



Crystal River Nuclear Plant
15760 W. Power Line Street
Crystal River, FL 34428
Docket 50-302
Docket 72-1035
Operating License No. DPR-72

10 CFR 50.83(b)

January 22, 2019
3F0119-01

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: Crystal River Unit 3 – Partial Site Release Request

Dear Sir:

In accordance with 10 CFR 50.83(b), Duke Energy Florida, LLC (DEF), hereby requests approval to remove a portion of the site from the Crystal River Nuclear Plant (CR3) Part 50 license (License No. DPR-72). Specifically, DEF requests approval to remove the non-impacted survey units from its Part 50 license in accordance with 10 CFR 50.83(b), "Release of part of a power reactor facility or site for unrestricted use".

Attachment 1, "Crystal River Energy Complex Supporting Information for Request for Partial Site Release," provides the supporting information for a partial release of the site for unrestricted use before receiving approval of the License Termination Plan (LTP) in accordance with the provisions of 10 CFR 50.83(b). Attachment 1 includes a description of the property and evaluation of the effect of releasing this property from the CR3 Part 50 license. The evaluation concludes that all applicable regulatory requirements will continue to be met and no change to the CR3 Operating License or the Permanently Defueled Technical Specifications is required.

Attachment 2 is a detailed description of the CR3 site that will be remaining in the CR3 Part 50 license after the release of the non-impacted areas requested above. This includes the revised description and maps that will be used to update the Defueled Safety Analysis Report once this request is approved.

Attachment 3 is a computer disk containing the non-NRC references from Attachment 1. These documents support the summary and conclusions described in Attachment 1.

DEF requests NRC approval of this request by September 30, 2019.

This correspondence contains no new regulatory commitments.

If you have any questions regarding this submittal, please contact Mr. Mark Van Sicklen, Licensing Lead, Nuclear Regulatory Affairs, at (352) 501-3045.

Sincerely,



Terry Hobbs
GM Decommissioning-SAFSTOR

Crystal River Nuclear Plant

TDH/mvs

Attachments:

1. Crystal River Energy Complex, Supporting Information for Request for Partial Site Release
2. Duke Energy Crystal River Plant Description, Sections 28, 29, 31, 32 & 33 Township 17 South, Range 16 East (SurvTech Solutions, Inc., August 22, 2018)
3. Computer Disk containing non-NRC referenced documents

xc: NMSS Project Manager
Regional Administrator, Region I

DUKE ENERGY FLORIDA, LLC

**DOCKET NUMBER 50 - 302 / DOCKET NUMBER 72 - 1035
LICENSE NUMBER DPR - 72**

ATTACHMENT 1

**CRYSTAL RIVER ENERGY COMPLEX SUPPORTING
INFORMATION FOR REQUEST FOR PARTIAL SITE RELEASE**

ATTACHMENT 1

Crystal River Energy Complex Supporting Information for Request for Partial Site Release

PURPOSE

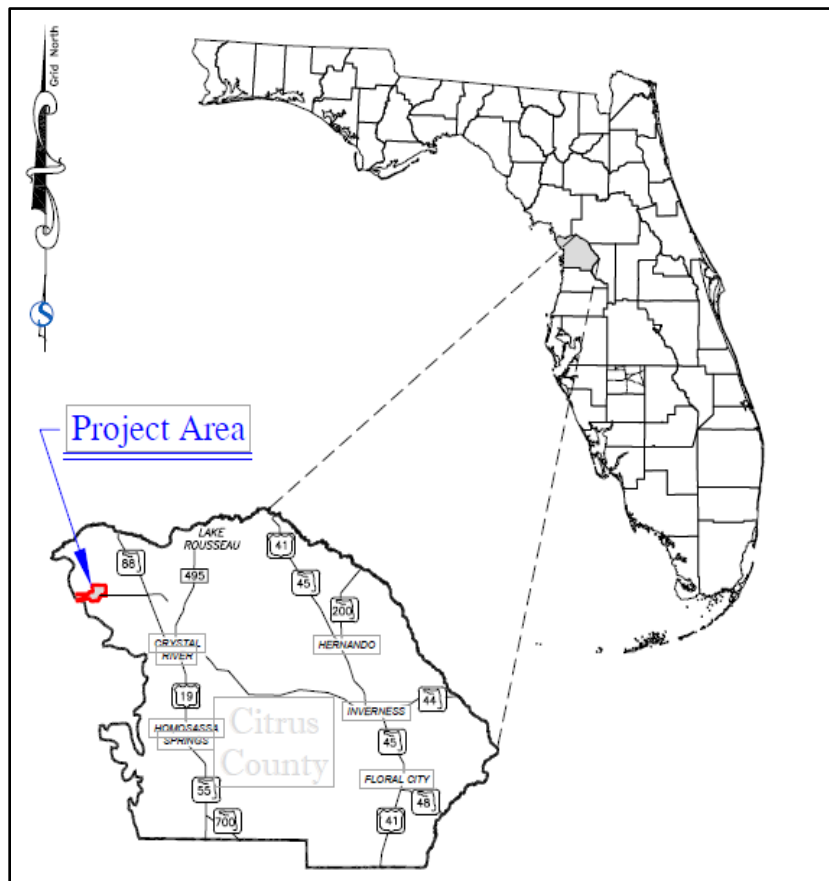
Duke Energy is requesting the release of portions of the “non-impacted” areas of the current Controlled Area (CA, also referred to as the 4,738-acre Site) at the Crystal River Energy Complex (CREC). Specifically, Duke Energy requests NRC approval for release of 3,854 acres per 10 CFR 50.83, *Release of Part of a Power Reactor Facility or Site for Unrestricted Use*, from the jurisdiction of Crystal River Unit 3 Nuclear Generating Plant (CR3) NRC operating license DPR-72.

The purpose of this document is to provide a summary of the results of radiological surveys performed in support of the Partial Site Release (PSR) at the CREC as well as a summary of the reviews and assessments performed that show that the property is non-impacted and that the release of the property will not have any adverse impact on public health or safety or adverse impact on the ability of the site in aggregate to meet 10 CFR Part 20, Subpart E, criteria for unrestricted release.

BACKGROUND

The CREC is located in Crystal River, FL approximately 75 miles north of Tampa, FL (see Figure 1). Crystal River 3 (CR3) Nuclear Generating Plant was a 2,609 MWt, single-unit pressurized light-water reactor (PWR) supplied by Babcock & Wilcox that was licensed to operate from December of 1976 to February 20, 2013. During a steam generator (SG) replacement outage that started on September 26, 2009, CR3 damaged the containment structure. The licensee attempted to repair the damage, but later decided to decommission the reactor. The facility is currently in a SAFSTOR condition although Duke Energy is still considering beginning active decommissioning. Duke Energy submitted the CR3 post-shutdown decommissioning activities report (PSDAR), including the site-specific cost estimate, on December 2, 2013. The plant began construction of an ISFSI in 2016, and began loading fuel in summer 2017. Fuel transfer to the ISFSI was completed in January 2018.

Figure 1, CREC Geographical Location



DESCRIPTION OF THE PROPERTY

The portion of the site under the jurisdiction of 10 CFR Part 50 License is approximately 4,738 acres in size. Of the 4,738 acres, Duke Energy has decided to keep approximately 884 acres under the 10 CFR Part 50 License (see Figure 2). The proposed site boundary/CR3 Controlled Area is comprised of the 27-acre footprint of the CR3 nuclear facility, as well as approximately 857 acres of the industrialized portions of the CREC, primarily comprised of the four coal plants (Units 1, 2, 4 and 5), ancillary support structures, parking lots, roadways, land and water. These industrialized portions of the new 884-acre CR3 Controlled Area/Site are not within the scope of this partial site release. The description of the property is provided in Attachment 2 to this submittal, *Duke Energy Crystal River Plant Description, Sections 28, 29, 31, 32 & 33 Township 17 South, Range 16 East* (SurvTech Solutions, Inc., August 22, 2018) (Reference 1).

The scope of the PSR is a portion of the non-impacted areas of the CREC consisting of 2,190 acres of uninhabitable tidal flats (TF) (see Figure 3) and approximately 1,664 acres of non-industrialized (NI) forest, creeks and wetlands as well as the site access road (see Figure 4). These groups have been sub-divided into twenty-one (21) appropriately defined survey units to better manage and facilitate survey planning and implementation. A complete listing of all survey units is provided in Table 1.

Table 1 - Classification and Description List of Non-Impacted Open Land Survey Units

Survey Unit ID	Survey Unit Description	Acres	m²	Classification
Tidal Flats				
TF-01	Little Rocky Creek	483	1,954,675	NI
TF-02	Inner Rocky Cove	146	590,065	NI
TF-03	Double Barrel Creek	639	2,584,394	NI
TF-04	Salt Creek	636	2,574,806	NI
TF-05	Cedar Creek	286	1,155,686	NI
Non-Industrialized				
NI-01	Access Road East	99	402,133	NI
NI-02	Access Road Mid-East	99	398,664	NI
NI-03	Access Road Mid-West	100	404,410	NI
NI-04	Access Road West/Mariculture Center	122	493,700	NI
NI-05	West of Units 4 and 5	114	459,441	NI
NI-06	West Discharge Canal	41	165,112	NI
NI-07	West Intake Canal	121	491,639	NI
NI-08	Mid-West Intake Canal	121	491,662	NI
NI-09	South of Rail Loop	116	458,678	NI
NI-10	Southeast of Rail Loop	108	438,994	NI
NI-11	West Wetlands	102	411,693	NI
NI-12	Mid-West Wetlands	107	434,940	NI
NI-13	West Central Wetlands	108	438,481	NI
NI-14	East Central Wetlands	108	436,517	NI
NI-15	Mid-East Wetlands	100	405,870	NI
NI-16	East Wetlands	98	398,103	NI

