January 18, 2012

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Subject: Composite Sampling Pilot Study Report
Midland Area Soils
MID 000 724 724

Please find the attached Composite Sampling Pilot Study Summary Report

If you have any comments or questions related to the attached Summary Report please contact me.

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Enclosure
mdc

The Dow Chemical Company
Draft Composite Sampling Pilot Study Summary Report

Prepared
January 2012
Prepared by URS Corporation

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## Tables



## Figures

**Attachments**

# 1.0 Introduction

This Summary Report has been prepared for The Dow Chemical Company (Dow) to detail the implementation and completion of a Pilot Study to demonstrate incremental composite soil sampling and its applicability to the Midland Area Soils project. Recent work in 2010 and previous studies performed in 1984, 1996, 1998, 2005, and 2006 (CH2M Hill, 2007) have identified soil analytical results above generic Michigan Department of Environmental Quality (MDEQ) Direct contact criteria in some Midland Area Soils. Through discussions with the MDEQ, the concept of incremental composite soil sampling was presented and MDEQ requested a pilot study be performed to demonstrate the method. Incremental Sampling (IS) is a structured soil sample collection and processing protocol designed for the collection and combination of a number of soil increments from a sample area to produce one sample result for analysis that contains the constituents of concern in exactly the same proportion as the sampled area.

This Pilot Study Summary Report presents the objectives of the study, describes the various studies that were performed as part of this effort, and the results of the studies.

## *1.1 Objectives*

The Pilot Study demonstrates incremental composite soil sampling as it relates to the Midland Area Soils project. The pilot study was designed to meet the following objectives, considering the scale of interest ranges from ¼-acre to approximately 4 acres in size:

- Establishing variability associated with field and laboratory methods:
    - Establish appropriate practices for field collection, homogenization and handling in the field;
    - Establish appropriate practices for sample handling and extraction in the laboratory;
    - Analyze the contribution of field and laboratory methods to the overall data variability; and
    - Comparability between MAS Fast Analysis and 1613b.

- Understanding of site-specific variability in the environment:
    - Establish an appropriate number of increments for composite sampling across the scales of interest; and
    - Conduct a preliminary evaluation of representativeness and reliability of larger-scale composite area for decision-making.

Each objective presented above is discussed in further detail in this report.

## *1.2 Pilot Study Overview*

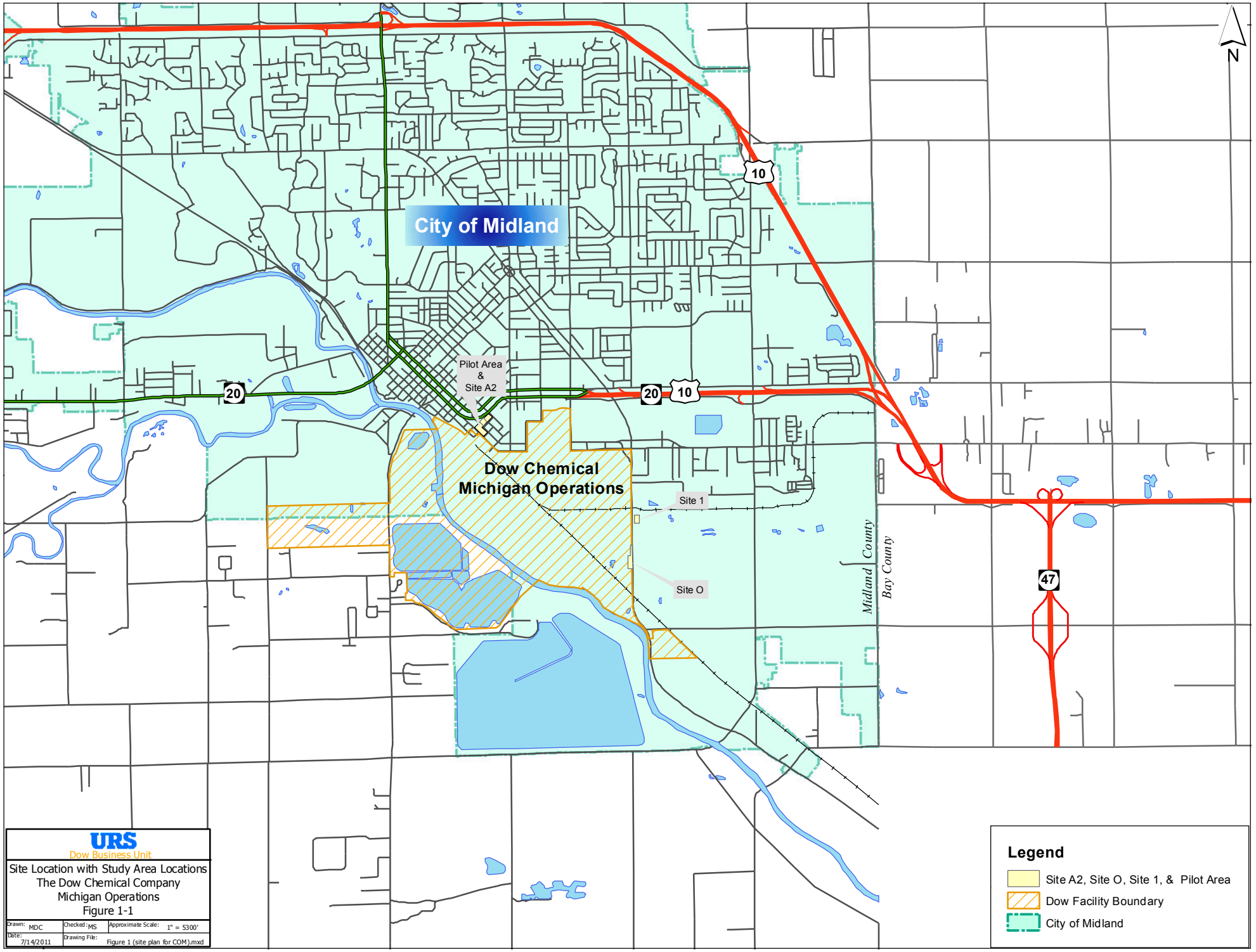
The Composite Sampling Pilot Study Work Plan was submitted to MDEQ on July 15, 2011 and then subsequently revised and resubmitted on July 22, 2011. The approach for implementing Phase 1 of the effort, which addresses the first objective (establish variability associated with field and laboratory methods), was approved on August 5, 2011. Phase 1 was then implemented during August 2011. The approach for Phase 2 of the effort, which addresses the second objective (understanding site-specific variability in the environment), was approved with modifications on October 6, 2011 and also implemented during October 2011. The MDEQ Phase 2 modifications included the following:

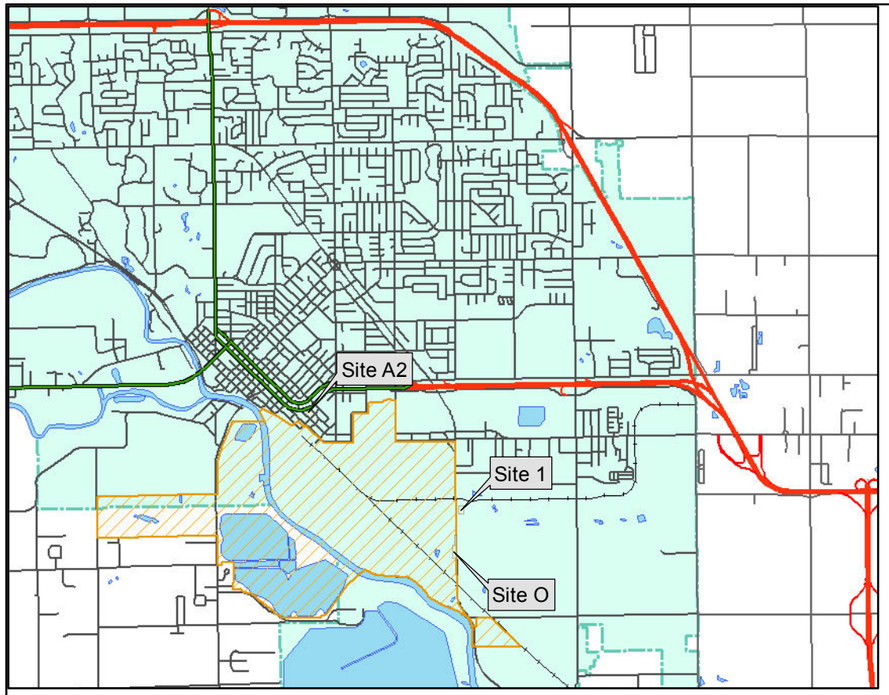
1. During Phase 2 implementation, Dow will collect and analyze at least 10 individual increments from four of the ¼-acre sampling units (one in each 1-acre subplot) in order to compare the mean of the individual increments for the test plots to the composite result for the same test plot.
2. Dow will test the use of a "riffle splitter" to split composite samples for analysis from Area O. These results will be compared to the Phase I results to determine which will be the better method to use (if one method proves to be superior over the other).

