Spotsylvania Solar Energy Center
Proposed Soil Testing and Remediation Plan
Operations Phase

1.0 Introduction

The purpose of this plan is to describe a Cadmium Telluride soil screening program, its methodology, protocols, and reporting procedures for the Spotsylvania Solar Energy Center proposed by sPower. The creation of this plan was proposed by Dewberry Engineers Inc. in their review of sPower cases SUP18-001, -002, and -003 dated November 26, 2018, for Spotsylvania County Staff.

1.1 Dewberry's Findings

In the November 26, 2018 review document submitted to Spotsylvania County Staff, Dewberry found:

> *Based upon our review of the above referenced documents, there is little evidence to suggest that CdTe based solar panels present risk to the population or environment. If they are handled properly during all phases of construction and disposal, they will not emit any toxicity into the environment.*
>
> *According to "Environmental Life Cycle Assessment of Cadmium Telluride Solar Cells: Cd Emissions", emissions of Cd can only happen during an accidental fire. Experiments have been conducted with fire and almost none of the Cd (0.04%) was actually released into the environment.*
> *Below are some risks associated with everyday life, where risks are prevalent.*
> *Some common uses of Cd that pose a risk include:*
>
> - *Ni-Cd batteries – these batteries use Cd, which is less stable than CdTe.*
> - *Coal & Petroleum – Coal and petroleum both contain Cd and it is emitting during burning.*
> - *Plastic – Cd is used as a stabilizer and for pigments in plastics.*
>
> *According to "The Health Risks of Cadmium in Cigarette Smoke":*
>
> - *Cadmium is present in water and foods because it is naturally occurring in water and soils.*
> - *Per the EPA, a safe level of Cadmium in drinking water is 5 ppb (parts per billion).*
> - *Cadmium occurs naturally in food: it is highest in vegetables, potatoes, meats, shellfish*
> - *Most foods in US contain 2 to 40 ppb.*
> - *Single cigarettes contain 1-2 mcg (micrograms) of Cadmium and produce 1,000 – 3,000 ppb in the smoke that is emitted. For each pack of cigarettes, the body will absorb approximately 1-3 mcg of cadmium.*
> - *It is estimated that the average person also ingested 30 mcg of Cadmium per day. The body only retains about 1-3 mcg of what it ingests.*

These findings support sPower's own findings regarding Cadmium Telluride panels and are in accordance with the assertion the panels present no risk to human or environmental health and safety.

1.2 Purpose

The purpose of the following protocol is to establish baseline levels of cadmium present at the proposed Spotsylvania Solar Energy Center site and monitor those levels through the life of the project. The protocol also outlines remediation action in the event baseline levels rise to quantities greater than environmental and human health and safety standards as a result of solar panel-related activities as per Virginia DEQ Tier II Screening Levels, and EPA Region 3 Residential Screening Levels.

2.0 Soil Testing

2.1 Baseline Sample Collection

2.1.1 Sample Collection Methodology

Soil samples collected during the geotechnical engineering effort will be analyzed for background (anthropogenic or naturally occurring) cadmium using the analyses described in Section 2.3 below. Samples will be collected from 1-2 feet below ground surface (bgs) and located in the area where CdTe panels will be used. A total of five (5) samples will be collected at random to define baselines conditions in these areas: 3 random locations within Site A, 1 location within Site B, and 1 location within Site C.

2.2 Operations Phase Sample Collection

2.2.1 Sample Collection Methodology

Sampling procedure shall be the following, derived from the Virginia Department of Environmental Quality Storage Tank Program Technical Manual 4th edition, section Z.5.1.1 "Collecting soil samples with a soil auger or a soil probe":

1. Advance a clean, decontaminated hand auger into the area of concern [5ft bgs] until the one auger bucket of material has been collected.
2. Don clean latex gloves and remove the first centimeter (approximately) from the bit end of the auger and discard that soil.
3. Remove the soil from the bit end and place that soil in the sampling containers that are appropriate for the analyses to be performed.
4. Label the sample containers.
5. Record information about soil texture, odor, color, and other soil characteristics.
6. Place soil remaining in the auger after sample collection back in the excavation.
7. Decontaminate the auger using a detergent solution and deionized water before another soil sample is collected.

Samples will be collected at 1-2 feet (bgs) using the auger methodology described above and collected at the frequency described in section 2.2.2 below.

2.2.2 Sample Location and Frequency

The potential for Cadmium Telluride to be released into the environment is extremely unlikely as noted in the Dewberry report (2018). sPower staff will collect 5 samples, samples in the CdTe panel arrays and at any operational facility where CdTe panels are stored: 3 samples within Site A, 1 sample within Site B, and 1 sample within Site C. During each sampling event, at least one sample should be taken from outside the solar array to serve as a control and document possible changes in the anthropogenic or naturally occurring baseline levels. Sample event frequency will be once every five (5) years. If requested, sPower will provide County Staff with at least 48-hour advance notice of all sampling events should the County wish to provide oversite of the sampling activity.

2.3 Sample Analysis

All samples collected in sections 2.1 and 2.2 will be sent to an Environmental Laboratory Program (ELAP) certified laboratory for analysis. Samples will be analyzed for Cadmium by USEPA Method 6020, or equivalent. Analysis results will be screened against the background levels as per Virginia DEQ Tier II Screening Levels, and EPA Region 3 Residential Screening Levels.

2.4 Reporting

sPower or their engineers will generate sampling reports for each sample event. Each report will contain at a minimum:

-sample location(s) map
-copy of the laboratory sample chain of custody
-laboratory analytical results
-summary report

Reports will be provided to the County via electronic copy and will be retained by the applicant for the life of the facility.

3.0 Remediation

In the event that the laboratory analysis indicates Cadmium levels above the Virginia DEQ Tier II Screening Levels, and EPA Region 3 Residential Screening Levels when compared against the control, sPower shall contact Spotsylvania County Staff within 24 hours of receiving the laboratory results. sPower and County Staff will then coordinate and determine next steps regarding further characterization and remediation of the sampled area, including, but not limited to: additional sampling and soil removal.