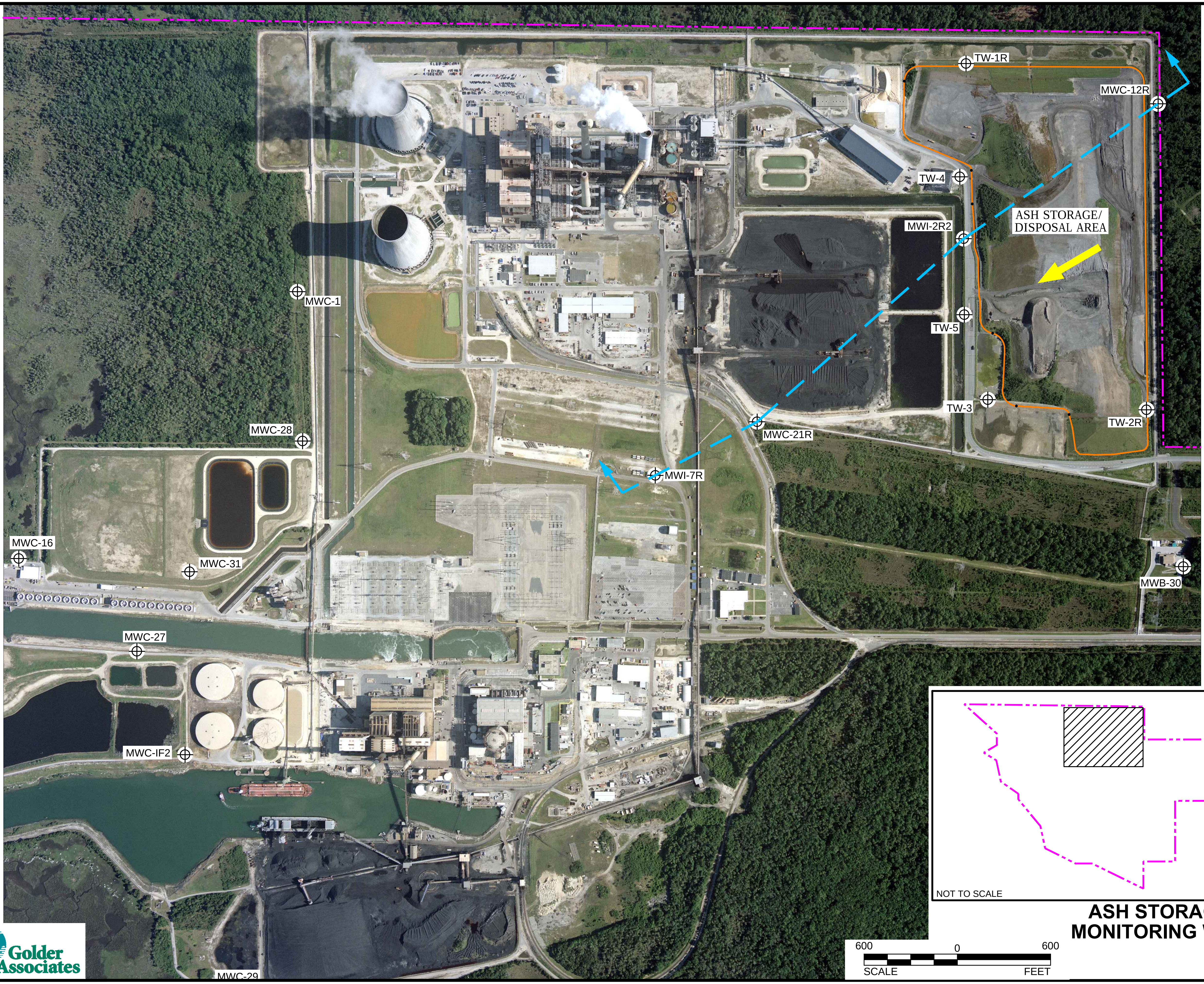
200 0 200
SCALE FEET

Golder Associates

PRELIMINARY CLOSURE SEQUENCING

FIGURE 4

N:\File\2008\083-82671 PEF Crystal River CCPIT - FDEP Presentation\Active Drawings\08382671-T001.dwg | Layout: TB-PS-B | Modified: Blucero 06/08/2011 1:30 PM | Plotted: blucero ---- | Jacksonville, FL



LEGEND

PROPERTY BOUNDARY

TW-1R GROUNDWATER MONITORING WELL

GENERALIZED DIRECTION OF GROUNDWATER FLOW

SECTION FOR TREND PLOTS

NOTES

1) WELL LOCATIONS ARE APPROXIMATE

REFERENCES

1) AERIAL PHOTOGRAPH FROM GEODETIC SERVICES SOUTH, INC., DATED APRIL 26, 2011.

600 0 600

SCALE FEET

Golder Associates

ASH STORAGE/DISPOSAL AREA MONITORING WELL LOCATION MAP

FIGURE 5

N:\File\2008\083-82671 PEF Crystal River CCPIT - FDEP Presentation\Active Drawings\08382671-T001.dwg | Layout: TB-PS-B | Modified: Blucero 06/08/2011 1:30 PM | Plotted: blucero ---- | Jacksonville, FL