Figure 2, Proposed Site Boundary/CR3 Controlled Area

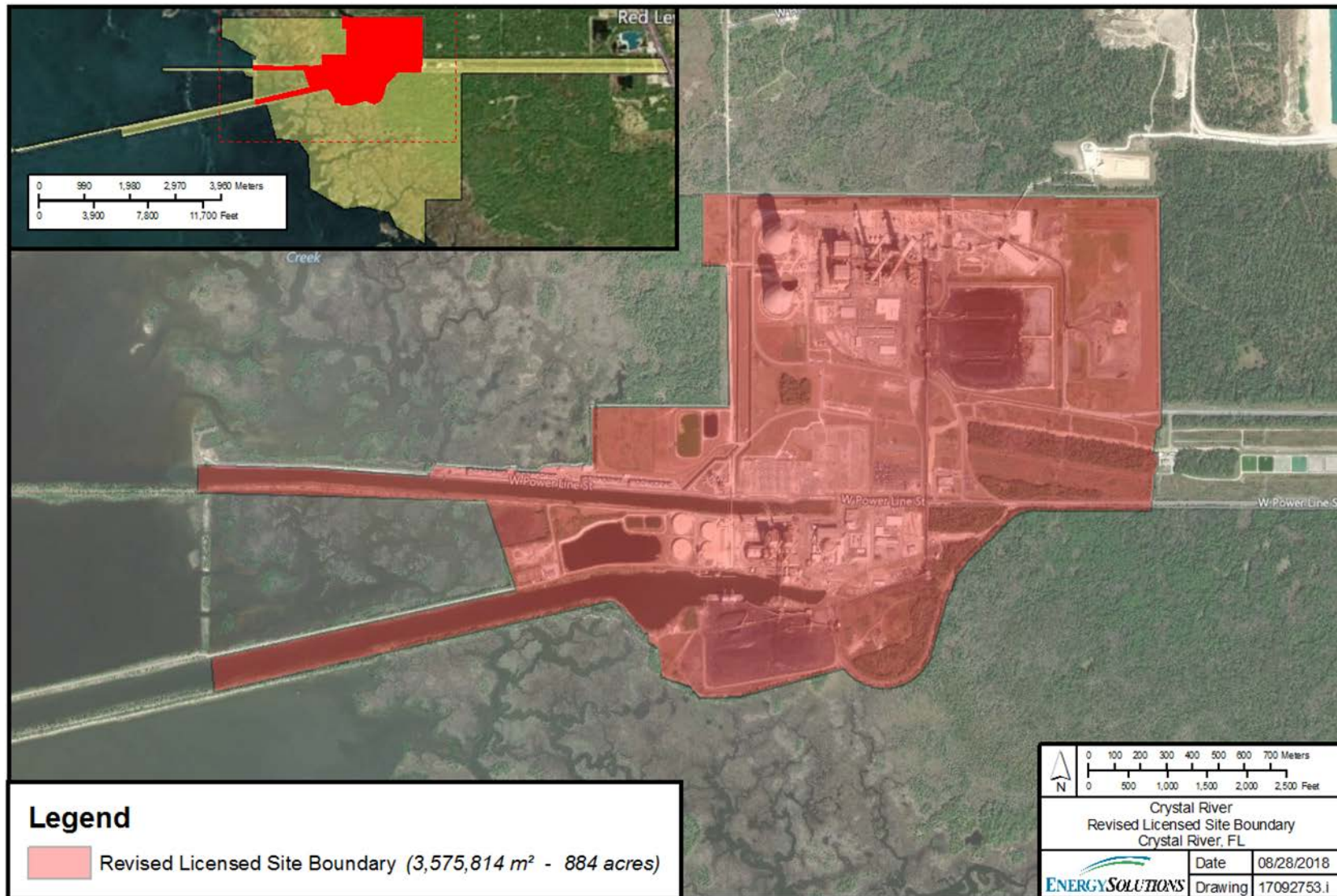


Figure 3, Tidal Flats Survey Units

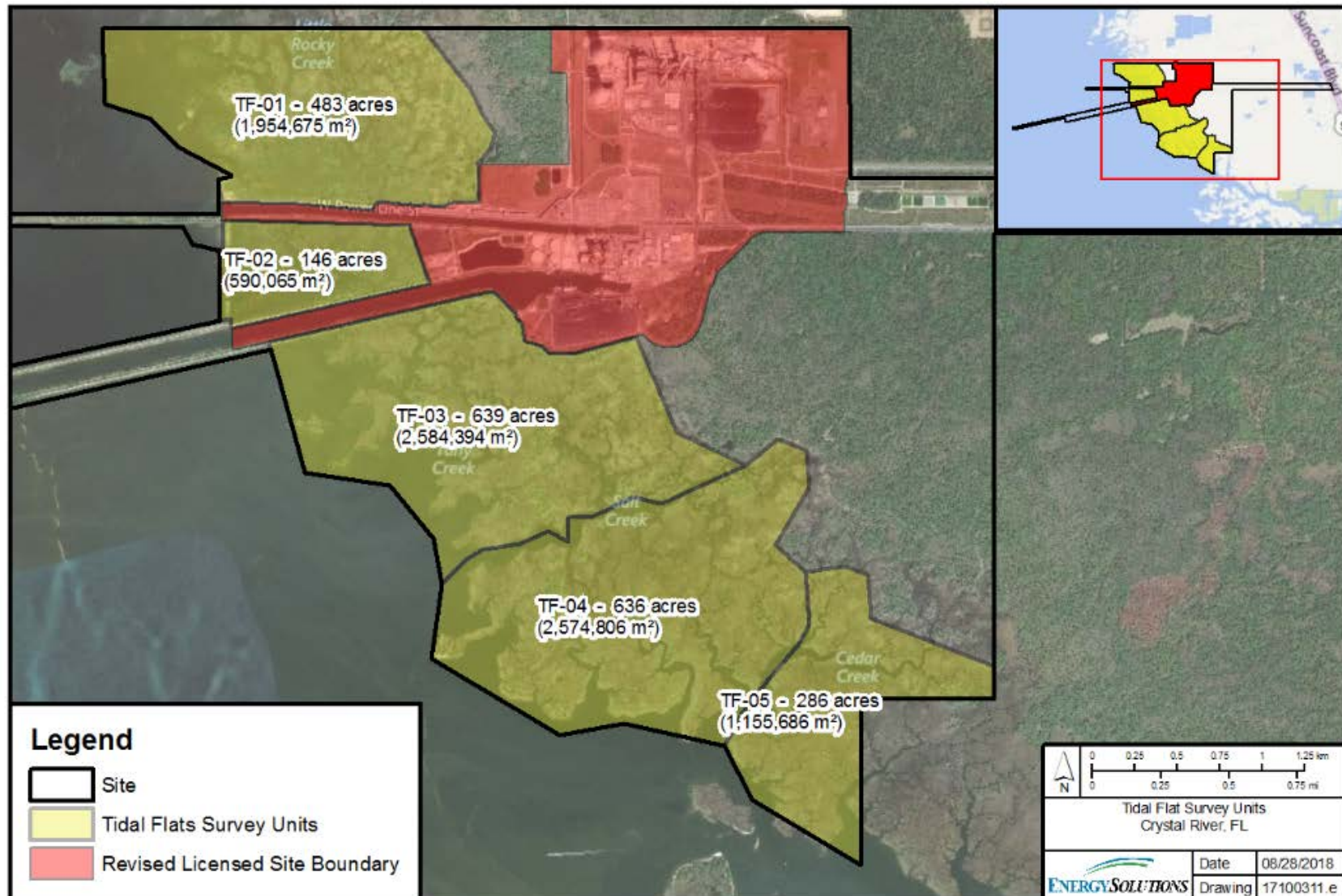
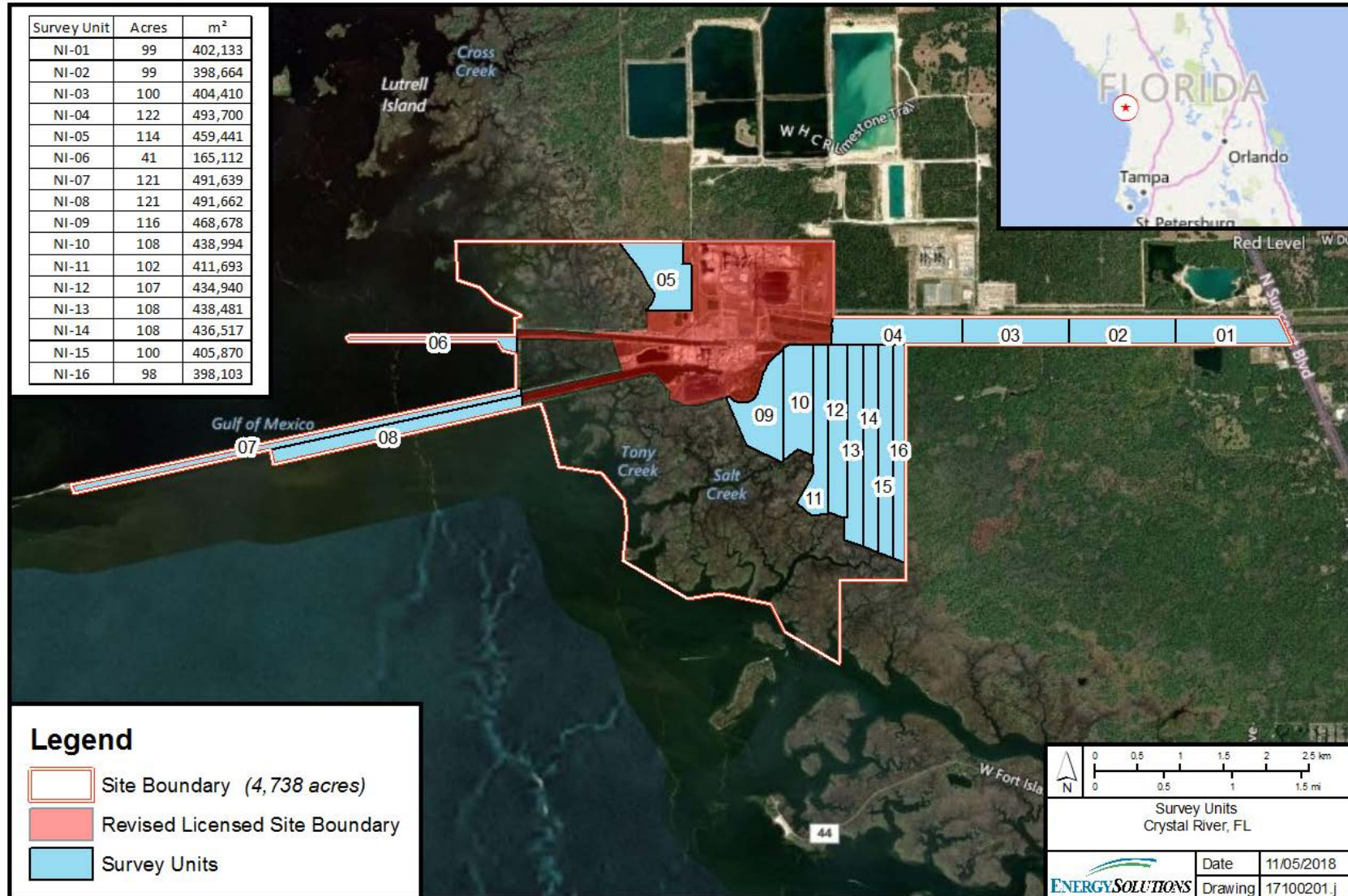


Figure 4, Non-Industrialized Survey Units



EVALUATION OF EFFECT OF PROPOSED RELEASE

Duke Energy has evaluated the effect of releasing the subject property from the Part 50 License in accordance with the criteria specified in 10 CFR 50.83(a)(1-3) in order to ensure that the site will continue to comply with all applicable statutory and regulatory requirements that may be affected by the release of the subject property.

Specifically, Duke Energy's evaluation confirmed the following with respect to each of the regulatory areas identified in 10 CFR 50.83(a)(1)(i)-(vi), (a)(2) and (a)(3):

(a)(1) *Evaluate the effects of releasing the property to ensure that:*

- i. *The dose to individual members of the public does not exceed the limits and standards of 10 CFR Part 20, Subpart D.***

Duke Energy has determined that this land was never used for any radiological purposes. Additionally, the radiological surveys performed on this property show that there is no plant-related residual radioactivity on this property above expected background levels. Duke Energy strictly controls effluents to ensure radioactivity released to the environment is maintained ALARA and does not exceed federal release limit criteria. Effluent controls include the pre-release sampling and dose calculations, use of dilution flow water and maintaining the CR3 Radiological Environmental Monitoring Program (REMP). The release of the subject property does not change any controls used to comply with dose limits for individual members of the public and the conservatively estimated yearly dose to a member of the public is well below the 10 CFR Part 20, Subpart D limits and standards.

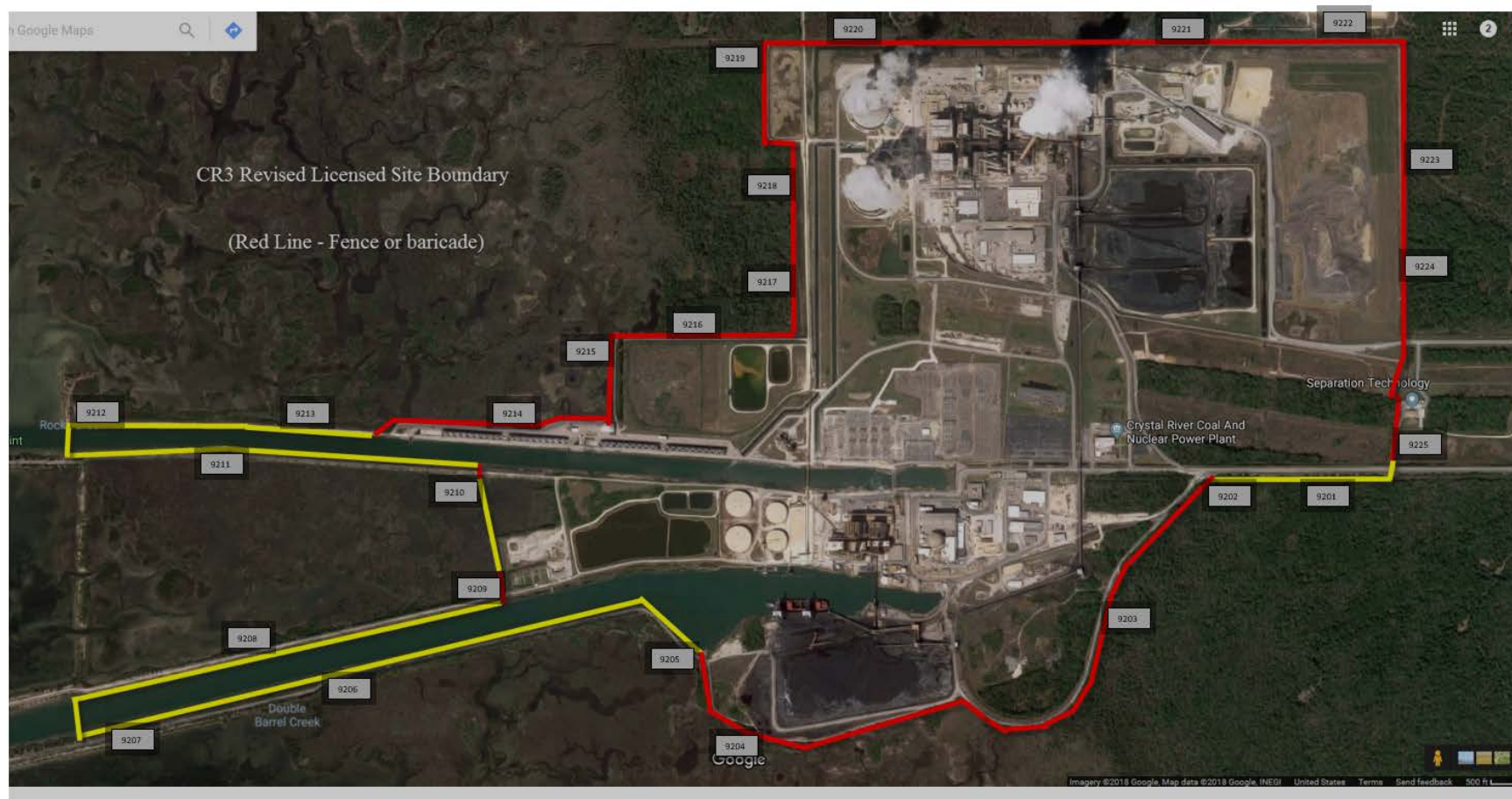
Starting on 07/02/18, Duke Energy placed twenty-five (25) TLDs along the new proposed licensed site boundary (see Figure 5). Although the TLDs are not part of the site REMP program, they will be read to assess boundary dose. Note, construction of the Independent Spent Fuel Storage Installation (ISFSI) and Horizontal Storage Modules was completed, and all 39 Dry Shielded Canisters along with one concrete vault (containing > Class C waste) was placed in the ISFSI Protected Area, prior to the start of this quarterly TLD monitoring period.