The implementation of the pilot study involved not only demonstrating the method itself (from sample collection to laboratory analysis) but also involved a plan to collect multiple composite samples over a range of geographic unit sizes (scales of interest range from ¼-acre to approximately 4 acres in size). The pilot study included the collection of replicate (triplicate) samples and collecting samples based on a range of sample increments. This Pilot Study

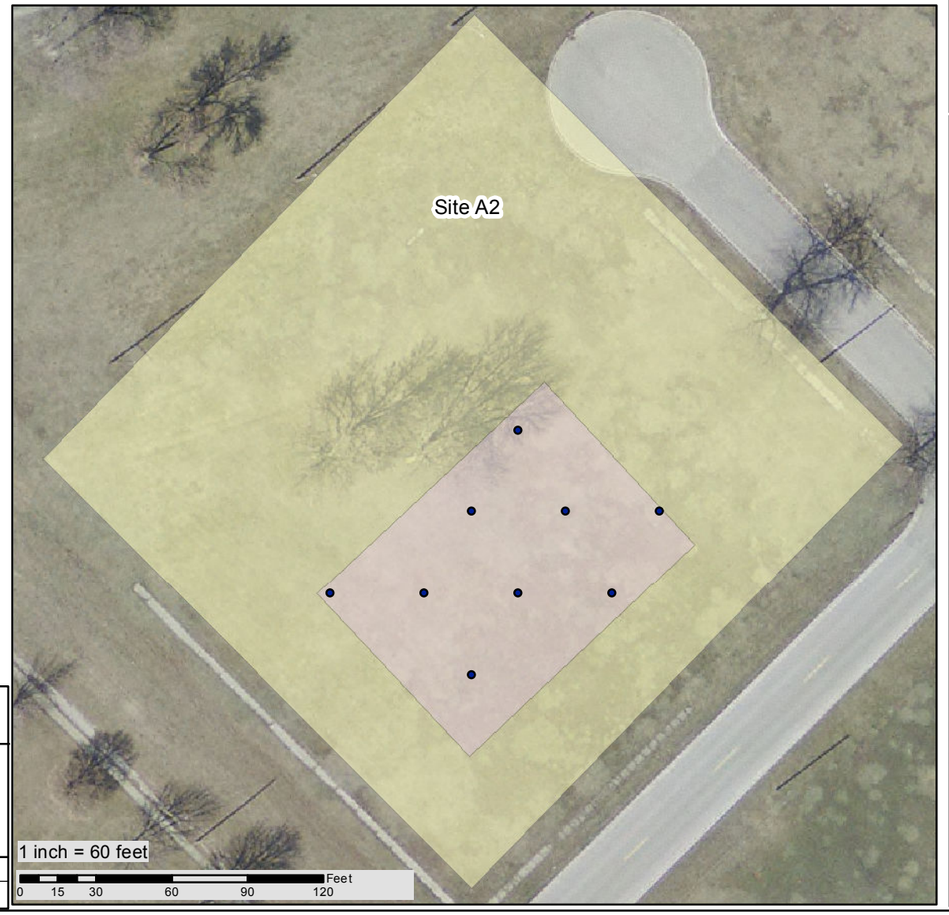
Summary Report provides the details of the sample collection and plan for utilizing these samples to meet the objectives outlined in Section 1.1.

Figure 1-1 presents the study area locations. The pilot study was conducted in two phases, both in smaller sites surrounding the Michigan Operations Facility and at a select acreage of Dow-owned property to the north of the facility. Figure 1-2 depicts the properties selected for the study area to demonstrate the method addressing the first objective. Figure 1-3 depicts the properties selected for the study area to evaluate the number of increments, size of unit, and variability to address the second objective.


City of Midland
Pilot Area
&
Site A2
Dow Chemical
Michigan Operations
Site 1
Site O
Midland County
Bay County
10
20
47
N
URS
Dow Business Unit
Site Location with Study Area Locations
The Dow Chemical Company
Michigan Operations
Figure 1-1
Drawn: MDC
Checked: MS
Approximate Scale: 1" = 5300'
Date: 7/14/2011
Drawing File: Figure 1 (site plan for COM).mxd
Legend
Site A2, Site O, Site 1, & Pilot Area
Dow Facility Boundary
City of Midland




Soil Sample Example Locations





## Legend

- Sample Locations
- Sample Locations .25 acres
- Site A2, Site O, and Site 1
- Dow Facility Boundary

URS
Dow Business Unit

Sites A2, O, and Site 1
The Dow Chemical Company
Michigan Operations
Figure 1-2

| | | |
|---|---|---|
| Drawn: MDC | Checked: MS | Approximate Scale: 1" = 700' |
| Date: 7/14/2011 | Drawing File: Figure 1-2_Site Sites A2-O-1.mxd | |

**Figure 1-3. Schematic of Field Replicate Composites**

**Site A2, Site O, and Site 1 1/4-acre sampling areas**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |

| | |
|---|---|
| 75 | Collect Increment and extrude into jar for later compositing |
| 76 | Collect increment and extrude directly into composite container in the field |
| 77 | Collect increment and extrude directly into composite container in the field |

**Increment Samples Collection:**

will collect 27 replicates
Systematic grid with random-start for PA1.

# 2.0 Formulation of Decisions and Statistical Hypothesis

To achieve the objectives stated above, testable hypotheses, as appropriate, were established for each of the objective components. This step included formulating a null hypothesis (or baseline condition) and an alternative hypothesis (bearing the burden of proof). Once these are established for each component, the pilot study was designed to collect samples in a manner that allowed for testing the hypothesis. An additional objective of the pilot study is to collect data to inform further work as the project progresses.

## *2.1 Establishing Variability Associated with Field and Laboratory Methods*

Phase 1 of the Pilot Study addresses the first project objective. Demonstrating the incremental composite sampling method both in the field and in the laboratory helped to identify the variability associated with the method itself and affect Phase 2 Pilot Study design. The Phase 1 objective is comprised of the following components:

- Establish appropriate practices for field collection, homogenization and handling in the field;
- Establish appropriate practices for sample handling and extraction in the laboratory;
- Analyze the contribution of field and laboratory methods to the overall data variability; and
- Comparability between MAS Fast Analysis and 1613b.

To address these components of the objective, composite soil samples built from thirty increments were obtained from three ¼-acre sampling units within previously sampled areas around the perimeter of the Michigan Operations Plant. Figure 1-2 presents example soil sample layouts. The following sections present the plan to meet the objective of Phase 1 of the Pilot Study.

### 2.1.1 Establish appropriate practices for field collection, homogenization and handling in the field

In order to establish appropriate practices for field collection, homogenization and sampling handling in the field, two different methods of creating incremental composite samples were evaluated. The two methods evaluated in the study were conducted utilizing the same general field procedures discussed in Section 3.1. The methods compared through the Phase 1 are:

- Method 1 – Composite Collection: Increments obtained are immediately added to a composite sample built in the field.
- Method 2 – Increment Collection: Increments are collected discretely in the field and later combined to build composite samples.

The second method is useful if additional composites samples built from specific increment combinations are desired through the full scale project implementation. Then increments collected in the field and stored for later use could be utilized as necessary to build additional composite samples and field team remobilization would not be necessary.

For this portion of the study, the decision is whether a field composite or a composite of increments collected individually yields lower variability. The decision was tested by taking three composite sample replicates and three incremental sample replicates at each of the three small-scale sites. Three replicate composites were built in the field (Method 1) and three replicate increments from each increment collection location were collected discretely in a polyethylene bag for later processing into a three thirty increment composite samples (Method 2).

### 2.1.2 Establish appropriate practices for sample handling and extraction in the laboratory

When the soil samples are delivered to the laboratory, the compounds of interest must be extracted from the soil and transferred to a liquid for injection into a gas chromatogram (GC). For this study, roughly 3 kg samples were delivered to the laboratory, and an extraction was performed on a 30 g subsample. Sub-sampling in the laboratory was accomplished by taking the entire 3 kg sample as delivered in the polyethylene bag, and homogenizing by squeezing the bag.

Individual ~1g subsamples were obtained using a lab spatula, mixing the bag between subsamples. This was repeated until a total of ~30g were obtained for extraction.

Uncertainty due to heterogeneity was tested by taking two sets of three laboratory splits from field samples using this method (see Figure 2-1). The laboratory splits were made by alternately subsampling the field sample for each laboratory split.

To evaluate the uncertainty due to the analytical process, four (4) sample extracts were split into replicates of three (3) and taken through the analytical process (including sample cleanup and injection into the GC).

Four (4) replicates (GC Vial samples) were injected and analyzed in replicates of three (3). Results of these analyses were used to evaluate uncertainty in concentration measured by the GC.

### 2.1.3 Analyze the contribution of field methods to the overall data variability

Results of field and laboratory duplicates/splits for respective sample handling methods were evaluated to assess the contribution of these sources to the overall data variability. The contribution of these sources was evaluated to determine if appropriate revisions were needed to the field and laboratory methods to improve their consistency.

### 2.1.4 Analyze the contribution of laboratory methods to the overall data variability

Thirty sample extracts (approximately sixteen percent) from this study were randomly selected and split for analysis by standard EPA method 1613b and extended confirmation for comparability.

## *2.2 Understanding of Site-Specific Variability in the Environment*

The objective of Phase 2 of the Pilot Study is to demonstrate that incremental composite sampling is applicable to the site by demonstrating the site-specific variability of the environment. This objective is comprised of the following components:

- Establish an appropriate number of increments for composite sampling over the scale of interest;
- Conduct a preliminary evaluation of representativeness and reliability of larger-scale composite area for decision-making; and
- Satisfy MDEQ approval condition by collecting and analyzing at least 10 individual increments from four of the ¼-acre sampling units (one in each 1-acre subplot) in order to compare the mean of the individual increments for the test plots to the composite result for the same test plot.

The following sections present the development of the null hypothesis and alternative hypothesis for each of these components. The pilot study involved collecting multiple samples across the selected area and across several different sizes of geographic units. The scale of interest ranges from ¼-acre to approximately 4 acre sampling units. The following sections present the plan to meet the objective of Phase 2 of the Pilot Study.

### 2.2.1 Establish an appropriate number of increments for composite sampling over the scale of interest

For this portion of the study, data were collected to inform project stakeholders regarding whether a certain number of increments for a particular size of sampling unit is more appropriate for decision making. As the number of increments per composite sample increases, data variability would be expected to decrease. A particular number of increments are considered suitable for decision-making if additional increments per composite sample do not reduce data variability significantly. In each ¼-acre parcels, we collected one composite sample of 30, 15, 10 and 5 increments using a random systematic sampling plan (see Figures 2-2 through 2-7). In one ¼-acre parcel within each 1-acre subplot, we collected each different increment quantity composite sample in triplicate. Each of the 1-acre and 4-acre sampling unit sizes samples were collected in triplicate for each different increment quantity composite sample.

For this pilot study, upper bounds were established at 60 increments for a 4-acre sampling unit and 30 increments for smaller sampling units (see notes on Figure 2-4, with concept discussed further in Section 3.0 of the Composite Sampling Pilot Study Work Plan).

Table 2-1 shows the variations in the number of increments that will be analyzed for different sizes of a sampling unit. The effect of varying the number of increments from 15 to 60 for a 4-acre sampling unit and from 5 to 30 for sampling units of ¼-acre and 1-acre were qualitatively assessed by plotting data variance for each size of a sampling unit as a function of the number of increments. This is shown schematically in Figure 2-8. One would look for the number of increments at which the curve flattens significantly. This would suggest that additional increments would not provide much benefit in terms of reduced data variability.

A formal statistical analysis -was also be performed to confirm the findings of the qualitative analysis. Specifically, the hypothesis that data variance is equal across different numbers of increments will be tested. The smallest size for which the variance is statistically no different from that for the maximum number of increments may be considered to be adequate.