The results for the 3rd quarter boundary TLD readings are provided in Table 2. After subtracting the average background value from each reading and adjusting for occupancy factors, the results ranged from 0.0 mrem/year to 4.0 mrem/year with an average of 0.62 mrem/year. Note, the TLD at location B-9214 was damaged due to weather and was rendered unreadable.

Table 2, Proposed License Site Boundary TLD Readings for 3rd Quarter of 2018

Location	Highest TLD (gross/QTR) (mrem)	AVG BKG (QTR) (mrem)	Neutron Dose	Occupancy Factor (QTR)	mrem/QTR	mrem/YEAR
B-9201	15	15	0	0.1	0.0	0.0
B-9202	17	15	0	0.1	0.2	0.8
B-9203	15	15	0	0.1	0.0	0.0
B-9204	14	15	0	0.1	0.0	0.0
B-9205	15	15	0	0.1	0.0	0.0
B-9206	15	15	0	0.1	0.0	0.0
B-9207	14	15	0	0.1	0.0	0.0
B-9208	16	15	0	0.1	0.1	0.4
B-9209	25	15	0	0.1	1.0	4.0
B-9210	13	15	0	0.1	0.0	0.0
B-9211	15	15	0	0.1	0.0	0.0
B-9212	16	15	0	0.1	0.1	0.4
B-9213	18	15	0	0.1	0.3	1.2
B-9214	TLD Damaged – not read					
B-9215	17	15	0	0.1	0.2	0.8
B-9216	17	15	0	0.1	0.2	0.8
B-9217	18	15	0	0.1	0.3	1.2
B-9218	16	15	0	0.1	0.1	0.4
B-9219	15	15	0	0.1	0.0	0.0
B-9220	16	15	0	0.1	0.1	0.4
B-9221	15	15	0	0.1	0.0	0.0
B-9222	15	15	0	0.1	0.0	0.0
B-9223	18	15	0	0.1	0.3	1.2
B-9224	23	15	0	0.1	0.8	3.2
B-9225	15	15	0	0.1	0.0	0.0

Figure 5, TLD Locations Along Proposed Site Boundary



ii. There is no reduction in the effectiveness of emergency planning or physical security.

Duke Energy has evaluated the release of this land in regards to Emergency Planning and Physical Security, specifically in accordance with 10 CFR 50.54(q) and (p). No credit is taken for this land in either the Emergency Plan or Security Plan. Therefore, the release of the subject property has no adverse effect on either plan.

iii. Effluent releases remain within license conditions.

The Duke Energy programs to assess and maintain effluent releases within license conditions remain in effect and the early release of the subject property does not impact those programs. Therefore, the effluent releases from the site will remain within license conditions.

iv. The environmental monitoring program and offsite dose calculation manual (ODCM) are revised to account for the changes.

Based on a review of the current REMP sampling locations and TLD positions, no changes to the REMP program are needed when the Controlled Area is reduced to 884 acres. Changes to the ODCM will be required when the new Controlled Area/Site boundary become effective to re-define these terms and account for any dispersion factor changes.

v. The siting criteria of 10 CFR Part 100 continue to be met.

The release of the subject property has been reviewed with respect to the siting criteria in 10 CFR 100 and it has been determined that the requirements of 10 CFR 100 are either not impacted (e.g., 10 CFR 100.11, low population zone or population center distance or 10 CFR 100 Appendix A, Seismic and Geologic Siting Criteria) or are not applicable (e.g., 10 CFR 100, Subpart B, Evaluation Factors for Stationary Power Reactor Site Application on or after January 10, 1997). Duke Energy will continue to control the CA and maintain the ability to remove members of the public from the CA in the case of a radiological emergency.

vi. All other applicable statutory and regulatory requirements continue to be met.

Duke Energy maintains policies and procedures to ensure that statutory and regulatory requirements continue to be met. Early release of the subject property has no adverse effect on these policies and procedures.

In summary, the proposed release of the subject property from the 10 CFR Part 50 License will not have any impact on the CR3 facility's continued compliance with applicable NRC regulatory standards.

(a)(2) *Perform a historical site assessment of the part of the facility or site to be released.*

In accordance with the guidance provided in Section 3.0 of NUREG-1575, “*Multi Agency Radiation Survey and Site Investigation Manual (MARSSIM)*” (Reference 2), an Historical Site Assessment (HSA) was performed and documented in June 2016. *Historical Site Assessment for Crystal River 3, TSD No. 16-015, Rev. 0* (Radiation Safety & Control Services) (Reference 3) is included as part of Attachment 3 to this submittal. Along with interviews of long-tenured employees, the following historical information was reviewed and compiled for the HSA:

- Records from the Florida Department of Environmental Protection (FDEP)
- Incident files (ARs, NCORs, PCs, etc.)
- Special survey and operational radiological survey records
- HP and Operator logs
- Engineering reports of subsurface investigations
- Reports of station inspections by American Nuclear Insurers (ANI)
- CR3 file maintained in compliance with 10 CFR 50.75(g) [3], namely HPP0230
- CR3 Offsite Dose Calculation Manual (ODCM)
- CR3 Final Safety Analysis Report (FSAR)
- CR3 Spill Prevention, Control and Countermeasures (SPCC) Plan
- CR3 Storm Water Pollution Prevention Plan (SWPPP)
- CR3 Annual Radioactive Effluent Release Reports
- CR3 Annual Radiological Environmental Monitoring Reports

The HSA was a detailed investigation to collect existing information from the start of CR3’s activities related to radioactive materials or other contaminants for the site and its surroundings, including the 3,854 acres subject to this partial site release. The HSA focused on historical events and routine operational processes that resulted in the contamination of the plant systems, onsite buildings, surface and subsurface soils within the CR3 Controlled Area as well as support structures, open land areas and subsurface soils outside of the CR3 Controlled Area, but within the OCA. The scope of the HSA included potential contamination from radioactive materials, hazardous materials, and state-regulated materials.

The HSA investigation was designed to obtain sufficient information to provide initial classification of the site land areas and structures as impacted or non-impacted. Impacted areas have a potential for contamination (based on historical data) or contain known contamination (based on past or preliminary radiological surveillance). MARSSIM defines non-impacted areas as those areas where there is no reasonable possibility of residual contamination.

Based on a review of the operating history of the facility, historical incidents, and operational radiological surveys as documented in the HSA, as well as subsequent characterization surveys discussed in the next section, the findings are that:

- The land has not been used for plant operations.
- The land has not been used for storage or use of radioactive material or waste.

- There are no event records that any spills, leaks or uncontrolled release of radiative material have ever occurred on the land.

The subject open land areas were deemed not impacted by licensed activities or materials and therefore, it was determined that the “non-impacted” classification is appropriate.

(a)(3) *Perform surveys adequate to demonstrate compliance with the radiological criteria for unrestricted use specified in 10 CFR 20.1402 for impacted areas.*

MARSSIM Section 2.5.2 states, “Non-impacted areas represent areas where all of the information necessary to demonstrate compliance is available from existing sources. For these areas, no statistical tests are considered necessary.” Additionally, Table 2.2 of MARSSIM, “Recommended Conditions for Demonstrating Compliance Based on Survey Unit Classification for a Final Status Survey,” requires no elevated measurement comparison, no sampling and/or direct measurements and no scanning to be performed in non-impacted areas. Despite this available waiver, a comprehensive partial site release (characterization) survey was performed.

The site-release criteria for the CR3 site corresponds to the 10 CFR 20.1402 criteria for unrestricted use. The residual radioactivity, including that from ground water sources, that is distinguishable from background, must not cause the total effective dose equivalent (TEDE) to an average member of the critical group to exceed 25 mrem/yr. The residual radioactivity must also be reduced to levels that are ALARA. However, in order to validate the non-impacted classification, the release criteria used in the subject land areas for partial site release is no detectable concentrations of plant-related radioactivity that is distinguishable from background.

The characterization surveys performed in support of partial site release were designed, implemented, and data assessed using guidance provided in MARSSIM, NUREG-1505, Rev. 1, *A Nonparametric Statistical Methodology for the Design and Analysis of Final Status Decommissioning Surveys* (Reference 4) and EPA/600/R-07/020, *Performance of Statistical Tests for Site Versus Background Soil Comparisons When Distributional Assumptions Are Not Met* (Reference 5). These surveys were also performed in accordance with EnergySolutions procedures DD-SC-PN-002, *Characterization Survey Plan* (Reference 6) in conjunction with DD-SC-PN-001, *Quality Assurance Project Plan (QAPP) for Crystal River 3 Partial Site Release* (Reference 7) which describes policy, organization, functional activities, the Data Quality Objective (DQO) process, and measures necessary to achieve quality data. A sample plan was written for each survey unit within the scope of the characterization survey. The characterization surveys were designed, implemented, data assessed and results reported using the following EnergySolutions procedures:

- DD-SC-PR-001, *Characterization Survey Plan Development* (Reference 8)
- DD-SC-PR-002, *Chain of Custody for Site Characterization* (Reference 9)
- DD-SC-PR-003, *Sample Media Collection for Site Characterization* (Reference 10)
- DD-SC-PR-004, *Sample Media Preparation for Site Characterization* (Reference 11)
- DD-SC-PR-005, *Characterization Survey Data Assessment* (Reference 12)
- DD-SC-PR-006, *Survey Data Reporting* (Reference 13)

A final report was written consistent with the guidance provided in NUREG-1757, Vol. 2, *Consolidated Decommissioning Guidance: Characterization, Survey, and Determination of Radiological Criteria, Revision 1* (Reference 14).

The Data Quality Objective (DQO) process was incorporated as an integral component of the survey planning and survey design steps of all radiological surveys. Data Quality Objectives are qualitative and quantitative statements derived from the DQO process that clarify technical and quality objectives, define the appropriate type of data, and specify the tolerable levels or potential decision errors used as the basis for establishing the quality and quantity of data required to support inference and decisions. The DQO process is a series of graded planning steps found to be effective in establishing criteria for data quality and guiding the development of survey plans.

For non-impacted open land areas, the measurement/sample locations were randomly chosen using computer software such as Visual Sample Plan (VSP) or ArcGIS. If a random sample was inaccessible, then an alternate location was chosen as close to the original location as possible. In this context, “inaccessible” is defined as an area where personnel or vehicle transit was inhibited by the presence of standing water, marsh or wet-lands, thick underbrush, trees or natural grasses where clearing would be prohibitive. Additional samples (judgmental) were obtained at areas that could have concentrated plant-related materials (e.g., soil or debris piles, outfall piping, etc.) and at areas of elevated activity identified during the scan survey (investigative).

All samples were analyzed to CR3 ODCM Lower Limits of Detection (LLDs) for Cs-137. Per QA requirements, split samples were acquired at 5% of the locations, chosen at random. An additional split sample was obtained in each survey unit and provided to the Florida Department of Health, Bureau of Radiation Control. In addition, 5% of the samples, selected based on highest gamma activity, were sent to an accredited off-site laboratory for gross alpha/beta analysis, gamma spectroscopy, and Hard-to-Detect (HTD) analysis for Ni-63, Fe-55, Sr-90, and H-3. Based on existing data in the HSA and REMP reports there is no positive indication of radionuclides other than Cs-137, Co-60 and H-3.

From August 1, 2018 to October 31, 2018, sufficient survey coverage and an adequate number of samples were obtained in the subject survey units to serve as the basis for the “Non-Impacted” classification. The survey design utilized a graded approach with scan and sampling frequencies based on the potential for contamination concentrations in excess of the release criteria. In general, the radiological release surveys consisted of the following activities:

- Gamma walkover surveys of open land areas using a 2” x 2” NaI detector, and
- Surface soil, sediment, water or other bulk material sampling for gamma spectroscopy and HTD analysis including tritium analysis

In general, non-impacted survey units had a gamma scan survey performed over a minimum of 1% of the accessible surface areas. It was not possible to achieve the minimum scan frequency in some areas, such as the tidal flats, where dry land is minimal and safe access was a factor. If during the scan survey an area of elevated activity was identified (typically defined as a reading in excess of the instrument Minimum Detectable Count Rate (MDCR) plus ambient background), then the elevated area(s) were bounded and an investigation was performed. Portable Radioisotope

Identification Devices (e.g., Thermo Fisher Scientific identiFINDER™, or Bicron Fieldspec™) or bulk material sampling were used at areas of elevated activity to discriminate between plant-related radionuclides and naturally occurring radioactive material (NORM).

The relative shift (Δ/σ) that determined the survey unit sample size used for the WRS test was developed in accordance with Table A.2b in NUREG-1505. Because DCGLs have not been established for the PSR Project, the 95th Percentile Value of the background assessment data was used in place of the DCGL (for Cs-137 in units of pCi/g) for the calculation of relative shift. The Lower Bound of the Gray Region (LBGR) was developed in accordance with section 13.3 in NUREG-1505, using the results from an Analysis of Variance (ANOVA) in the computer software R, a free software developed by the R Foundation. The PSR Project elected to use $3\hat{\omega}$ for the LBGR. The calculations for $\hat{\omega}$ and $3\hat{\omega}$ are provided below.

Equation 1

$$\hat{\omega} = \sqrt{(s_b^2 - s_w^2)/n_0}$$

where:

s_b^2 = mean square within reference areas (provided from ANOVA)

s_w^2 = mean square between reference areas (provided from ANOVA)

n_0 = number of measurements in each reference area

The values of $\hat{\omega}$ and the LBGR were calculated as follows:

$$\hat{\omega} = \sqrt{(0.002806 - 0.001488)/15} = 0.009$$

$$3\hat{\omega} = LBGR = 0.028$$

The formula for relative shift is as follows:

Equation 2

$$\frac{\Delta}{\sigma} = \frac{DCGL - LBGR}{\sigma}$$

where:

$DCGL$ = 95th Percentile Value from background assessment

$LBGR$ = Lower Bound of the Gray Region ($3\hat{\omega}$)

σ = standard deviation of mean background levels among reference areas ($\hat{\omega}$)

The relative shift was calculated as follows:

$$\frac{\Delta}{\sigma} = \frac{0.132 - 0.028}{0.009} = 14.356$$

From Table A.2b in NUREG-1505, the maximum relative shift given is four (4). Because the calculated relative shift of 14.356 is larger, four (4) was used. Using Type I and Type II error values (α and β) of 0.05, a relative shift of four (4) equates to a sample size of nine (9). The PSR Project elected to use a conservative sample size of fourteen (14) for each survey unit.

A total of 68,286 m² was scanned using a Model 2350-1 paired with a Model 44-10 NaI detector. Alarm set-points for the instrument were set at the observed background plus the MDCR of the instrument. With an average background of approximately 4,500 cpm, the range of observed scan result was 1,075 cpm to 17,666 cpm. Seven (7) instrument alarms were logged with a maximum observed scan reading of 13,600 cpm. All alarms were investigated and soil samples were taken at locations where the elevated reading was verified. In all instances, the elevated readings were attributed to NORM.

Two-hundred and ninety-four (294) soil/sediment samples were taken. Of the total number of surface soil samples taken and analyzed, Cs-137 was identified at concentrations greater than the MDC in 132 samples. Twenty-one (21) samples exceeded the 95th percentile of background values for Cs-137 (approximately 7.1%), and eleven (11) exceeded the 99th percentile of background values for Cs-137 (approximately 3.7%). These percentages are reasonably close to the expected percentages; there is a low percentage of Cs-137 values that exceed the release criteria.

Besides Cs-137, no other plant-related radionuclides were identified above MDC with the exception of three (3) samples analyzed at the off-site laboratory (GEL Laboratories LLC):

- Sample L4-NI09-CR-008-SSD in Survey Unit NI-09 identified H-3 at a concentration of 7.72 pCi/g with an MDC of 5.25 pCi/g.
- Sample L4-NI10-CR-013-SSW in Survey Unit NI-10 identified Ni-63 at a concentration of 2.91 pCi/g with an MDC of 2.25 pCi/g.
- Sample L4-NI15-CR-005-SSW in Survey Unit NI-15 identified H-3 at a concentration of 9.22 pCi/g with an MDC of 6.0 pCi/g.

In order to rule out a chemical or radiological interference, GEL Laboratories investigated the Liquid Scintillation Counter (LSC) spectrum for Ni-63 and H-3. A recount of the samples verified the original results. Additionally, the reprocessing and recounting of remaining sample material identified similar concentrations in all three samples. As part of a site investigation, four (4) additional samples were obtained at the corners of a one-meter square grid equidistant from the center of the original sample location at all three elevated locations. The four (4) samples for each location were composited and a concerted effort was made to remove all biota from each sample. These three (3) composite samples were analyzed at GEL laboratories, and no H-3 or Ni-63 was identified above their respective Minimum Detectable Concentrations (MDCs).

As part of the REMP program, Duke Energy regularly samples broadleaf vegetation and shoreline sediment and analyzes them using gamma spectroscopy. Cs-137 is the only potential licensed radionuclide typically identified above MDC. For the broadleaf vegetation samples, Cs-137 is

typically seen in the range of 1-2 E-7 $\mu\text{Ci/g}$. This range of results also includes the broadleaf vegetation samples collected at a CR3 background location in Orlando. For the shoreline sediment samples, Cs-137 is detected typically around 2-3 E-8 $\mu\text{Ci/g}$, which is close to the counting MDC. Most shoreline sediment samples taken as part of the REMP program show concentrations less than MDC.

Based on these historical REMP results, it is known that Cs-137 tends to concentrate in vegetative material. The REMP lab processes the shoreline sediment samples to remove all vegetative matter before counting. This purposeful segregation of vegetative material was not performed for the soil samples collected during the PSR project. As such, most PSR soil samples contained some vegetative matter, typically in the form of muck or peat, with some of the samples containing significant amounts. This is why the PSR soil samples show Cs-137 concentrations with higher values and over a wider range than the REMP samples. This is also a possible explanation for the anomalous H-3 and Ni-63 concentrations identified at concentration slightly above MDC.

Additional details on the survey and sampling methodology and results of the radiological analysis of each measurement and soil sample obtained during the characterization of non-impacted open land survey units are presented in EnergySolutions CR-SC-RPT-001, "*Partial Site Release of the Crystal River Energy Complex, Radiological Survey Final Report*" (Reference 15) and is included as Attachment 3 to the submittal. Based upon the results of the characterization surveys performed of the non-impacted open land areas, it can be concluded that a non-impacted classification for these areas is appropriate. Cs-137 was the only radionuclide positively identified that could potentially be classified as plant-derived. However, the concentrations observed are well within the range of activity defined as background due to global fallout. The investigation of the anomalous H-3 and Ni-63 concentrations did not identify concentrations above their respective MDCs and the original samples with the elevated concentrations is likely due to interference associated with excessive plant matter in the samples.

Non-impacted areas are defined in MARSSIM as areas that have no reasonable potential for residual contamination, no radiological impact from site operations and are typically identified during the HSA. Duke Energy has found no evidence of using, storing, or burying radioactive material in the subject property. None of the event records in the HSA indicated the uncontrolled release of radioactive material to the subject property. Therefore, it can be concluded that the release of the subject property will have no adverse impact on the ability of the CREC site in aggregate to meet the Part 20, Subpart E requirements for unrestricted release.

SCHEDULE FOR SUBJECT PROPERTY RELEASE

For non-impacted areas, 10 CFR 50.83 (b)(3) requires a schedule for release of the property. Duke Energy intends to begin undertaking activities associated with the release of the subject property from the Part 50 License on or before October 30, 2019. Therefore, Duke Energy requests that the NRC approve the acceptability of the release of the subject property from the Part 50 License by September 30, 2019.

RESULTS OF 10CFR 50.59 EVALUATION

10 CFR 50.83(b)(4) requires for non-impacted areas that the licensee submit the results of the evaluation performed in accordance with 10 CFR 50.59. The assessment of the release of the subject property is as follows:

The partial site release involves approximately 3,854 acres of non-impacted land out of the approximate 4,738 that make up the Owner Controlled Area. The release does not involve property that is actively used by the plant for routine or decommissioning operations or that is needed for the site's emergency plan.

The 10 CFR 50.59 review assessed the impact of the change in the CR3 Controlled Area boundary on off-site dose calculations and effluent releases and concluded that the change:

- does not adversely affect any design function as described in the Defueled Safety Analysis Report (DSAR) (Reference 16)
- does not adversely affect how a design function as described in the DSAR is performed or controlled
- does not revise or replace an evaluation method used to establish design basis or safety analysis, and
- does not involve a test or experiment not described in the DSAR.

ENVIRONMENTAL IMPACTS

Under 10 CFR 50.83(b)(5), a request for NRC approval of a release of non-impacted areas must include the reasons for concluding that the environmental impacts associated with the proposed release of property will be bounded by appropriate previously issued Environmental Impact Statements. The original Final Environmental Statement (FES) for Crystal River 3 was issued in May 1973 (Reference 17).

Duke Energy has evaluated the environmental impacts associated with the proposed release of the subject property and considered those impacts in light of the original FES. The evaluation did not identify any significant new environmental impacts or any significant changes from the environmental impacts previously assessed, or currently being assessed, by the NRC. In particular, the evaluation found as follows:

- The land transfer will have no measurable increase in off-site dose consequences and no change in effluent releases.
- The Crystal River 3 REMP will account for the revised site area boundary, and no increases in effects are anticipated.

Accordingly, Duke Energy concludes that the environmental impacts associated with the proposed release of the subject property are bounded by the NRC's previous or current reviews, of the CR3 facility.

ADDITIONAL AREAS TO BE ADDRESSED TO SUPPORT RELEASE OF THE SUBJECT PROPERTY

Statement of Dismantling Activities

No dismantlement activities are required in the subject survey units.

Potential for Cross-Contamination from Subsequent Activities

The potential for cross-contamination of the subject non-impacted areas due to subsequent decommissioning activities is diminutive. The exterior portions of the subject areas are bounded on the northwest by the State of Florida Department of Environmental Protection, the north/northeast by the United States Gypsum Company and HRC Limestone mines, the south/southeast by the State of Florida Department of Environmental Protection and the west by the Gulf of Mexico. The interior portions of the subject areas are bounded by the remaining non-impacted portions of the OCA still subject to the Part 50 license.

When active decommissioning is initiated, isolation and control measures will be implemented during and following remediation and subsequent final status surveys. Isolation and control measures in CR3 Controlled Areas adjacent to the subject property will be implemented through approved procedures and will remain in force throughout site final survey activities and until there is no undue risk of contamination from decommissioning. In the event that isolation and control measures established for these survey areas are compromised, evaluations will be performed and documented to confirm that no radioactive material was introduced into the area that would affect the results of the final status surveys. Given the isolation and controls established for the areas adjacent to the subject property, it is highly unlikely that radioactive materials could be introduced into the subject property borders. Radioactive material generated during the decommissioning process will be handled and controlled in a manner to prevent contamination of the subject non-impacted areas. These controls will include contamination containment, dust control measures, storm water runoff control measures, and proper radiological protection program implementation (including periodic surveillances). Additionally, open-air demolition controls of primary side structures are implemented to limit the spread of contamination during demolition.

Impact of Releasing the Subject Property on Part 50 License Basis

The license basis for the CR3 site includes the maintenance of certain programs to fulfill regulatory requirements and functional responsibilities. Throughout decommissioning, these programs will be modified as necessary and terminated when the applicable concern is no longer relevant. These program changes are implemented using the change processes specified for each type of program. The methodology for releasing land requires a review and assessment of the impact on license program for the site lands remaining within the domain of the Part 50 License.

- The Technical Specifications are not impacted by the early release of the subject property.
- The Defueled Safety Analysis Report (DSAR) will require changes to describe the reduced site licensed area boundaries resulting from the release of the subject property from the Part 50 License.
- The Radiological Groundwater Monitoring Program will not be affected by early release of the subject property.
- The Fire Protection Program will not be affected by early release of the subject property.
- The Training Program will not be affected by the early release of the subject property.

CONCLUSION

Based on the results of radiological surveys performed in support of partial site release, along with the reviews and assessments described above, the release of the subject property from the CR3 Part 50 License has no impact on Duke Energy's continued compliance with applicable NRC regulatory standards. Duke Energy has determined under 10 CFR 50.83 that we have adequately evaluated the effect of releasing the subject property, that the subject property has been properly classified as "non-impacted," and that the release of the property will not have any adverse impact on public health or safety or adverse impact on the ability of the site in aggregate to meet 10 CFR Part 20, Subpart E, criteria for unrestricted release. Accordingly, Duke Energy is requesting the NRC to approve the requested release of the subject property under the provisions of 10 CFR 50.83.