**Table 2-1. Study Design for Determining Appropriate Number of Increments**

| Sampling Unit Size | Sampling Unit | Number of Increments | | | |
|---|---|---|---|---|---|
| | | 5 | 10 | 15 | 30 |
| ¼-acre | PA1 | 3 rep | 3 rep | 3 rep | 3 rep |
| | PA2 | 1 rep | 1 rep | 1 rep | 1 rep |
| | PA3 | 1 rep | 1 rep | 1 rep | 1 rep |
| | PA4 | 1 rep | 1 rep | 1 rep | 1 rep |
| | PB1 | 1 rep | 1 rep | 1 rep | 1 rep |
| | PB2 | 3 rep | 3 rep | 3 rep | 3 rep |
| | PB3 | 1 rep | 1 rep | 1 rep | 1 rep |
| | PB4 | 1 rep | 1 rep | 1 rep | 1 rep |
| | PC1 | 1 rep | 1 rep | 1 rep | 1 rep |
| | PC2 | 1 rep | 1 rep | 1 rep | 1 rep |
| | PC3 | 3 rep | 3 rep | 3 rep | 3 rep |
| | PC4 | 1 rep | 1 rep | 1 rep | 1 rep |
| | PD1 | 1 rep | 1 rep | 1 rep | 1 rep |
| | PD2 | 1 rep | 1 rep | 1 rep | 1 rep |
| | PD3 | 1 rep | 1 rep | 1 rep | 1 rep |
| | PD4 | 3 rep | 3 rep | 3 rep | 3 rep |
| 1-acre | PA | 3 rep | 3 rep | 3 rep | 3 rep |
| | PB | 3 rep | 3 rep | 3 rep | 3 rep |
| | PC | 3 rep | 3 rep | 3 rep | 3 rep |
| | PD | 3 rep | 3 rep | 3 rep | 3 rep |

**Table 2-1. Study Design for Determining Appropriate Number of Increments, Continued**

| Sampling Unit Size | Replicate | Number of Increments | | | |
|---|---|---|---|---|---|
| | | 15 | 30 | 60* | |
| 4-acre | PA+PB+PC+PD | 3 rep | 3 rep | 3 rep | |

*Not shown in Figure 2-6 but referenced in notes.

### 2.2.2 Conduct a preliminary evaluation of representativeness and reliability of larger-scale composite area for decision-making

The purpose of this portion of the pilot study is to evaluate whether composite samples from larger scale land blocks (approximately 4-5 acres) can be used to conduct a screening evaluation to determine if areas need to be sampled further. This evaluation is being proposed as preliminary and is intended to inform on-going pilot-scale evaluations as the project moves forward. It is not intended at this time to be a final sampling strategy for the Project. Further joint evaluation is needed to established final sampling methodology. The pilot-scale decision to be made for this evaluation is whether the larger-scale composite will be sufficiently representative of the range of results obtained from the individual (approximately ¼ acre) subunits.

To perform this evaluation, we selected for each size of a sampling unit (¼-acre, 1-acre, and 4-acre) the optimal number of increments determined from the preceding analysis. Three replicate composite samples will be formed for each sampling unit of given size using the optimal number of increments for that size. The hypothesis that the mean concentrations across the 3 sizes of a sampling unit are equal will be tested. If this hypothesis is not rejected, it might be reasonable to assume that the larger-scale compositing would adequately represent the range of average concentrations over the ¼-acre units. If the hypothesis is rejected, one would conclude that the larger-scale compositing may not properly represent the range of average concentrations over the ¼-acre units. In that case, we will examine the differences in the average concentrations between a ¼-acre sampling unit and each larger sampling unit. One may select the largest sampling unit for which the average concentration is statistically no different than that for a ¼-acre sampling unit.

We also analyzed the probability of a false negative error; that is, the probability that the test would fail to detect a specified increase of concern over the average concentration of a ¼-acre sampling unit. Figures 2-9 and 2-10 show the flowcharts which present the evaluation approach for the pilot study analysis, and the possible future process during the full-scale implementation. During the pilot study phase, a statistical evaluation was performed to determine if the means of different-scale sampling units are equal (as described above), whether the variances are equal between different-scale sampling units, as well as whether the power of detecting the differences between the criteria and the mean is sufficient.

### 2.2.3 Additional Parameters of Investigation Based on Phase 1 Results

As discussed in Section 1.2, after completion of Phase 1 of the Pilot Study, the results were discussed with MDEQ. MDEQ subsequently approved Phase 2 implementation which addresses the second objective (understanding site-specific variability in the environment), with the following inclusions:

1. During Phase 2 of the implementation of the Plan, Dow will collect and analyze at least 10 individual increments from 4 of the 16 quarter-acre test plots (one for each acre) in order to compare the mean of the individual increments for the test plots to the composite result for the same test plot.
2. Dow will test the use of a "riffle splitter" to split composite samples for analysis from Area O. These results will be compared to the Phase I results to determine which will be the better method to use (if one method proves to be superior over the other).

As such, the Phase 2 field and laboratory efforts were modified to address these additional requests.

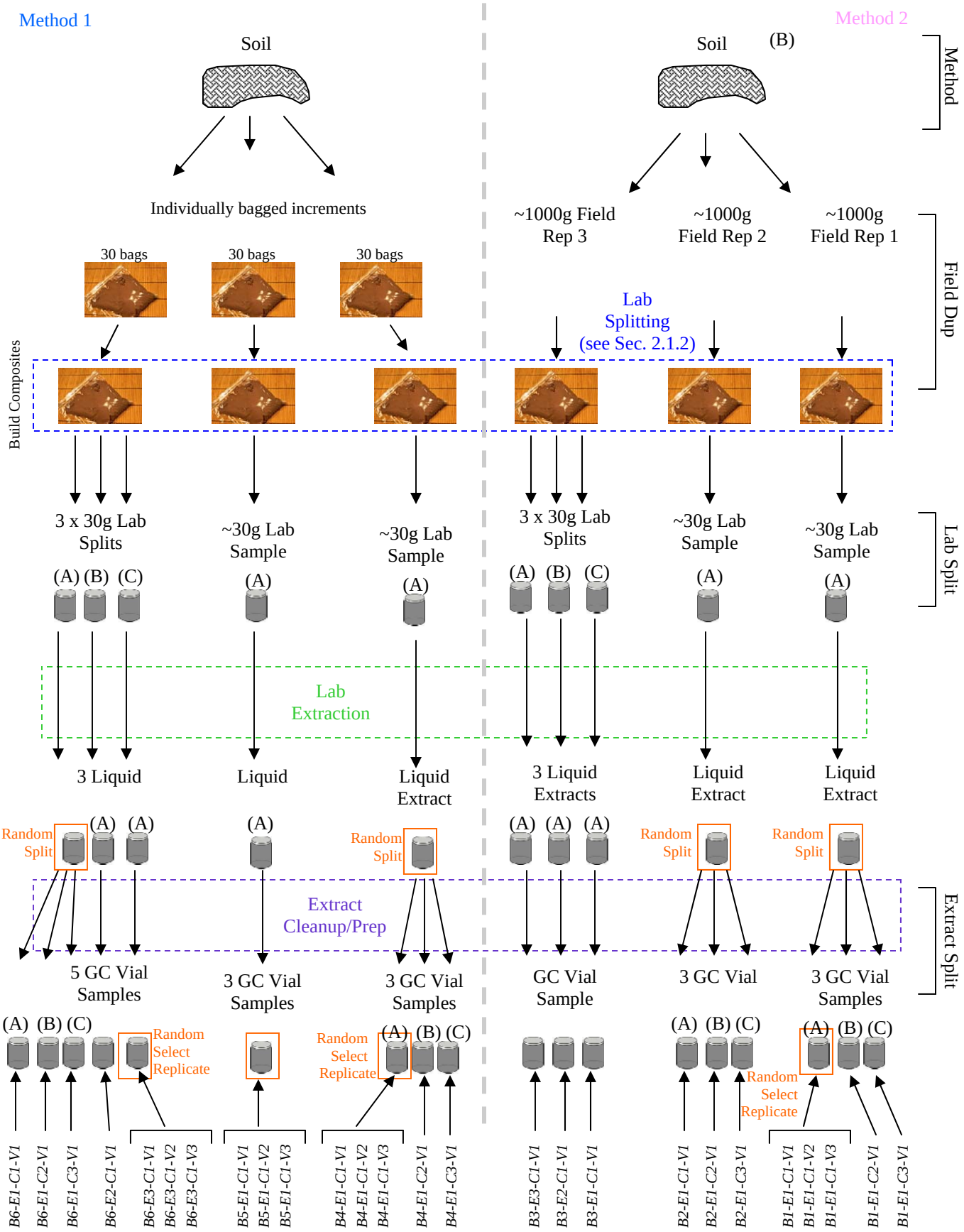


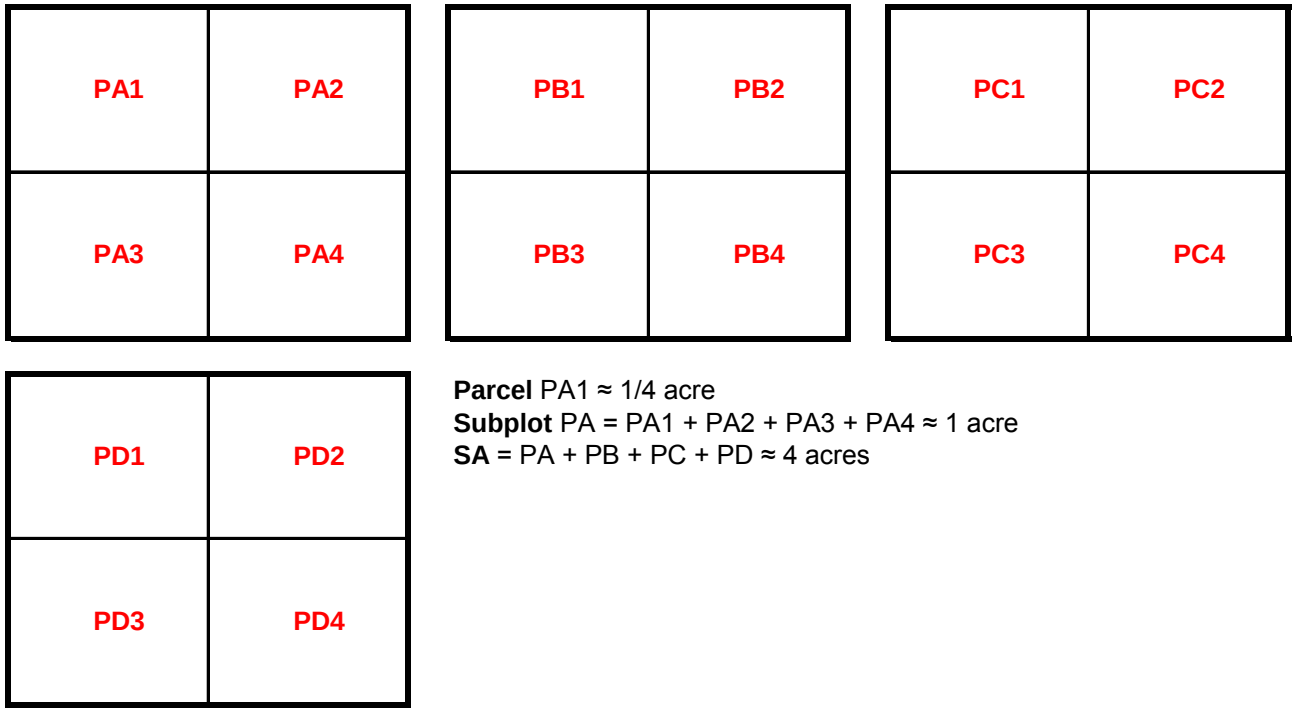

**Figure 2-1**
**Testing Uncertainty due to Heterogeneity—Schematic Drawing of Laboratory Splits**


URS
Dow Business Unit

Site Plan Pilot Area
The Dow Chemical Company
Michigan Operations
Figure 2-2

| | | |
|---|---|---|
| Drawn: MDC | Checked: MS | Approximate Scale: 1" = 130' |
| Date: 7/14/2011 | Drawing File: Figure 2-2_Site Plan Pilot Area.mxd | |

**Figure 2-3. Proposed Pilot Study Area -- Sampling Nomenclature**




**Parcel** PA1 ≈ 1/4 acre
**Subplot** PA = PA1 + PA2 + PA3 + PA4 ≈ 1 acre
**SA** = PA + PB + PC + PD ≈ 4 acres

**Figure 2-4. Proposed Composite Sampling Grid - 30 Increments**

**PA1**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| PA1-01 | PA1-02 | PA1-03 | PA1-04 | PA1-05 | PA1-06 | PA1-07 | PA1-08 | PA1-09 | PA1-10 |
| PA1-11 | PA1-12 | PA1-13 | PA1-14 | PA1-15 | PA1-16 | PA1-17 | PA1-18 | PA1-19 | PA1-20 |
| PA1-21 | PA1-22 | PA1-23 | PA1-24 | PA1-25 | PA1-26 | PA1-27 | PA1-28 | PA1-29 | PA1-30 |
| PA1-31 | PA1-32 | PA1-33 | PA1-34 | PA1-35 | PA1-36 | PA1-37 | PA1-38 | PA1-39 | PA1-40 |
| PA1-41 | PA1-42 | PA1-43 | PA1-44 | PA1-45 | PA1-46 | PA1-47 | PA1-48 | PA1-49 | PA1-50 |
| PA1-51 | PA1-52 | PA1-53 | PA1-54 | PA1-55 | PA1-56 | PA1-57 | PA1-58 | PA1-59 | PA1-60 |
| PA1-61 | PA1-62 | PA1-63 | PA1-64 | PA1-65 | PA1-66 | PA1-67 | PA1-68 | PA1-69 | PA1-70 |
| PA1-71 | PA1-72 | PA1-73 | PA1-74 | PA1-75 | PA1-76 | PA1-77 | PA1-78 | PA1-79 | PA1-80 |
| PA1-81 | PA1-82 | PA1-83 | PA1-84 | PA1-85 | PA1-86 | PA1-87 | PA1-88 | PA1-89 | PA1-90 |

**PA2**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| PA2-01 | | | PA2-04 | | | PA2-07 | | | PA2-10 |
| | | PA2-13 | | | PA2-16 | | | PA2-19 | |
| | PA2-22 | | | PA2-25 | | | PA2-28 | | |
| PA2-31 | | | PA2-34 | | | PA2-37 | | | PA2-40 |
| | | PA2-43 | | | PA2-46 | | | PA2-49 | |
| | PA2-52 | | | PA2-55 | | | PA2-58 | | |
| PA2-61 | | | PA2-64 | | | PA2-67 | | | PA2-70 |
| | | PA2-73 | | | PA2-76 | | | PA2-79 | |
| | PA2-82 | | | PA2-85 | | | PA2-88 | | |

**PA3**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | PA3-02 | | | PA3-05 | | | PA3-08 | | |
| PA3-11 | | | PA3-14 | | | PA3-17 | | | PA3-20 |
| | | PA3-23 | | | PA3-26 | | | PA3-29 | |
| | PA3-32 | | | PA3-35 | | | PA3-38 | | |
| PA3-41 | | | PA3-44 | | | PA3-47 | | | PA3-50 |
| | | PA3-53 | | | PA3-56 | | | PA3-59 | |
| | PA3-62 | | | PA3-65 | | | PA3-68 | | |
| PA3-71 | | | PA3-74 | | | PA3-77 | | | PA3-80 |
| | | PA3-83 | | | PA3-86 | | | PA3-89 | |

**PA4**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | PA4-03 | | | PA4-06 | | | PA4-09 | |
| | PA4-12 | | | PA4-15 | | | PA4-18 | | |
| PA4-21 | | | PA4-24 | | | PA4-27 | | | PA4-30 |
| | | PA4-33 | | | PA4-36 | | | PA4-39 | |
| | PA4-42 | | | PA4-45 | | | PA4-48 | | |
| PA4-51 | | | PA4-54 | | | PA4-57 | | | PA4-60 |
| | | PA4-63 | | | PA4-66 | | | PA4-69 | |
| | PA4-72 | | | PA4-75 | | | PA4-78 | | |
| PA4-81 | | | PA4-84 | | | PA4-87 | | | PA4-90 |

**Increment Samples Collection:**
Randomly select one parcel (PA1) to collect 60 increments, the other three parcels (PA2, PA3, PA4) will collect 30 increments.
Systematic grid with random-start for PA1.
Systematic grid with random-start and random-node for PA2, PA3, and PA4.
Repeat the same process for subplots PB, PC, and PD.

**At Parcel Level:**
Three composite samples for PA1 (by color). One composite sample each for PA2, PA3, and PA4.
Repeat the same process for subplots PB, PC, and PD.

**At Subplot Level:**
Systematic random-start to select 7-8 increments per parcel (total 30 increments) and composte. Repeat for 3 composite samples.
Repeat the same process for subplots PB, PC, and PD.

**At SA Level (30 Increments):**
Systematic random-start to select 1-2 increments per parcel (total 30 increments) and composite. Repeat for 3 composite samples.

**At SA Level (for 60 increments, not shown in diagram):**
Systematic random-start to select 3-4 increments per parcel (total 60 increments) and composite. Repeat for 3 composite samples.

**Figure 2-5. Proposed Composite Sampling Grid - 15 Increments**

**PA1**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| PA1-01 | PA1-02 | PA1-03 | | | | PA1-07 | PA1-08 | PA1-09 | |
| | | PA1-13 | PA1-14 | PA1-15 | | | | PA1-19 | PA1-20 |
| PA1-21 | | | | PA1-25 | PA1-26 | PA1-27 | | | |
| PA1-31 | PA1-32 | PA1-33 | | | | PA1-37 | PA1-38 | PA1-39 | |
| | | PA1-43 | PA1-44 | PA1-45 | | | | PA1-49 | PA1-50 |
| PA1-51 | | | | PA1-55 | PA1-56 | PA1-57 | | | |
| PA1-61 | PA1-62 | PA1-63 | | | | PA1-67 | PA1-68 | PA1-69 | |
| | | PA1-73 | PA1-74 | PA1-75 | | | | PA1-79 | PA1-80 |
| PA1-81 | | | | PA1-85 | PA1-86 | PA1-87 | | | |

**PA2**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| PA2-01 | | | | | | PA2-07 | | | |
| | | PA2-13 | | | | | | PA2-19 | |
| | | | | PA2-25 | | | | | |
| PA2-31 | | | | | | PA2-37 | | | |
| | | PA2-43 | | | | | | PA2-49 | |
| | | | | PA2-55 | | | | | |
| PA2-61 | | | | | | PA2-67 | | | |
| | | PA2-73 | | | | | | PA2-79 | |
| | | | | PA2-85 | | | | | |

**PA3**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | PA3-02 | | | | | | PA3-08 | | |
| | | | PA3-14 | | | | | | PA3-20 |
| | | | | | PA3-26 | | | | |
| | PA3-32 | | | | | | PA3-38 | | |
| | | | PA3-44 | | | | | | PA3-50 |
| | | | | | PA3-56 | | | | |
| | PA3-62 | | | | | | PA3-68 | | |
| | | | PA3-74 | | | | | | PA3-80 |
| | | | | | PA3-86 | | | | |

**PA4**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | PA4-03 | | | | | | PA4-09 | |
| | | | | PA4-15 | | | | | |
| PA4-21 | | | | | | PA4-27 | | | |
| | | PA4-33 | | | | | | PA4-39 | |
| | | | | PA4-45 | | | | | |
| PA4-51 | | | | | | PA4-57 | | | |
| | | PA4-63 | | | | | | PA4-69 | |
| | | | | PA4-75 | | | | | |
| PA4-81 | | | | | | PA4-87 | | | |

**Increment Samples Collection:**
Randomly select one parcel (PA1) to collect 45 increments, the other three parcels (PA2, PA3, PA4) will collect 15 increments.
Systematic grid with random-start for PA1.
Systematic grid with random-start and random-node for PA2, PA3, and PA4.
Repeat the same process for subplots PB, PC, and PD.

**At Parcel Level:**
Three composite samples for PA1 (by color). One composite sample each for PA2, PA3, and PA4.
Repeat the same process for subplots PB, PC, and PD.

**At Subplot Level:**
Systematic random-start to select 3-4 increments per parcel (total 15 increments) and composte. Repeat for 3 composite samples.
Repeat the same process for subplots PB, PC, and PD.

**At SA Level:**
Systematic random-start to select 0-1 increments per parcel (total 15 increments) and composite. Repeat for 3 composite samples.