REFERENCES

- 1) *Duke Energy Crystal River Plant Description, Sections 28, 29, 31, 32 & 33 Township 17 South, Range 16 East* (SurvTech Solutions, Inc., August 22, 2018)
- 2) NUREG-1575, Rev. 1, “*Multi Agency Radiation Survey and Site Investigation Manual (MARSSIM)*”
- 3) *Historical Site Assessment for Crystal River 3, TSD No. 16-015, Rev. 0* (Radiation Safety & Control Services)
- 4) NUREG-1505, Rev. 1, *A Nonparametric Statistical Methodology for the Design and Analysis of Final Status Decommissioning Surveys*
- 5) EPA/600/R-07/020, *Performance of Statistical Tests for Site Versus Background Soil Comparisons When Distributional Assumptions Are Not Met*
- 6) DD-SC-PN-002, *Characterization Survey Plan*
- 7) DD-SC-PN-01, *Quality Assurance Project Plan (QAPP) for Crystal River 3 Partial Site Release*
- 8) DD-SC-PR-001, *Characterization Survey Plan Development*
- 9) DD-SC-PR-002, *Chain of Custody for Site Characterization*
- 10) DD-SC-PR-003, *Sample Media Collection for Site Characterization*
- 11) DD-SC-PR-004, *Sample Media Preparation for Site Characterization*
- 12) DD-SC-PR-005, *Characterization Survey Data Assessment*
- 13) DD-SC-PR-006, *Survey Data Reporting*
- 14) NUREG-1757, Vol. 2, *Consolidated Decommissioning Guidance: Characterization, Survey, and Determination of Radiological Criteria, Revision 1*
- 15) CR-SC-RPT-001, “*Partial Site Release of the Crystal River Energy Complex, Radiological Survey Final Report*”
- 16) Crystal River Unit 3 Defueled Safety Analysis Report (DSAR)
- 17) Final Environmental Statement (FES) for Crystal River 3

DUKE ENERGY FLORIDA, LLC

**DOCKET NUMBER 50 - 302 / DOCKET NUMBER 72 - 1035
LICENSE NUMBER DPR - 72**

ATTACHMENT 2

DRAFT CRYSTAL RIVER UNIT 3

**DUKE ENERGY CRYSTAL RIVER PLANT DESCRIPTION,
SECTIONS 28, 29, 31, 32 & 33
TOWNSHIP 17 SOUTH, RANGE 16 EAST
(SURVTECH SOLUTIONS, INC., AUGUST 22, 2018)**

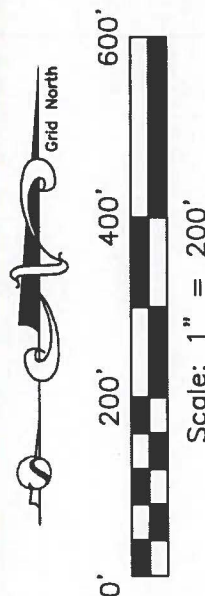
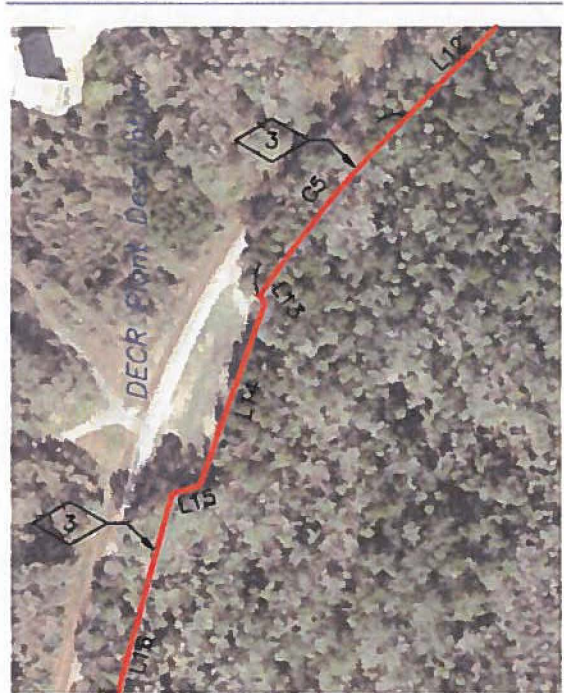
DECR Plant Description Sketch

Sketch & Description
Duke Energy Crystal River Plant Description
Sections 28, 29, 31, 32 & 33 Township 17 South, Range 16 East
Citrus County, Florida

Detail "A"



Detail "B"



See Sheet 10 for Legal Description Qualifying Calls

THIS IS NOT A FIELD SURVEY

PROJECT NO.: 20070032
 PHASE: 31
 LAST FIELD DATE: 7/18/18



SURVTECH SOLUTIONS, INC. SURVEYORS AND MAPPERS

10220 U.S. Highway 92 East, Tampa, FL 33610

phone: (813)-621-4929, fax: (813)-621-7194, Licensed Business #7340

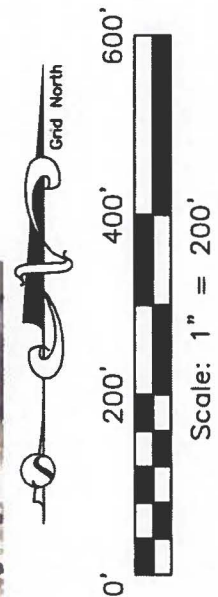
email: sbrown@survtechsolutions.com <http://www.survtechsolutions.com>

Drawing Name: 20070032_31SK

SHEET: 6 OF 19

Sketch & Description
Duke Energy Crystal River Plant Description
Sections 28, 29, 31, 32 & 33 Township 17 South, Range 16 East
Citrus County, Florida

Detail "C"



THIS IS NOT A FIELD SURVEY

PROJECT NO.: 20070032
PHASE: 31
LAST FIELD DATE: 7/18/18



SURVTECH SOLUTIONS, INC. SURVEYORS AND MAPPERS

10220 U.S. Highway 92 East, Tampa, FL 33610

phone: (813)-621-4929, fax: (813)-621-7194, Licensed Business #7340

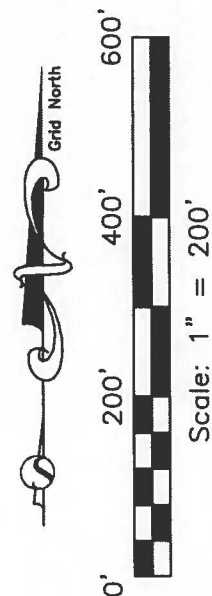
email: sbrown@survtechsolutions.com <http://www.survtechsolutions.com>

Drawing Name: 20070032_31SK

SHEET: 7 OF 19

Sketch & Description
Duke Energy Crystal River Plant Description
Sections 28, 29, 31, 32 & 33 Township 17 South, Range 16 East
Citrus County, Florida

Detail "D"



THIS IS NOT A FIELD SURVEY

PROJECT NO.: 20070032
 PHASE: 31
 LAST FIELD DATE: 7/18/18



SURVTECH SOLUTIONS, INC. SURVEYORS AND MAPPERS
 10220 U.S. Highway 92 East, Tampa, FL 33610
 phone: (813)-621-4929, fax: (813)-621-7194, Licensed Business #7340
 email: sbrown@survtechsolutions.com <http://www.survtechsolutions.com>

Drawing Name: 20070032_31SK

SHEET: 8 OF 19

Sketch & Description
Duke Energy Crystal River Plant Description
Sections 28, 29, 31, 32 & 33 Township 17 South, Range 16 East
Citrus County, Florida

Line Information

Line Information:

LINE	BEARING	DISTANCE
L1	N 00°39'12" W	2647.62'
L2	S 89°28'02" E	5264.62'
L3	S 00°36'50" E	2883.83'
L4	S 59°19'37" W	72.41'
L5	S 09°15'51" W	296.31'
L6	S 86°56'55" E	69.64'
L7	S 00°11'38" W	63.17'
L8	S 00°29'09" W	44.95'
L9	S 31°12'32" W	39.80'
L10	S 04°33'24" W	420.60'
L11	N 89°43'29" W	1450.27'
L12	S 45°14'17" W	690.75'
L13	S 34°23'36" E	10.70'
L14	S 19°56'53" W	215.96'
L15	S 73°48'31" W	31.96'
L16	S 15°18'52" W	747.55'
L17	N 46°09'29" W	103.99'
L18	S 74°47'29" W	1320.58'
L19	S 84°09'04" W	183.83'
L20	S 89°04'50" W	351.67'
L21	N 41°30'58" W	188.25'
L22	N 71°52'09" W	383.16'
L23	N 06°43'16" W	373.76'
L24	N 63°03'04" W	134.93'
L25	N 01°53'57" E	93.81'
L26	N 15°16'27" E	22.75'
L27	N 80°12'56" W	61.09'
L28	N 42°00'11" W	182.57'
L29	N 42°03'09" W	109.07'
L30	N 42°07'09" W	109.06'
L31	N 42°57'43" W	39.62'
L32	N 47°46'52" W	39.18'
L33	N 52°54'06" W	39.57'
L34	N 57°45'59" W	39.14'
L35	N 69°59'27" W	20.92'

Line Information:

LINE	BEARING	DISTANCE
L36	S 77°09'18" W	5145.53'
L37	N 05°04'29" W	430.25'
L38	N 77°33'22" E	3944.20'
L39	N 19°57'31" W	220.80'
L40	N 19°03'26" W	939.21'
L41	N 02°07'23" E	35.66'
L42	N 88°16'26" W	3639.80'
L43	N 00°00'00" W	345.49'
L44	S 88°28'53" E	1461.51'
L45	S 85°20'23" E	1461.50'
L46	N 02°45'30" E	45.13'
L47	N 40°00'37" E	132.68'
L48	S 86°17'04" E	245.38'
L49	S 86°02'02" E	607.43'
L50	N 52°55'57" E	45.67'
L51	S 86°01'46" E	122.99'
L52	S 42°53'12" E	46.23'
L53	S 85°57'35" E	230.08'
L54	N 53°42'27" E	109.55'
L55	N 80°53'44" E	41.36'
L56	N 80°30'02" E	50.82'
L57	N 82°13'46" E	30.90'
L58	N 84°47'47" E	27.24'
L59	N 88°43'56" E	39.40'
L60	S 88°37'22" E	68.16'
L61	S 86°58'29" E	78.13'
L62	S 85°58'08" E	86.72'
L63	N 60°01'50" E	23.49'
L64	N 87°48'16" E	85.49'
L65	S 86°54'36" E	65.09'
L66	N 00°59'12" E	735.00'
L67	S 89°51'16" E	1741.39'
L68	N 01°19'56" W	1775.85'
L69	S 89°55'19" W	303.10'
L70	N 00°19'41" E	917.60'
L71	S 89°28'02" E	490.19'

THIS IS NOT A FIELD SURVEY

PROJECT NO.: 20070032
 PHASE: 31
 LAST FIELD DATE: 7/18/18



SURVTECH SOLUTIONS, INC. SURVEYORS AND MAPPERS

10220 U.S. Highway 92 East, Tampa, FL 33610

phone: (813)-621-4929, fax: (813)-621-7194, Licensed Business #7340

email: sbrown@survtechsolutions.com <http://www.survtechsolutions.com>

Drawing Name: 20070032_31SK

SHEET: 9 OF 19

Sketch & Description
Duke Energy Crystal River Plant Description
Sections 28, 29, 31, 32 & 33 Township 17 South, Range 16 East
Citrus County, Florida

Curve Information

Curve Information:

CURVE	RADIUS	ARC LENGTH	CHORD BEARING	CHORD LENGTH	DELTA ANGLE	TANGENT
C1	173.55'	36.25'	S 05°29'52" E	36.18'	11°58'02"	18.19'
C2	126.61'	67.89'	S 15°50'51" W	67.08'	30°43'23"	34.78'
C3	154.80'	72.01'	S 17°52'58" W	71.36'	26°39'08"	36.67'
C4	499.40'	392.55'	S 67°45'24" W	382.52'	45°02'15"	207.05'
C5	1366.79'	260.56'	S 39°46'36" W	260.17'	10°55'22"	130.68'
C6	632.86'	1309.19'	S 74°34'42" W	1087.92'	118°31'38"	1064.32'

Legal Description Qualifying Calls

- 1 West Boundary of the SW 1/4 of Section 28-17S-16E
- 2 Line being 60.00' South of and parallel with Main Line of Railroad tracks
- 3 Line being 60.00' Southerly of and parallel with Spur Line of Railroad tracks

THIS IS NOT A FIELD SURVEY

PROJECT NO.: 20070032
 PHASE: 31
 LAST FIELD DATE: 7/18/18



SURVTECH SOLUTIONS, INC. SURVEYORS AND MAPPERS
 10220 U.S. Highway 92 East, Tampa, FL 33610
 phone: (813)-621-4929, fax: (813)-621-7194, Licensed Business #7340
 email: sbrown@survtechsolutions.com <http://www.survtechsolutions.com>

Drawing Name: 20070032_31SK

SHEET: 10 OF 19

Sketch & Description
Duke Energy Crystal River Plant Description
 Sections 28, 29, 31, 32 & 33 Township 17 South, Range 16 East
 Citrus County, Florida

DECR Plant Description Corners



DECR Plant Description Corners

0' 2000' 4000' 6000'



Scale: 1" = 2000'