**Figure 2-6. Proposed Composite Sampling Grid - 10 Increments**

**PA1**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| PA1-01 | PA1-02 | PA1-03 | | | | | | | |
| | | PA1-13 | PA1-14 | PA1-15 | | | | PA1-19 | PA1-20 |
| PA1-21 | | | | | | | | | |
| PA1-31 | PA1-32 | PA1-33 | | | | PA1-37 | PA1-38 | PA1-39 | |
| | | | | | | | | PA1-49 | PA1-50 |
| PA1-51 | | | | PA1-55 | PA1-56 | PA1-57 | | | |
| | | | | | | PA1-67 | PA1-68 | PA1-69 | |
| | | PA1-73 | PA1-74 | PA1-75 | | | | | |
| | | | | PA1-85 | PA1-86 | PA1-87 | | | |

**PA2**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| PA2-01 | | | | | | | | | |
| | | PA2-13 | | | | | | PA2-19 | |
| | | | | | | | | | |
| PA2-31 | | | | | | PA2-37 | | | |
| | | | | | | | | PA2-49 | |
| | | | | PA2-55 | | | | | |
| | | | | | | PA2-67 | | | |
| | | PA2-73 | | | | | | | |
| | | | | PA2-85 | | | | | |

**PA3**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | PA3-02 | | | | | | | | |
| | | | PA3-14 | | | | | | PA3-20 |
| | | | | | | | | | |
| | PA3-32 | | | | | | PA3-38 | | |
| | | | | | | | | | PA3-50 |
| | | | | | PA3-56 | | | | |
| | | | | | | | PA3-68 | | |
| | | | PA3-74 | | | | | | |
| | | | | | PA3-86 | | | | |

**PA4**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | PA4-03 | | | | | | | |
| | | | | PA4-15 | | | | | |
| PA4-21 | | | | | | | | | |
| | | PA4-33 | | | | | | PA4-39 | |
| | | | | | | | | | |
| PA4-51 | | | | | | PA4-57 | | | |
| | | | | | | | | PA4-69 | |
| | | | | PA4-75 | | | | | |
| | | | | | | PA4-87 | | | |

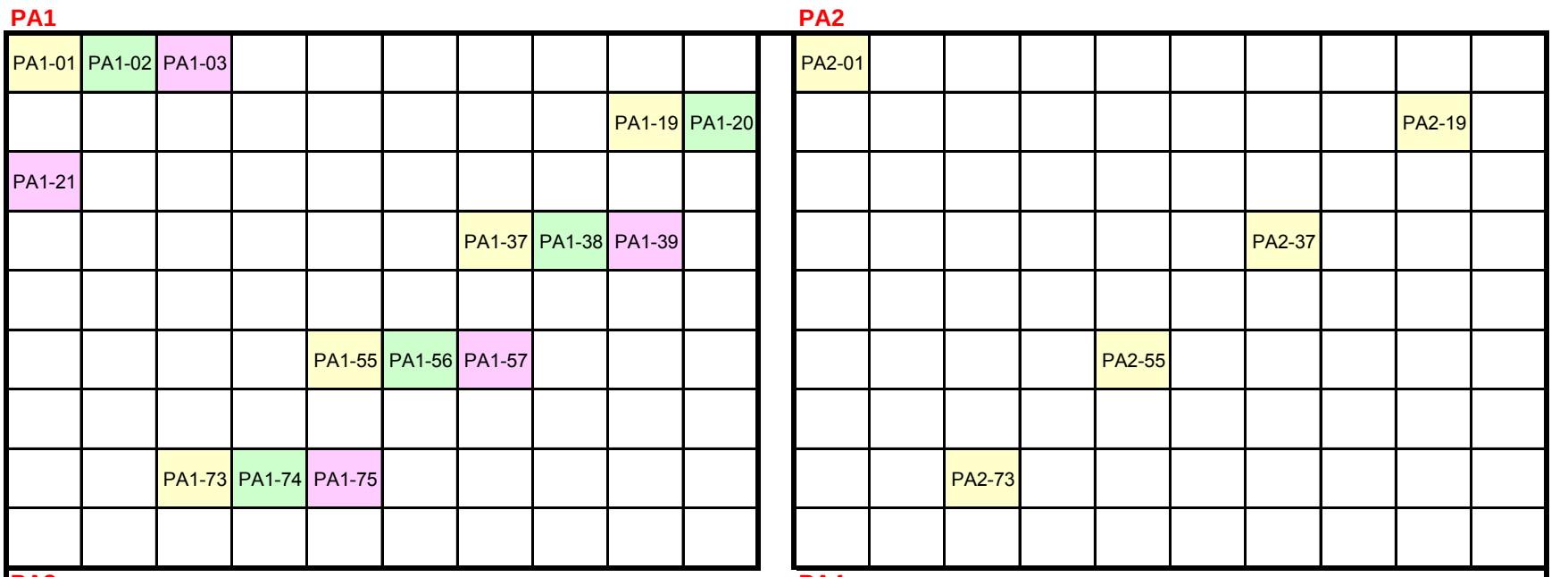
**Increment Samples Collection:**
Randomly select one parcel (PA1) to collect 30 increments, the other three parcels (PA2, PA3, PA4) will collect 10 increments.
Systematic grid with random-start for PA1.
Systematic grid with random-start and random-node for PA2, PA3, and PA4.
Repeat the same process for subplots PB, PC, and PD.

**At Parcel Level:**
Three composite samples for PA1 (by color). One composite sample each for PA2, PA3, and PA4.
Repeat the same process for subplots PB, PC, and PD.

**At Subplot Level:**
Systematic random-start to select 2-3 increments per parcel (total 10 increments) and composte. Repeat for 3 composite samples.
Repeat the same process for subplots PB, PC, and PD.

**At SA Level:**
Not applicable.

**Figure 2-7. Proposed Composite Sampling Grid - 5 Increments**




**Increment Samples Collection:**
Randomly select one parcel (PA1) to collect 15 increments, the other three parcels (PA2, PA3, PA4) will collect 5 increments.
Systematic grid with random-start for PA1.
Systematic grid with random-start and random-node for PA2, PA3, and PA4.
Repeat the same process for subplots PB, PC, and PD.

**At Parcel Level:**
Three composite samples for PA1 (by color). One composite sample each for PA2, PA3, and PA4.
Repeat the same process for subplots PB, PC, and PD.

**At Subplot Level:**
Systematic random-start to select 1-2 increments per parcel (total 5 increments) and composte. Repeat for 3 composite samples.
Repeat the same process for subplots PB, PC, and PD.

**At SA Level:**
Not applicable.

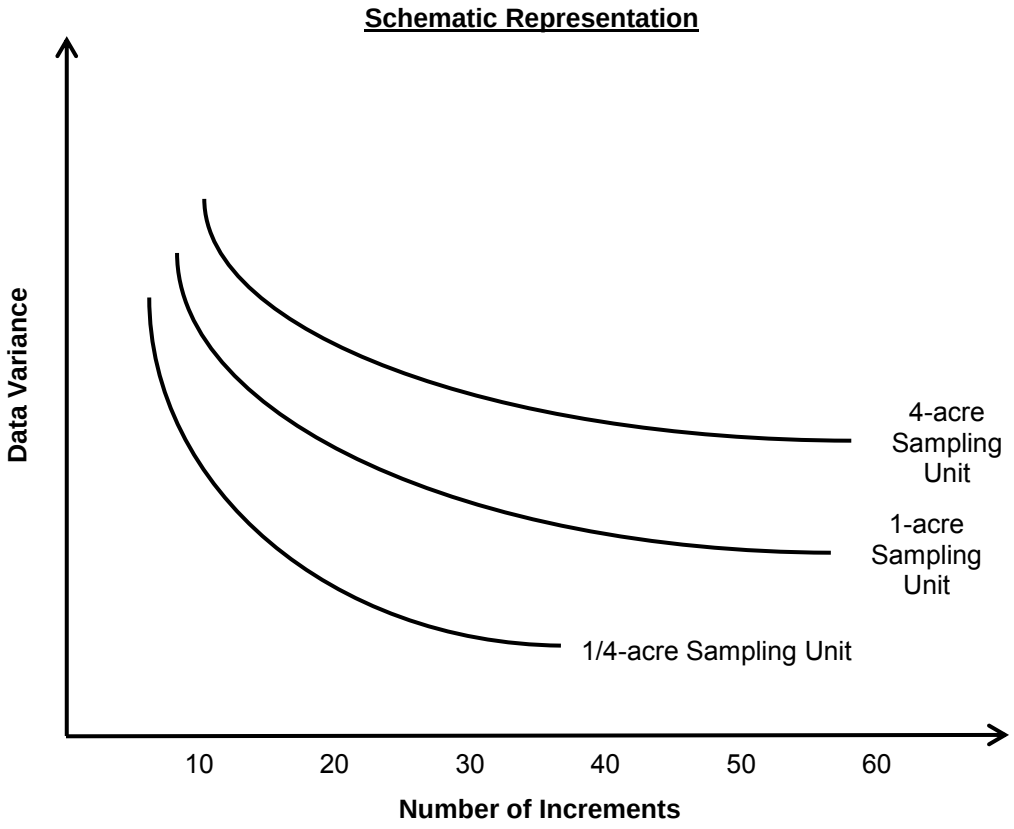
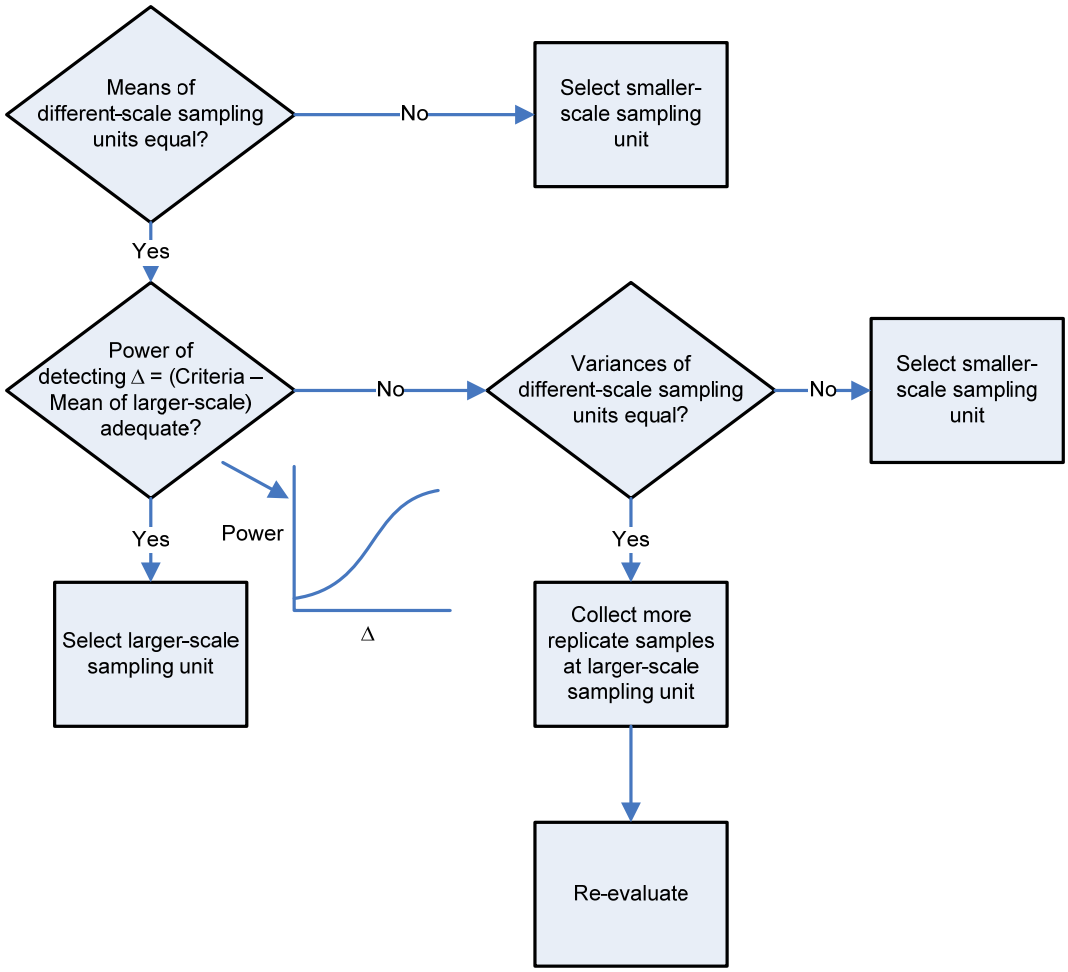
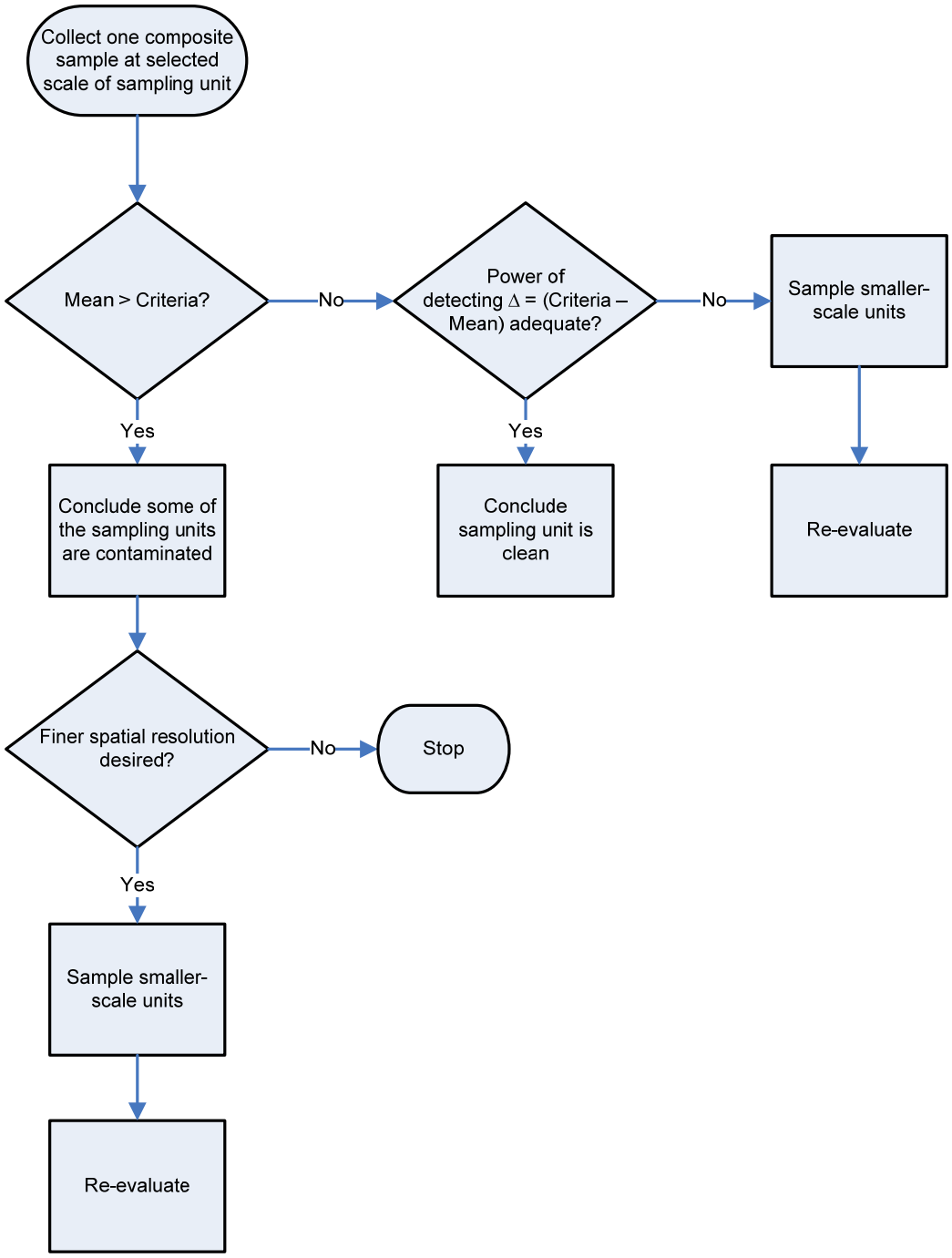



**Figure 2-8. Effect of Number of Increments on Data Variability**




Notes: Smaller-scale (e.g., ¼-acre); Larger-scale (e.g., 1-acre, 4-acre)

**Figure 2-9. Evaluating Size of Unit and Representativeness - Pilot Study Analysis Flowchart**




Notes: Smaller-scale (e.g., ¼-acre); Larger-scale (e.g., 1-acre, 4-acre)

**Figure 2-10. Evaluating Size of Unit and Representativeness – Example Full-Scale Implementation Flowchart**

# 3.0 Pilot Study Implementation – Field Effort

This section provides documentation of how the study design as described in the Composite Sampling Pilot Study Work Plan was implemented in the field and laboratory.

## *3.1 Composite Sample Collection*

Basic principles of incremental sampling (IS) were employed throughout the Pilot Study Implementation. IS is a structured soil sample collection and processing protocol designed to obtain a sample aliquot for analysis that contains the constituents of concern in exactly the same proportion as the sampled area. The objective of IS is to obtain a single sample having a mean analyte concentration that is representative of a specifically defined population - i.e. the designated sampling unit.

IS involves the collection and combination of a number of soil increments from a sample area to produce one sample result. Distributional heterogeneity, or grouping and segregation error, is addressed by collecting a sufficient number of increments in an unbiased manner from the entire volume of material to be represented by the sample result.

Field sampling procedures that distinguish IS from conventional composite sampling include:

- Collecting a sufficiently large number of increments to address the distributional heterogeneity of analytes;
- Ensuring that individual increments are of uniform size (mass or volume);
- Ensuring that the increments are collected from throughout the entire sample area in an unbiased manner; and
- Collecting an adequate total sample mass to overcome effects of compositional heterogeneity due to the inherent particulate nature of soil and sediment.

### 3.1.1 Sample Location

The field teams were provided with maps of all sampling units and increment collection locations. The increments collection locations within each sampling unit were generated using a

systematic random approach. In the systematic-random pattern, a random starting point is generated and then subsequent increments locations are established on an even spacing within the remainder of the sampling unit. As such, for each composite sample built from a different quantity of increments within a particular sampling unit new increment collection locations were generated. The increment collection locations were created in Geographic Information Systems (GIS) and loaded into handheld global positioning system (GPS) with sub-foot accuracy (Trimble GeoXH) units for field teams. Each increment collection location within each of the sampling units was clearly identified by a member of the field team with a color coded survey flag prior to the sample collection.

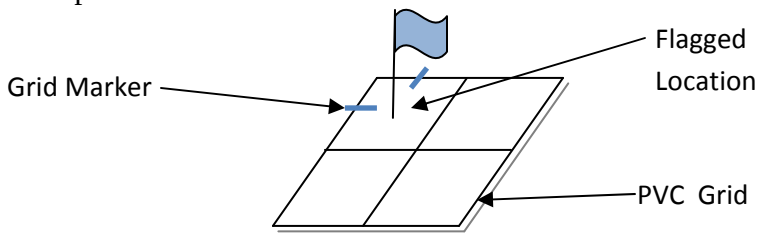
### 3.1.2 Sample Collection

Soil cores (increments) were collected using stainless steel push samplers or an Enterprise Venture Corporation (EVS) Incremental Sampling tool in order to ensure that each increment was collected at the same depth and volume. The sampling method allows for discrete increment collection for individual analysis or immediate field compositing of increments. Each increment for the study project was collected using a 1" diameter coring device to a depth of 6" below ground surface.

Increments were collected at consistently off-set positions from the flagged increment collection location. A custom made polyvinylchloride (PVC) grid was created and divided equally into a number of cells equal to the number of increments to be collected for replicate samples for each location within a sampling unit. One corner of the grid was marked as the placement location and each cell within the grid was labeled consecutively with a number from 1 to 4-6 dependent upon the number of increments to be collected at that location (see sketch below). Please note that field replicates for incremental samples are not field splits; they are independently collected incremental samples from the same decision unit.

At each increment collection location the placement corner marked on the grid was lined up with the increment collection flag. Then an increment was collected from approximately the center of each cell in the grid and stored appropriately. Increment collection was not biased to avoid vegetation. However, vegetation was not included in the analysis of the soil sample. Vegetation included with the collection of the increment remained with the sample until processing (Section

3.1.6.2 Sample Processing). Increments from each increment collection location were sampled as field teams moved their way back and forth across the sampling units, removing the increment location flags as samples were collected.




### 3.1.3 Field Procedures

The following general procedures were applied to both Phases of the Pilot Study when collecting samples:

1. All equipment is cleaned before each sampling event and between sampling units as described in the protocol for Equipment Decontamination.
2. Personal protective equipment is worn (e.g., latex gloves, long pants, covered shoes, and safety glasses).
3. Each increment collection location to be used in a particular sample is marked by a field team member prior to the increment collection as a quality control check to ensure all locations for each sampling unit have been appropriately identified before the increment collection begins on the sampling unit.
4. The PVC sampling grid is placed on the ground with the location flag in the marked corner with the right angle of the marked corner aligned in the same manner for the collection of all increments within a sampling unit.
5. The sampler device is placed in the center of each cell within the grid for increment collection.
6. The sampler is driven into the soil to a depth of 6” for each increment. If the sampler cannot be driven to the target depth within the grid cell, the increment is collected to the closest possible depth within the grid cell.
7. The sampler is removed from the subsurface and the sample is collected and stored in the appropriate labeled sample collection bag.
8. Once the sample has been collected and placed into the labeled polyethylene sampling bag, seal the bag taking care to minimize any trapped air. Check the label to ensure all the

proper label information has been included as described in Section 3.1.6 Sample Handling.