See Sheet 15 for Corner Coordinates

THIS IS NOT A FIELD SURVEY

PROJECT NO.: 20070032
 PHASE: 31
 LAST FIELD DATE: 7/18/18



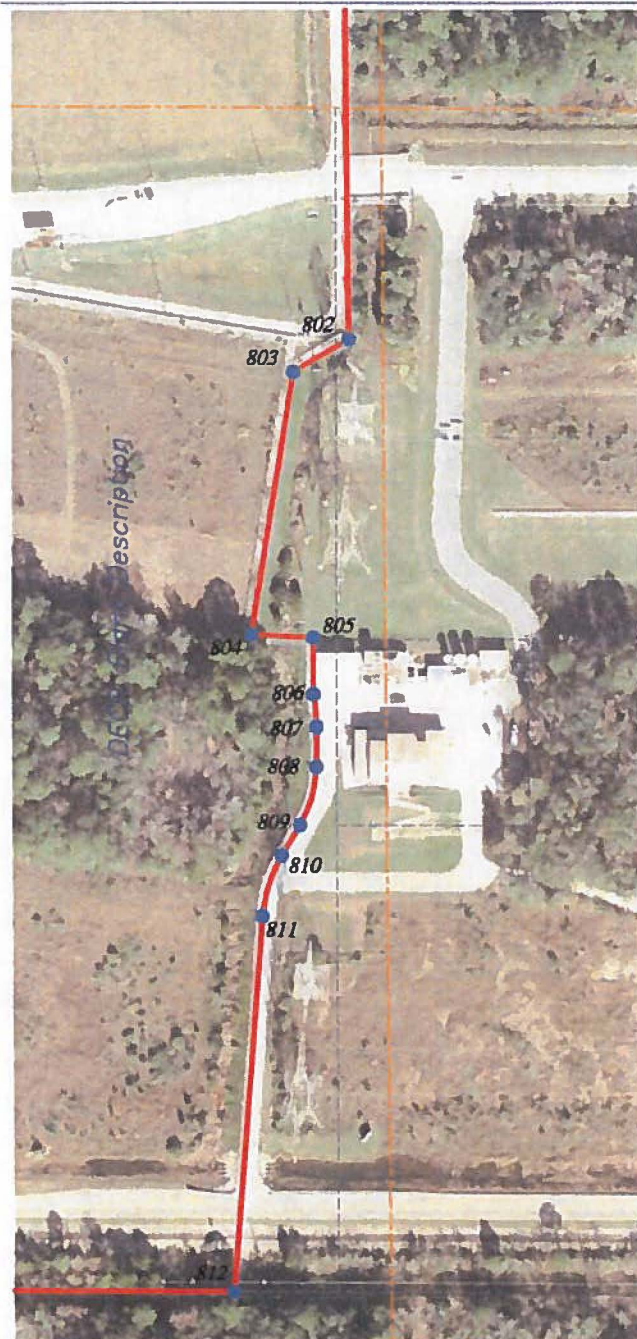
SURVTECH SOLUTIONS, INC. SURVEYORS AND MAPPERS
 10220 U.S. Highway 92 East, Tampa, FL 33610
 phone: (813)-621-4929, fax: (813)-621-7194, Licensed Business #7340
 email: sbrown@survtechsolutions.com <http://www.survtechsolutions.com>

Drawing Name: 20070032_31SK

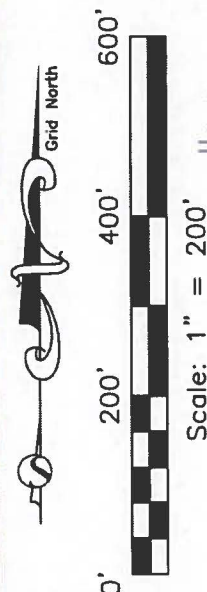
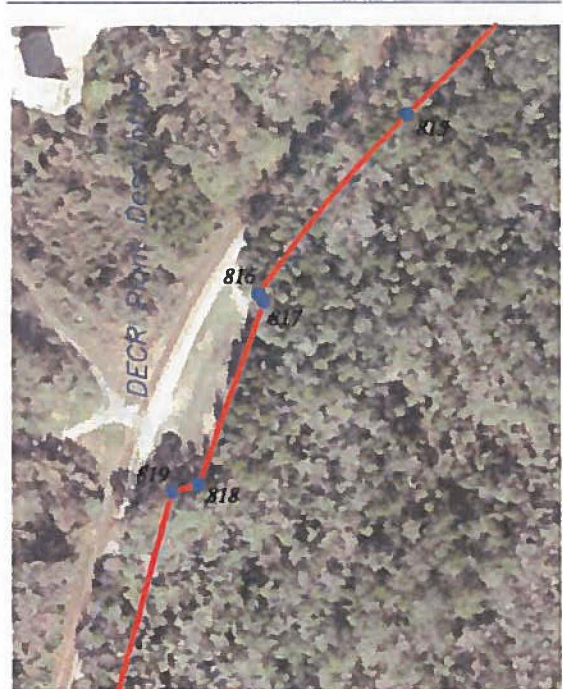
SHEET: 11 OF 19

Sketch & Description
Duke Energy Crystal River Plant Description
Sections 28, 29, 31, 32 & 33 Township 17 South, Range 16 East
Citrus County, Florida

Detail "E"



Detail "F"



**DECRC Plant
Description Corners**

See Sheet 15 for
Corner Coordinates

THIS IS NOT A FIELD SURVEY

PROJECT NO.: 20070032
 PHASE: 31
 LAST FIELD DATE: 7/18/18



SURVTECH SOLUTIONS, INC. SURVEYORS AND MAPPERS
 10220 U.S. Highway 92 East, Tampa, FL 33610
 phone: (813)-621-4929, fax: (813)-621-7194, Licensed Business #7340
 email: sbrown@survtechsolutions.com <http://www.survtechsolutions.com>

Drawing Name: 20070032_31SK

SHEET: 12 OF 19

Sketch & Description
Duke Energy Crystal River Plant Description
Sections 28, 29, 31, 32 & 33 Township 17 South, Range 16 East
Citrus County, Florida

DECR Plant Description Corners

See Sheet 15 for Corner Coordinates

Detail "G"



THIS IS NOT A FIELD SURVEY

PROJECT NO.: 20070032
PHASE: 31
LAST FIELD DATE: 7/18/18



SURVTECH SOLUTIONS, INC. SURVEYORS AND MAPPERS

10220 U.S. Highway 92 East, Tampa, FL 33610

phone: (813)-621-4929, fax: (813)-621-7194, Licensed Business #7340

email: sbrown@survtechsolutions.com <http://www.survtechsolutions.com>

Drawing Name: 20070032_31SK

SHEET: 13 OF 19

Sketch & Description
Duke Energy Crystal River Plant Description
Sections 28, 29, 31, 32 & 33 Township 17 South, Range 16 East
Citrus County, Florida

DECR Plant Description Corners

See Sheet 15 for Corner Coordinates

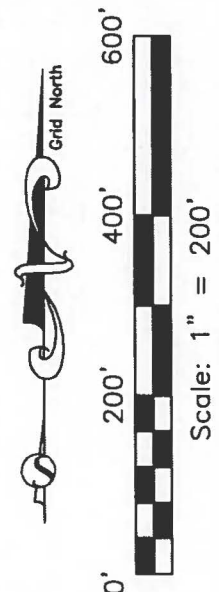
Detail "H"



SEE BELOW



SEE ABOVE



THIS IS NOT A FIELD SURVEY

PROJECT NO.: 20070032
PHASE: 31
LAST FIELD DATE: 7/18/18



SURVTECH SOLUTIONS, INC. SURVEYORS AND MAPPERS

10220 U.S. Highway 92 East, Tampa, FL 33610

phone: (813)-621-4929, fax: (813)-621-7194, Licensed Business #7340

email: sbrown@survtechsolutions.com <http://www.survtechsolutions.com>

Drawing Name: 20070032_31SK

SHEET: 14 OF 19

Sketch & Description
Duke Energy Crystal River Plant Description
Sections 28, 29, 31, 32 & 33 Township 17 South, Range 16 East
Citrus County, Florida
DECR Plant Corner Information

Designation	Northing	Easting
	Florida West	Florida West
	US Survey Feet	US Survey Feet
	NAD 1983	NAD 1983
800	1685971.30	431738.14
801	1685922.36	437002.53
802	1683038.69	437033.43
803	1683001.76	436971.16
804	1682709.32	436923.45
805	1682705.61	436993.00
806	1682642.44	436992.79
807	1682606.42	436996.25
808	1682561.48	436995.87
809	1682496.95	436977.55
810	1682462.91	436956.93
811	1682395.00	436935.02
812	1681975.72	436901.60
813	1681982.69	435451.35
814	1681837.89	435097.29
815	1681351.49	434606.83
816	1681151.54	434440.37
817	1681142.70	434446.42
818	1680939.70	434372.74
819	1680930.79	434342.05
820	1680209.78	434144.61
821	1679920.48	433095.86
822	1679992.51	433020.85
823	1679646.07	431746.52
824	1679627.34	431563.65
825	1679621.70	431212.02
826	1679762.65	431087.24
827	1679881.89	430723.10
828	1680253.08	430679.36
829	1680314.23	430559.08
830	1680407.99	430562.19
831	1680429.93	430568.18
832	1680440.31	430507.98
833	1680575.98	430385.81
834	1680656.97	430312.75
835	1680737.87	430239.61
836	1680766.86	430212.61
837	1680793.19	430183.59
838	1680817.06	430152.03

Designation	Northing	Easting
	Florida West	Florida West
	US Survey Feet	US Survey Feet
	NAD 1983	NAD 1983
839	1680837.93	430118.92
840	1680845.09	430099.27
841	1679701.16	425082.51
842	1680129.72	425044.45
843	1680979.63	428895.99
844	1681187.17	428820.62
845	1682074.90	428513.95
846	1682110.53	428515.28
847	1682220.17	424877.12
848	1682565.66	424877.12
849	1682526.93	426338.12
850	1682408.19	427794.79
851	1682453.26	427796.96
852	1682554.88	427882.26
853	1682538.98	428127.13
854	1682496.97	428733.10
855	1682524.50	428769.55
856	1682515.98	428892.24
857	1682482.11	428923.71
858	1682465.90	429153.21
859	1682530.74	429241.51
860	1682537.28	429282.35
861	1682545.67	429332.47
862	1682549.85	429363.09
863	1682552.32	429390.22
864	1682553.19	429429.61
865	1682551.55	429497.75
866	1682547.43	429575.77
867	1682541.33	429662.28
868	1682553.07	429682.63
869	1682556.35	429768.07
870	1682552.84	429833.07
871	1683287.73	429845.72
872	1683283.31	431587.11
873	1685058.68	431545.82
874	1685058.27	431242.72
875	1685975.86	431247.97