9. Once sample collection at a location is complete, the location flag is removed by the sampling team as a quality control procedure.
10. Each sample is processed and packed as detailed in Section 3.1.6 Sample Handling.
11. Sample information is added to a Chain-of-Custody document before sample transfer to the laboratory.
12. Samples are transported to Dow Laboratory immediately after processing.

### 3.1.4 Field Documentation

Each field team was provided with a detailed daily assignment log of sampling units and samples to be collected within each sampling unit. Each field team was responsible for supplying the required information on the form upon sample collection including time of sample collection, date of sample collection, any unusual field conditions or mechanical issues encountered and initial each sample collection line items to verify the entry. At the end of each field day the Field Team Leader collected all team logs and conducted a quality control check of all samples delivered from the daily activities.

### 3.1.5 Equipment Decontamination

Solid materials samplers and soil processing equipment including stainless steel sieves and bowls were decontaminated according to the following procedures:

1. Scrub the equipment to remove visible contamination, using appropriate brush(es), approved water, and non-phosphate laboratory detergent.
2. Rinse with tap water.
3. Rinse with deionized water.
4. Equipment will be allowed to air dry or be wiped dry with paper towels prior to reuse.

All cleaned sampling equipment was stored in a clean environment and covered in aluminum foil or clean plastic sheeting. All decontamination solutions were properly disposed of at the Dow wastewater treatment plant (WWTP).

## 3.1.6 Sample Handling

### 3.1.6.1 Labeling Procedures

Before field teams began the collection of any sample, the polyethylene sample collection bags were labeled in accordance with the Sample Identification Methodology (described in Sections 4.1 and 5.1) with a waterproof marker.

During the sampling event, the field sampler wrote the following additional information on the polyethylene bag and on the sample collection log:

- Field sampler's initials;
- Date (mm/dd/yy); and
- Time of sample collection (military format).

### 3.1.6.2 Sample Processing

Once each sample was collected in the field, it was brought back to a clean designated workspace for further processing before delivery to the laboratory. At a minimum, each sample was sieved before packaging for laboratory delivery. During this step the vegetation was broken in smaller pieces to release trapped particles and extracted from the soil sample. The majority of vegetation did not pass through the sieve and therefore is not part of the subsample extracted for analysis.

The following procedures were employed when processing samples:

1. ¼" stainless steel sieves and bowls are decontaminated prior to use, and in-between samples if they are required for reuse, in accordance with the decontamination procedures.
2. The field sample (or portion of the field sample) is carefully emptied onto the sieve placed on the large stainless steel bowl. If the entire sample cannot be placed on the sieve at once, sieve the sample in portions into the large stainless steel bowl. If individual increments are to be composited, place appropriate increments on the sieve on the sieve to be composited while sieving.

3. Donning a clean pair of nitrile gloves, push the soil material around the sieve and agitate the sieve to move the soil through the sieve and retain the vegetation on the sieve. Dispose of the retained vegetation.

Once the samples were processed, all samples were packed for immediate delivery to the Dow laboratory. Processed samples were returned to into the original polyethylene sampling bag if possible or into a new clean polyethylene sampling bag. A second polyethylene sampling bag was labeled in accordance with sample labeling procedures in Section 3.1.6.1. and all samples were double bagged. Samples were placed in coolers with chain-of-custody forms and were immediately delivered to the laboratory for login and storage.

## *3.2 Analytical Methods*

A method was developed by Dow analytical chemists by adaptation of existing EPA Method 8280 for fast determination of polychlorinated dibenzo-p-dioxins (PCDDS) and dibenzofurans (PCDFs) in soil by high resolution gas chromatography/high or low resolution mass spectrometry (HRGC/HRMS or HRGC/LRMS). It is specific to the Midland Area Soils (MAS). This was done to decrease the time necessary for each laboratory analysis and decrease the overall testing cost for the project. The Standard Operating Procedure (SOP) for Method 8280 was submitted to MDEQ and EPA on June 29, 2011 and was approved for use on October 21, 2011.

The principal means of laboratory analyses will be Method 8280 Midland Area Soils (MAS) Site-Specific Fast Analysis method. Additional methods, such as EPA Method 1613b are available and may be used for confirmatory analysis. In cases where interferences are identified, additional sample chromatographic column confirmation may also be performed. Analytical options and performance criteria are discussed in detail in the Quality Assurance Project Plan (QAPP). The draft QAPP was previously submitted for review on September 6, 2011.

# 4.0 Phase 1 Implementation

This section documents the implementation and evaluation of results from Phase 1 of the Pilot Study. The purpose of Phase 1 of the Pilot Study was to assess the random variability in the dioxin TEQ data introduced by the field and laboratory procedures.

The following sources of variability were analyzed:

Source #1. Laboratory analysis of the liquid sample extract
Source #2. Laboratory sample cleanup of liquid extract sample
Source #3. Laboratory soil sub-sampling and extraction of liquid sample
Source #4. Field sample composited from individual increment samples (Method 1 of field sampling)
Source #5. Field collection of a single sample directly from increment locations (Method 2 of field sampling)
Source #6. Field sampling method (Method 1 or 2)

## *4.1 Field Implementation*

As discussed in Section 2.1, both Method 1 (Composite Collection) and Method 2 (Increment Collection) were tested on the same three ¼-acre sampling units located within Site O, Site 1 and Site A2; previously sampled areas around the perimeter of the Michigan Operations Plant.

For the Phase 1 implementation, six replicates were collected at each of the thirty increment collection locations within each of the sampling units in order to create the three replicate Method 1 samples and three replicate Method 2 samples for each sampling unit. The replicates were collected at consistently off-set positions from each increment collection location. A 1.5’ x 1’ PVC grid was created and divided equally into six cells for the Phase 1 increment collection. One corner of the grid was marked as the placement location and each cell within the grid was labeled consecutively from 1 to 6. The PVC sampling grid was placed on the ground with the location flag in the marked corner with the right angle of the marked corner aligned in the same manner for the collection of all increments within a sampling unit. Increments were collected

from approximately the center of each cell in the grid and then placed in a polyethylene sampling container in accordance with the composite sample methodology employed. Replicates collected from grids 1-3 were used for Method 1 and those from grid 4-6 were used for Method 2 samples.

For the Method 1 composite collection samples, sample teams were equipped with large 24" x 24" 6 mil reclosable polyethylene sampling bags. For each sampling unit, teams lined three clean 5-gallon buckets with these sample collection bags to facilitate direct composite sample collection. Each bucket was labeled in two places with a 1, 2, or 3 corresponding to the primary, duplicate or triplicate Method 1 sample and PVC grid number.

For the Method 2 discrete increment collection, field teams utilized pint size Ziploc® Brand Freezer Bags. An additional three 5-gallon buckets were utilized to move each set of 30 sampling bags for the primary, duplicate, and triplicate sample for Method 2. Each one of these buckets were also labeled in two places, but with a 4, 5, or 6 also corresponding to sample labeling methodology and PVC grid number.

Each replicate collected from an increment collection location was placed in the appropriate sampling bag within the correct bucket as field teams moved their way back and forth across the sampling units. The increment location flags were removed by the sample collection teams once all replicates had been collected at a location before moving on to the next collection location.

### 4.1.1 Sample Nomenclature

In order prevent the misidentification of samples and ensure that a uniform and consistent number system was employed in the field, all soil samples collected during the Pilot Phase 1 activities employed the following standard designation format:

[Project Phase](+)[Sample Unit](+)[Sample Type]- [Increment Number (for IS samples type only)]-[Sample Number]

The **project phase** short hand for the Phase 1 activities was:

- PP = Preliminary Phase Pilot

**Sampling Units** are the alphanumeric values used to represent the sampling units and will contain the 2-digit sampling unit code. For Phase 1, the sampling units are:

- SO – Site O
- 01 – Site 1
- A2 – Site A2

The following designation will be used for each **sample type**:

- IS = Sample of Individual Increment to be composited after field collection
- CS = Composite Sample built in the field from increments

For IS sample types, additional information regarding the **increment number** was included in the sample ID for quality control purposes for subsequent sample compositing. Each IS sample type also included a number from 1-30 for this portion of the sample ID in order to identify each increment of the sampling unit.

**Sample number** short hand will be different for the individual ISs and the composite samples (CS).

For CS sample types

- 01: Primary Sample
- 02: Duplicate Sample
- 03: Triplicate Sample

For IS Sample Types

- 04: Primary Sample
- 05: Duplicate Sample
- 06: Triplicate Sample

For example, the primary composite field sample taken from the Site A2 was designated PPA2CS-01. The replicate samples were collected and identified with the same sample identification as the primary samples, with the only difference being the last two-digits of sample number (i.e., either 02 or 03).

Each sample bag was labeled on the outside of the primary sample bag and the outside of the second polyethylene bag (once processed). Once the IS sample types were processed into composite samples, their ID was changed to reflect a CS sample type, but identified as composited through Method 2 by the last two-digits of sample number (i.e., either 04, 05, or 06). For example, Method 2 increments collected in the field with sample identification numbers of PPA2IS-01-04 through PPA2IS-30-04 were processed and composited into sample ID PPA2CS-04.

### 4.1.2 Sample Processing

Samples collected for the Phase 1 study were processed in accordance with the procedures described in Section 3.1.6.2. Method 1 composite samples were sieved prior to delivery to the laboratory while Method 2 samples were composited and sieved before transport to the laboratory.

## *4.2 Analytical Results*

The results of Phase 1 of the Pilot Study are presented in Table 4-1. In addition, the analytical data packages are presented as Attachment 1 to this report.

## *4.3 Evaluation of Data Variability*

### 4.3.1 Approach

The basic approach to analyze data variability was through replicate measurements for each source of variability. Data variability was expressed in terms of the relative standard deviation (RSD) of replicate measurements, which was calculated as the standard deviation of the measurements divided by their respective mean.