THIS IS NOT A FIELD SURVEY

PROJECT NO.: 20070032
 PHASE: 31
 LAST FIELD DATE: 7/18/18



SURVTECH SOLUTIONS, INC. SURVEYORS AND MAPPERS

10220 U.S. Highway 92 East, Tampa, FL 33610

phone: (813)-621-4929, fax: (813)-621-7194, Licensed Business #7340

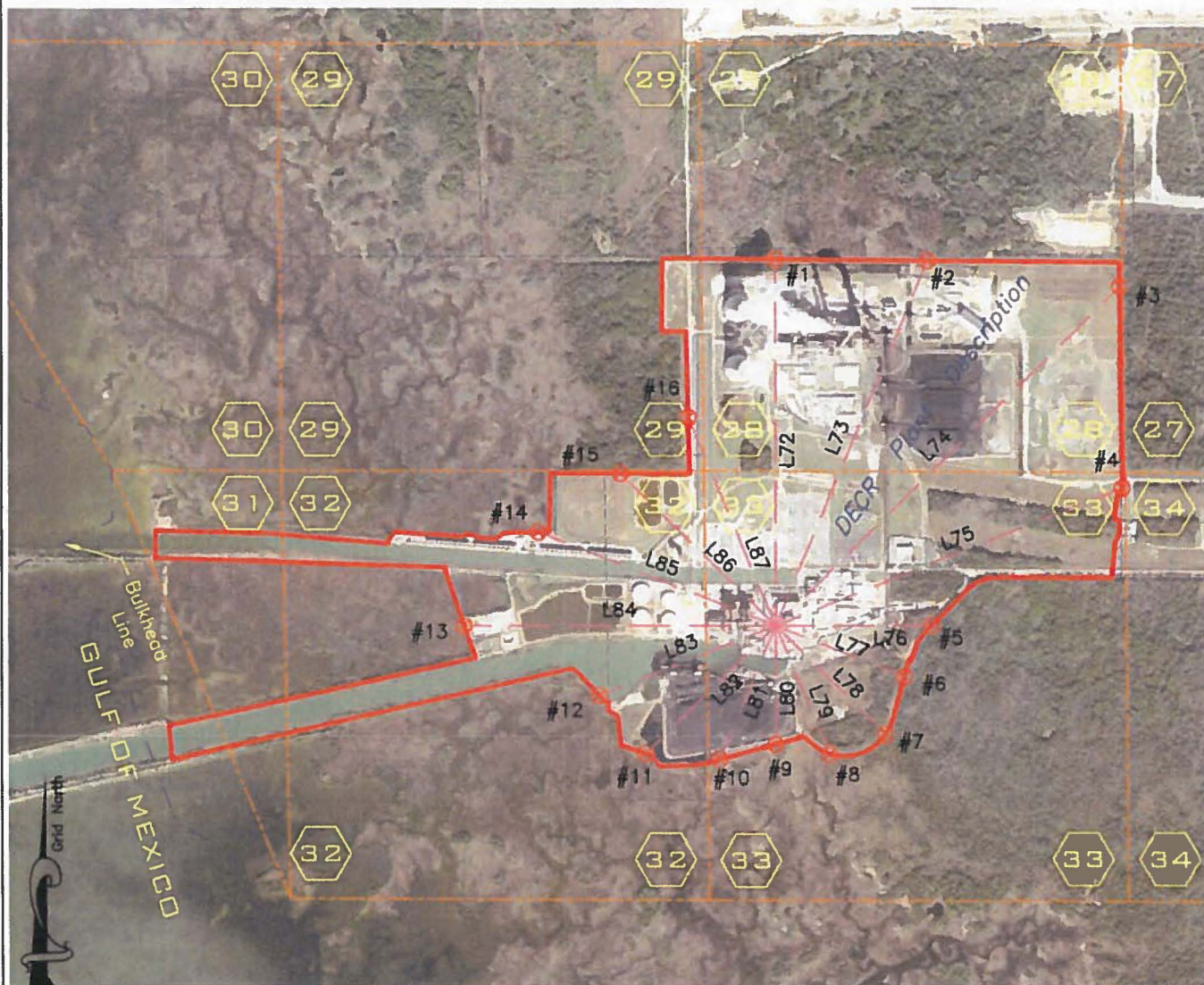
email: sbrown@survtechsolutions.com <http://www.survtechsolutions.com>

Drawing Name: 20070032_31SK

SHEET: 15 OF 19

Sketch & Description
Duke Energy Crystal River Plant Description
Sections 28, 29, 30, 31 & 32 Township 17 South, Range 16 East
Citrus County, Florida

DECR Plant Minimum Exclusion Radius



THIS IS NOT A FIELD SURVEY

0' 2000' 4000' 6000'



Scale: 1" = 2000'

Approximate Center of
Reactor Building (As Supplied)
N: 1681382
E: 432668
LATITUDE: 28°57'25.87"
LONGITUDE: 82°41'55.95"

PROJECT NO.: 20070032
PHASE: 31
LAST FIELD DATE: 7/18/18



SURVTECH SOLUTIONS, INC. SURVEYORS AND MAPPERS

10220 U.S. Highway 92 East, Tampa, FL 33610

phone: (813)-621-4929, fax: (813)-621-7194, Licensed Business #7340
email: sbrown@survtechsolutions.com <http://www.survtechsolutions.com>

Drawing Name: 20070032_31SK

SHEET: 16 OF 19

Sketch & Description
Duke Energy Crystal River Plant Description
Sections 28, 29, 31, 32 & 33 Township 17 South, Range 16 East
Citrus County, Florida

DECR Plant Minimum Exclusion Radius
Tie Point Information

Line Information:

LINE	BEARING	DISTANCE
L72	N 00°00'00" W	4580.91'
L73	N 22°50'00" E	4951.01'
L74	N 45°40'00" E	6064.50'
L75	N 68°30'00" E	4691.28'
L76	N 90°00'00" E	1969.44'
L77	S 68°30'00" E	1743.95'
L78	S 45°40'00" E	1944.49'
L79	S 22°50'00" E	1745.62'
L80	S 00°00'00" E	1485.20'
L81	S 22°50'00" W	1819.78'
L82	S 45°40'00" W	2290.01'
L83	S 68°30'00" W	2386.21'
L84	N 90°00'00" W	3914.52'
L85	N 68°30'00" W	3197.05'
L86	N 45°40'00" W	2724.20'
L87	N 22°50'00" W	2827.42'

Designation	Northing	Easting
	Florida West	Florida West
	US Survey Feet	US Survey Feet
	NAD 1983	NAD 1983
#1	1685962.67	432667.91
#2	1685944.80	434589.16
#3	1685619.83	437005.77
#4	1683101.12	437032.76
#5	1681381.76	434637.35
#6	1680742.60	434290.51
#7	1680022.89	434058.78
#8	1679772.93	433345.31
#9	1679896.56	432667.91
#10	1679704.58	431961.75
#11	1679781.43	431029.90
#12	1680507.21	430447.74
#13	1681381.76	428753.40
#14	1682553.48	429693.33
#15	1683285.51	430719.33
#16	1683987.62	431570.73

THIS IS NOT A FIELD SURVEY

PROJECT NO.: 20070032
 PHASE: 31
 LAST FIELD DATE: 7/18/18



SURVTECH SOLUTIONS, INC. SURVEYORS AND MAPPERS

10220 U.S. Highway 92 East, Tampa, FL 33610

phone: (813)-621-4929, fax: (813)-621-7194, Licensed Business #7340
 email: sbrown@survtechsolutions.com <http://www.survtechsolutions.com>

Sketch & Description
Duke Energy Crystal River Plant Description
Sections 28, 29, 30, 31 & 32 Township 17 South, Range 16 East
Citrus County, Florida

Approximate Parcel Ownership Lines



NOTE: Parcel Ownership Lines depicted hereon are approximate and were taken from the Citrus County Property Appraiser website.

0' 2000' 4000' 6000'



Scale: 1" = 2000'

THIS IS NOT A FIELD SURVEY

PROJECT NO.: 20070032
PHASE: 31
LAST FIELD DATE: 7/18/18



SURVTECH SOLUTIONS, INC. SURVEYORS AND MAPPERS

10220 U.S. Highway 92 East, Tampa, FL 33610

phone: (813)-621-4929, fax: (813)-621-7194, Licensed Business #7340

email: sbrown@survtechsolutions.com <http://www.survtechsolutions.com>

Drawing Name: 20070032_31SK

SHEET: 18 OF 19

Sketch & Description
Duke Energy Crystal River Plant Description
Sections 28, 29, 30, 31 & 32 Township 17 South, Range 16 East
Citrus County, Florida

Parcel Ownership Information

(A)

Parcel Id. #16E17S33 14000
Altkey: 2705892
DUKE ENERGY FLORIDA INC
TAX DEPT - DEC41B
550 S TRYON ST
CHARLOTTE, NC 28202
(ORB UNKNOWN PG UNKNOWN)

(F)

Parcel Id. #16E17S27 20000
Altkey: 3511673
DUKE ENERGY FLORIDA INC
DBA DUKE ENERGY
550 S TRYON ST
CHARLOTTE, NC 28202
(ORB 2630 PG 1075)

(B)

Parcel Id. #16E17S33 42400
Altkey: 1002397
DUKE ENERGY FLORIDA INC
TAX DEPT - DEC41B
550 S TRYON ST
CHARLOTTE, NC 28202
(ORB 2804 PG 352)

(G)

Parcel Id. #16E17S28 12000
Altkey: 3388548
UNITED STATES GYPSUM
COMPANY PROPERTY DEPT #179
PO BOX 6721
CHICAGO, IL 60680 6721
(ORB 2440 PG 918)

(C)

Parcel Id. #16E17S33 10000
Altkey: 1002362
DUKE ENERGY FLORIDA INC
TAX DEPT - DEC41B
550 S TRYON ST
CHARLOTTE, NC 28202
(ORB UNKNOWN PG UNKNOWN)

(H)

Parcel Id. #16E17S10 10000
Altkey: 3511660
HCR LIMESTONE INC
ATTN HOLCIM TAX DEPARTMENT
201 JONES RD
WALTHAM, MA 02451
(ORB UNKNOWN PG UNKNOWN)

(D)

Parcel Id. #16E17S34 44400
Altkey: 2705884
DUKE ENERGY FLORIDA INC
TAX DEPT - DEC41B
550 S TRYON ST
CHARLOTTE, NC 28202
(ORB UNKNOWN PG UNKNOWN)

(I)

Parcel Id. #16E17S33 11000
Altkey: 2620251
DUKE ENERGY FLORIDA INC
TAX DEPT - DEC41B
550 S TRYON ST
CHARLOTTE, NC 28202
(ORB UNKNOWN PG UNKNOWN)

(E)

Parcel Id. #16E17S34 11000
Altkey: 1002401
DUKE ENERGY FLORIDA INC
TAX DEPT - DEC41B
550 S TRYON ST
_OTTE, NC 28202(ORB UNKNOWN PG UNKNOWN)

NOTE: Parcel information and most recent ORB/PG (if any)
depicted hereon was taken from the Citrus County
Property Appraiser website.

THIS IS NOT A FIELD SURVEY

PROJECT NO.: 20070032
PHASE: 31
LAST FIELD DATE: 7/18/18



SURVTECH SOLUTIONS, INC. SURVEYORS AND MAPPERS

10220 U.S. Highway 92 East, Tampa, FL 33610
phone: (813)-621-4929, fax: (813)-621-7194, Licensed Business #7340
email: sbrown@survtechsolutions.com <http://www.survtechsolutions.com>








Drawing Name: 20070032_31SK

SHEET: 19 OF 19

Sketch & Description
Duke Energy Crystal River Plant Description
Sections 28, 29, 31, 32 & 33 Township 17 South, Range 16 East
Citrus County, Florida
Surveyor's Notes

- 1.) Not valid without the signature and original raised seal of a Florida Licensed Surveyor and Mapper.
- 2.) The bearing structure for this survey is based on a NAD 1983 Florida State Plane West Zone, bearing of S 89°42'09" E for the South Boundary of Section 28-17S-16E.
- 3.) The horizontal datum utilized for this project is NAD 1983 Florida West Zone, 2011 Adjustment, U.S. Survey Feet. Said datum was established by utilizing the Florida Permanent Reference Network (FPRN).
- 4.) The aeriels depicted hereon are from 2017 and obtained from the LABINS website (www.labins.org)
- 5.) The Duke Energy Crystal River Plant Description depicted hereon was written and created by SurvTech utilizing: a) supplied data, b) supplied limits, and c) specific features located in the field as specified per client, including but not exclusive to: fences, barricades, railroad tracks, or top of bank of canals/ditches, to be used for limits of said description.
- 6.) A parent tract legal description could not be obtained by SurvTech, nor was one provided. Site area is a continuously changing and working plant, with multiple uses. Site area is also delineated in multiple tax parcels per the Citrus County Property Appraiser website. The limits as depicted hereon were created using supplied surveys and specific site features located in the field as directed by client.
- 7.) Bulkhead Line depicted hereon per "BULKHEAD LINE PLAT" performed by Moorehead Engineering Company, potentially dated 10/4/63, as supplied by client, "SUR-0071-D", "Crystal River Plat Bulkhead Line Plat ?(Illegible), 60073902.pdf"
- 8.) THIS IS NOT A BOUNDARY SURVEY.

**Legend &
Abbreviations**

P.S.M.	Professional Surveyor and Mapper
Id.	Identification
LB	Licensed Business
ORB	Official Records Book
PG	Page
CCR	Certified Corner Record per FDEP
FDEP	Florida Department of Environmental Protection
DECR	Duke Energy Crystal River
	Legal Description Qualifying Call
	Parcel Ownership Designation
	Section Designation
	Approximate Parcel Line
	Approximate Section Line
	DECR Corner Deflection
	DECR Exclusion Radius Tie Point

Stacy L. Brown P.S.M. No. 6516
SurvTech Solutions, Inc. LB No. 7340

Project No.: 20070032

Phase: 31

Drawing Name: 20070032_31SK

Last Field Date: 7/18/18

Field Book/Page: 18-14/28

Drafted By: B. Stinson

Date Drafted: 8/08/18

Revision Date: N/A

Approved By: S. Brown

Date Approved: 8/13/18

SURVTECH SOLUTIONS, INC. SURVEYORS AND MAPPERS

10220 U.S. Highway 92 East, Tampa, FL 33610

phone: (813)-621-4929, fax: (813)-621-7194, Licensed Business #7340

email: sbrown@survtechsolutions.com <http://www.survtechsolutions.com>

THIS IS NOT A FIELD SURVEY

SURVEYING TODAY WITH
TOMORROW'S TECHNOLOGY



Sketch & Description
Duke Energy Crystal River Plant Description
Sections 28, 29, 31, 32 & 33 Township 17 South, Range 16 East
Citrus County, Florida

Duke Energy Plant Legal Description

Duke Energy Plant Legal Description: As Written by SurvTech Solutions

A parcel of land lying and being in Sections 28, 29, 31, 32, and 33, Township 17 South, Range 16 East, Citrus County, Florida, being more particularly described as follows:

COMMENCE at a point marking the Southwest corner of the Southwest 1/4 of Section 28, Township 17 South, Range 16 East, Citrus County, Florida; thence coincident with the West boundary of the Southwest 1/4 of said Section 28, N 00°39'12" W a distance of 2647.62 feet to the POINT OF BEGINNING; thence departing said West boundary, S 89°28'02" E a distance of 5264.62 feet; thence S 00°36'50" E a distance of 2883.83 feet; thence S 59°19'37" W a distance of 72.41 feet; thence S 09°15'51" W a distance of 296.31 feet; thence S 86°56'55" E a distance of 69.64 feet; thence S 00°11'38" W a distance of 63.17 feet to a point coincident with a non-tangent curve, concave Westerly, said curve having a radius of 173.55 feet, a delta angle of 11°58'02", and being subtended by a chord bearing of S 05°29'52" E for a distance of 36.18 feet; thence coincident with the arc of said curve for a distance of 36.25 feet; thence S 00°29'09" W a distance of 44.95 feet to a point coincident with a tangent curve, concave Westerly, said curve having a radius of 126.61 feet, a delta angle of 30°43'23", and being subtended by a chord bearing of S 15°50'51" W for a distance of 67.08 feet; thence coincident with the arc of said curve for a distance of 67.89 feet; thence S 31°12'32" W a distance of 39.80 feet to a point coincident with a tangent curve, concave Easterly, said curve having a radius of 154.80 feet, a delta angle of 26°39'08", and being subtended by a chord bearing of S 17°52'58" W for a distance of 71.36 feet; thence coincident with the arc of said curve for a distance of 72.01 feet; thence S 04°33'24" W a distance of 420.60 feet to a point coincident with a line being 60.00 feet South of and parallel with the main line of a set of railroad tracks; thence coincident with said parallel line, N 89°43'29" W a distance of 1450.27 feet to a point marking the intersection of a line being 60.00 feet South of and parallel with the main line of said railroad tracks with a line being 60.00 feet Southerly of and parallel with a spur line of said railroad tracks, said point also being a point coincident with a tangent curve, concave Southerly, said curve having a radius of 499.40 feet, a delta angle of 45°02'15", and being subtended by a chord bearing of S 67°45'24" W for a distance of 382.52 feet; thence departing said parallel line with the main line of said railroad tracks, coincident with said line being 60.00 feet Southerly of and parallel with the spur line of said railroad tracks, also being coincident with the arc of said curve for a distance of 392.55 feet; thence continue coincident with said parallel line being 60.00 feet Southerly of said spur line for the following two (2) courses: 1) S 45°14'17" W a distance of 690.75 feet to a point coincident with a tangent curve, concave Southeasterly, said curve having a radius of 1366.79 feet, a delta angle of 10°55'22", and being subtended by a chord bearing of S 39°46'36" W for a distance of 260.17 feet; 2) thence coincident with the arc of said curve for a distance of 260.56 feet; thence departing said parallel line, S 34°23'36" E a distance of 10.70 feet; thence S 19°56'53" W a distance of 215.96 feet; thence S 73°48'31" W a distance of 31.96 feet to a point coincident with the aforesaid line being 60.00 feet Southerly of and parallel with the spur line of said railroad tracks;

CONTINUED ON SHEET 3

THIS IS NOT A FIELD SURVEY

PROJECT NO.: 20070032
PHASE: 31
LAST FIELD DATE: 7/18/18



SURVTECH SOLUTIONS, INC. SURVEYORS AND MAPPERS

10220 U.S. Highway 92 East, Tampa, FL 33610

phone: (813)-621-4929, fax: (813)-621-7194, Licensed Business #7340

email: sbrown@survtechsolutions.com <http://www.survtechsolutions.com>

Drawing Name: 20070032_31SK

SHEET: 2 OF 19

Sketch & Description
Duke Energy Crystal River Plant Description
Sections 28, 29, 31, 32 & 33 Township 17 South, Range 16 East
Citrus County, Florida

Duke Energy Plant Legal Description

CONTINUED FROM SHEET 2

thence coincident with said parallel line for the following two (2) courses: 1) S 15°18'52" W a distance of 747.55 feet to a point coincident with a tangent curve, concave Northerly, said curve having a radius of 632.86 feet, a delta angle of 118°31'38", and being subtended by a chord bearing of S 74°34'42" W for a distance of 1087.92 feet; 2) thence coincident with the arc of said curve for a distance of 1309.19 feet; thence departing said parallel line, N 46°09'29" W a distance of 103.99 feet; thence S 74°47'29" W a distance of 1320.58 feet; thence S 84°09'04" W a distance of 183.83 feet; thence S 89°04'50" W a distance of 351.67 feet; thence N 41°30'58" W a distance of 188.25 feet; thence N 71°52'09" W a distance of 383.16 feet; thence N 06°43'16" W a distance of 373.76 feet; thence N 63°03'04" W a distance of 134.93 feet; thence N 01°53'57" E a distance of 93.81 feet; thence N 15°16'27" E a distance of 22.75 feet; thence N 80°12'56" W a distance of 61.09 feet; thence N 42°00'11" W a distance of 182.57 feet; thence N 42°03'09" W a distance of 109.07 feet; thence N 42°07'09" W a distance of 109.06 feet; thence N 42°57'43" W a distance of 39.62 feet; thence N 47°46'52" W a distance of 39.18 feet; thence N 52°54'06" W a distance of 39.57 feet; thence N 57°45'59" W a distance of 39.14 feet; thence N 69°59'27" W a distance of 20.92 feet; thence S 77°09'18" W a distance of 5145.53 feet; thence N 05°04'29" W a distance of 430.25 feet; thence N 77°33'22" E a distance of 3944.20 feet; thence N 19°57'31" W a distance of 220.80 feet; thence N 19°03'26" W a distance of 939.21 feet; thence N 02°07'23" E a distance of 35.66 feet; thence N 88°16'26" W a distance of 3639.80 feet; thence N 00°00'00" W a distance of 345.49 feet; thence S 88°28'53" E a distance of 1461.51 feet; thence S 85°20'23" E a distance of 1461.50 feet; thence N 02°45'30" E a distance of 45.13 feet; thence N 40°00'37" E a distance of 132.68 feet; thence S 86°17'04" E a distance of 245.38 feet; thence S 86°02'02" E a distance of 607.43 feet; thence N 52°55'57" E a distance of 45.67 feet; thence S 86°01'46" E a distance of 122.99 feet; thence S 42°53'12" E a distance of 46.23 feet; thence S 85°57'35" E a distance of 230.08 feet; thence N 53°42'27" E a distance of 109.55 feet; thence N 80°53'44" E a distance of 41.36 feet; thence N 80°30'02" E a distance of 50.82 feet; thence N 82°13'46" E a distance of 30.90 feet; thence N 84°47'47" E a distance of 27.24 feet; thence N 88°43'56" E a distance of 39.40 feet; thence S 88°37'22" E a distance of 68.16 feet; thence S 86°58'29" E a distance of 78.13 feet; thence S 85°58'08" E a distance of 86.72 feet; thence N 60°01'50" E a distance of 23.49 feet; thence N 87°48'16" E a distance of 85.49 feet; thence S 86°54'36" E a distance of 65.09 feet; thence N 00°59'12" E a distance of 735.00 feet; thence S 89°51'16" E a distance of 1741.39 feet; thence N 01°19'56" W a distance of 1775.85 feet; thence S 89°55'19" W a distance of 303.10 feet; thence N 00°19'41" E a distance of 917.60 feet; thence S 89°28'02" E a distance of 490.19 feet to the POINT OF BEGINNING.

Containing an area of 38,489,493.36 square feet, 883.597 acres, more or less.

THIS IS NOT A FIELD SURVEY

PROJECT NO.: 20070032
PHASE: 31
LAST FIELD DATE: 7/18/18



SURVTECH SOLUTIONS, INC. SURVEYORS AND MAPPERS

10220 U.S. Highway 92 East, Tampa, FL 33610

phone: (813)-621-4929, fax: (813)-621-7194, Licensed Business #7340

email: sbrown@survtechsolutions.com <http://www.survtechsolutions.com>

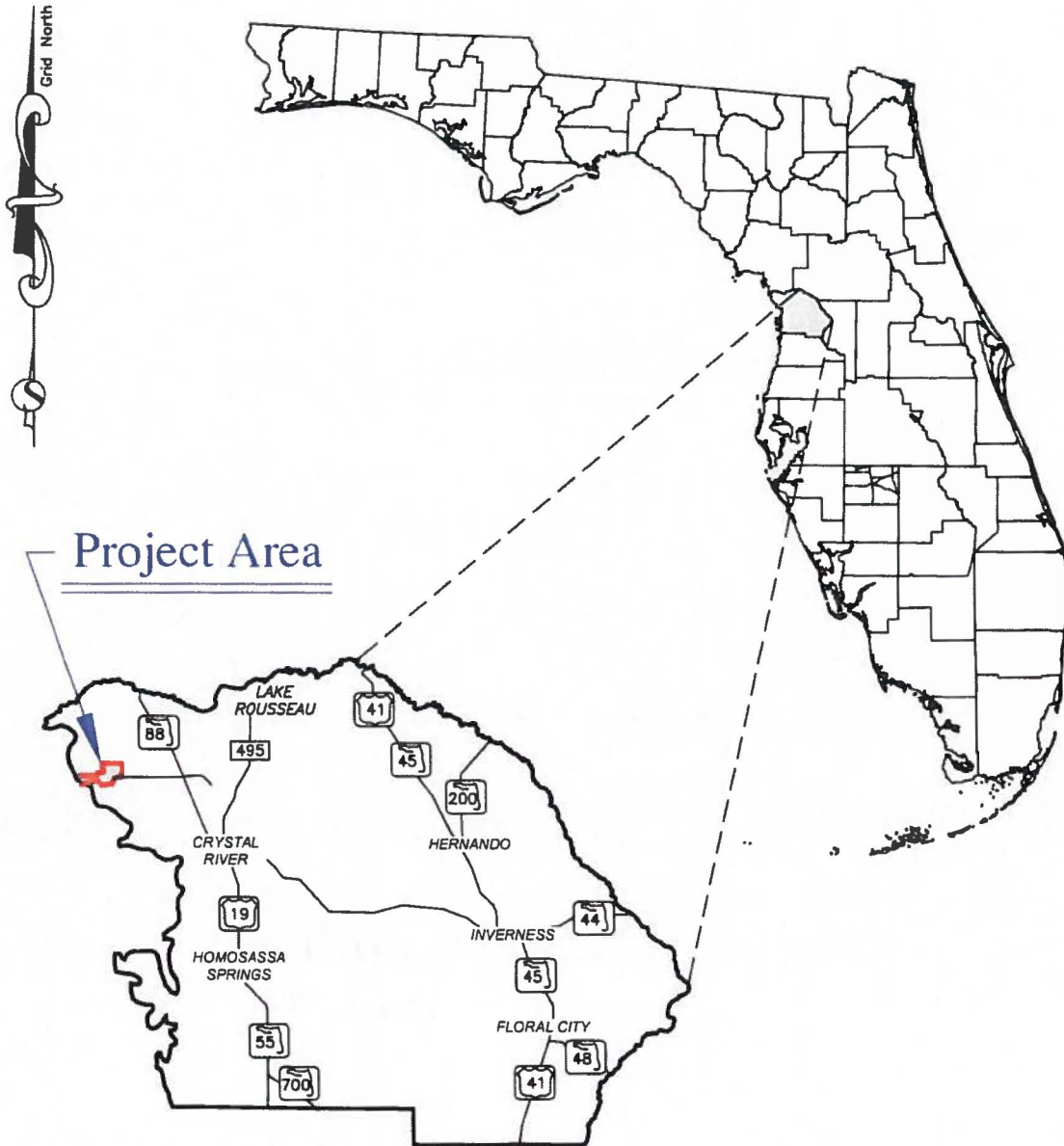
Drawing Name: 20070032_31SK

SHEET: 3 OF 19

Sketch & Description
Duke Energy Crystal River Plant Description
Sections 28, 29, 31, 32 & 33 Township 17 South, Range 16 East
Citrus County, Florida

Vicinity Map

Not to Scale



THIS IS NOT A FIELD SURVEY

PROJECT NO.: 20070032
PHASE: 31
LAST FIELD DATE: 7/18/18



SURVTECH SOLUTIONS, INC. SURVEYORS AND MAPPERS
10220 U.S. Highway 92 East, Tampa, FL 33610
phone: (813)-621-4929, fax: (813)-621-7194, Licensed Business #7340
email: sbrown@survtechsolutions.com <http://www.survtechsolutions.com>

Drawing Name: 20070032_31SK

SHEET: 4 OF 19

DUKE ENERGY FLORIDA, LLC

**DOCKET NUMBER 50 - 302 / DOCKET NUMBER 72 - 1035
LICENSE NUMBER DPR - 72**

ATTACHMENT 3

DRAFT CRYSTAL RIVER UNIT 3

**COMPUTER DISK CONTAINING
NON-NRC REFERENCED DOCUMENTS**