Figure 2-1 shows the replication sequence consisting of field replicates, laboratory/liquid extract replicates from a field sample, vial sample replicates from a laboratory/liquid extract sample

processed through sample cleanup, and finally, analysis replicates from a vial sample. A total of 26 samples were analyzed for dioxin and furan congener concentrations at Site A1, Site 1, and Site O, each being approximately ¼ acre. For each sample, 11 dioxin and furan congeners were tested using the Midland Area Soils Fast Analysis method, and based on these 11 congener concentrations, the dioxin TEQ was calculated for each sample.

At the last step of the replication sequence shown in Figure 1, the dioxin TEQ values from replicate analyses were directly used to calculate the RSD attributed to the extraction of a sample for laboratory analysis and the laboratory equipment/procedures.

The next upstream step in the replication sequence was sample cleanup of liquid extract sample. Replicate vial samples were obtained from each of four laboratory liquid extract samples. For a vial sample that was further replicated for analysis samples, the three replicate analysis results could not be combined (such as combined by averaging) with the results from two other vial samples (that were not further replicated) to calculate the RSD. This was because the replicate results would likely have different (smaller) variability than the independent results from the other two vial sample results.

To analyze the replicate data properly, a Monte Carlo simulation approach was used. For each vial sample that was further replicated, one of the replicate analysis results was selected randomly. This randomly selected result from the replicated vial sample was combined with the analysis results from the two non-replicated vial samples, and the RSD of the combined data was calculated. This process was repeated for 1,000 simulation trials, and an RSD was calculated for each trial. The average RSD, calculated from the 1,000 trials, was attributed to vial sample extraction from a laboratory/liquid extract sample.

This process of Monte Carlo simulation was repeated at each upstream step in the replication sequence. Where replicate samples were analyzed, one of the replicate results was selected randomly in each Monte Carlo trial. The randomly selected result was then combined with results from non-replicated samples, and an RSD of the combined data was calculated in each trial. The average RSD (over 1,000 trials) was attributed to the source of variability associated

with the step being analyzed in the replication sequence.

### 4.3.2 Findings

Table 4-2 shows a summary of the average RSD for each of the six sources of data variability identified previously at each of the three sites.

The process of laboratory analysis and measuring congeners concentrations (Source #1) and the laboratory cleanup process of the liquid extract sample (Source #2) both had a very low average RSD, in the range of 1% to 2%. This result suggested that these two processes were executed consistently, and the random variability introduced by each was relatively small.

The process of laboratory soil sub-sampling and extraction of liquid sample (Source #3) had a somewhat higher variability, but still only moderate, with an average RSD in the range of 4% to 8%.

The process of compositing from individual increment samples (Source #4 – Method 1 of field sampling) had an average RSD in the range of 8% to 12%. The process of collecting increments for later compositing (Source #5 – Method 2 of field sampling) had an average RSD in the range of 3% to 17%. The results support the finding that either method was acceptable for use.

It was anticipated that the variability was higher for field sample collection than for laboratory sample replication and analysis. However, the RSD for the field sample collection was still only moderate and well below general QAQC guidelines for multi-incremental sampling suggested in regulatory guidance. US Army Corps of Engineers (USACE) guidance suggested that for field replicates, the multi-incremental sampling effort was considered to be "successful" and the field replicate variability was acceptable when the RSD was less than 30-35%. For laboratory replicates, the suggested maximum RSD was 15%. The variability observed in the data collected for this study met both types of threshold.

**Table 4-1. Dioxin TEQ Data Collected for Phase 1 Pilot Study**

| Sample Description | Site A2 | Site 1 | Site O |
|---|---|---|---|
| B1-E1-C1-V1 | 457 | 297 | 594 |
| B1-E1-C1-V2 | 443 | 287 | 613 |
| B1-E1-C1-V3 | 443 | 289 | 613 |
| B1-E1-C2-V1 | 434 | 294 | 609 |
| B1-E1-C3-V1 | 436 | 289 | 608 |
| B2-E1-C1-V1 | 531 | 296 | 660 |
| B2-E1-C2-V1 | 523 | 299 | 650 |
| B2-E1-C3-V1 | 532 | 299 | 665 |
| B3-E1-C1-V1 | 444 | 308 | 508 |
| B3-E2-C1-V1 | 473 | 282 | 457 |
| B3-E3-C1-V1 | 428 | 286 | 449 |
| B4-E1-C1-V1 | 487 | 265 | 567 |
| B4-E1-C1-V2 | 474 | 268 | 572 |
| B4-E1-C1-V3 | 483 | 269 | 576 |
| B4-E1-C2-V1 | 474 | 273 | 592 |
| B4-E1-C3-V1 | 477 | 266 | 561 |
| B5-E1-C1-V1 | 521 | 268 | 496 |
| B5-E1-C1-V2 | 525 | 265 | 501 |
| B5-E1-C1-V3 | 533 | 270 | 488 |
| B6-E1-C1-V1 | 532 | 236 | 632 |
| B6-E1-C2-V1 | 539 | 216 | 629 |
| B6-E1-C3-V1 | 538 | 215 | 667 |
| B6-E2-C1-V1 | 601 | 218 | 626 |
| B6-E3-C1-V1 | 483 | 207 | 630 |
| B6-E3-C1-V2 | 490 | 211 | 629 |
| B6-E3-C1-V3 | 482 | 217 | 639 |

**Table 4-2. Summary of Random Variability of Field/Laboratory Procedures**

| | | Average Relative Standard Deviation (RSD) | | |
|---|---|---|---|---|
| **Source #** | **Source of Variability** | **Site A2** | **Site 1** | **Site O** |
| 1 | Analysis sample extraction from vial sample | 1.3% | 1.6% | 1.2% |
| 2 | Vial sample extraction from lab sample/liquid extract sample | 1.1% | 2.2% | 2.0% |
| 3 | Laboratory sample/liquid sample extraction from field sample | 7.8% | 3.9% | 4.2% |
| 4 | Field sample extraction from soil volume sample (Method 1) | 7.7% | 11.7% | 12.3% |
| 5 | Field sample directly from incremental samples (Method 2) | 10.7% | 2.6% | 16.7% |
| 6 | Field sampling method (Method 1 or 2) | 8.3% | 11.2% | 10.4% |

# 5.0 Phase 2 Implementation

This section documents the implementation and evaluation of results from Phase 2 of the Pilot Study.

## *5.1 Field Implementation*

The Method 1 field sample collection utilized in Phase 1 was selected for the Phase 2 composite sampling due to the relative ease of implementation of this method compared to Method 2 and the results of the Phase 1 investigation showing comparable average variabilities between the Method 1 and Method 2 compositing strategies.

As discussed in Section 2.2, three different sampling unit sizes – ¼-acre, 1-acre, and 4-acre, were utilized in Phase 2. For the purpose of the study design and description of sampling activities the entire 4-acre area investigated in Phase 2 is considered to be the study area (SA). The SA is sub-divided into four 1-acre subplots (PA, PB, PC, and PD). Each subplot is then further divided into four ¼-acre parcels (PA1, PA2, PA3, PA4, PB1, etc.), which represent the smallest sampling units in the Phase 2 study. Figure 2-3 presents the pilot study layout.

As shown in Table 2-1 found in Section 2.2.1, each ¼-acre parcel and 1-acre subplot was sampled with composite samples built from four different increment quantities: 5, 10, 15, and 30 increments. The 4-acre study area was sampled for three different composite samples built from 15, 30 and 60 increments. Triplicate composite samples were collected for each increment quantity from one ¼-acre parcel found within each 1-acre subplot, each 1-acre subplot, and the 4-acre study area for each different incremental composite sample collected from that sampling unit. MDEQ requested modifications to the Phase 2 implementation were addressed by adding collection of 10 individual increments for laboratory analysis from the same ¼-acre parcels within each 1-acre subplot selected for triplicate composite sample collection (PA1, PB2, PC3, PD4).

At the ¼-acre parcels 10-increment collection locations three replicates went immediately into the appropriate composite collection containers, while the fourth was individually collected for a discrete sample analysis in accordance with the MDEQ Phase 2 approval modifications.

Each replicate increment was collected at consistently off-set positions from the increment collection location. A 1' square PVC grid divided equally into four cells was used at each increment collection location. One corner of the grid was marked as the placement location and was aligned in the same manner for each location within a sampling unit. Each cell within the grid was labeled consecutively from 1 to 4. Increments were collected from approximately the center of each cell in the grid and then placed into the appropriate polyethylene sampling container. Increments collected from grids 1-3 were used for the composite primary, duplicate and triplicate samples, respectively. Increments were only sampled from grid 4 for the discrete individual samples collected from the four ¼-acre parcels.

Using the sample collection procedures established through Method 1 of Phase 1, sample teams were equipped with large 24" x 24" 6 mil reclosable polyethylene sampling bags used to line clean 5-gallon buckets so that composite samples could easily be built in the field. For primary samples not requiring replicates, only one bucket was needed for each different increment quantity composite sample collected in a sampling unit. Field teams utilized pint size Ziploc® Brand Freezer Bags for the collection of individual increments for discrete analysis.

Unlike the Phase 1 sampling activities, different increment quantity composite samples were collected from the same sampling units. As such, a color coding system was employed to ensure that increment sampling locations for different samples could be marked simultaneously by a member of the sampling teams and sampling teams could quickly distinguish between different increment quantity collection locations. A specific color flagging was utilized for each different increment quantity sample. The following color coding was utilized for sample collection:

- Orange – 5 increment sample collection location
- Blue – 10 increment sample collection location
- Green – 15 increment sample collection location
- Yellow – 30 increment sample collection location
- Red – 60 increment sample collection location

Increment collection location flags were removed by the sample collection teams once the

location was sampled to visibly mark progress and ensure proper sample collection.

### 5.1.1 Sample Nomenclature

A slightly different sample nomenclature system was employed in the collection of samples for Phase 2 of the Pilot Study in order to account of the differing increment composite samples being built for sampling units in the field. As with the Phase 1 work, the intent of the sample nomenclature system is to prevent the misidentification of samples and ensure that a uniform and consistent number system is employed in the field. All soil samples collected during the Pilot Phase 2 activities employed the following standard designation format:

[Project Phase](+)[Sample Type](+)[Sample Unit]-[Number of Increments]-[Sample Number]

The **project phase** short hand will be:

- P2 = Phase 2 Pilot

The following designation will be used for each **sample type**:

- IS = Sample of Individual Increment to be analyzed independently in the laboratory
- CS = Composite Sample built from Increments

**Sampling Units** are the alphanumeric values used to represent the sampling units and will always contain four digits.

- SAAA = The 4-acre study area
- PAAA, PBBB, PCCC, PDDD = The 1-acre subplots
- PA01-PA04; PB01-PB04; PC01-PC04; PD01-PD04 = The ¼ acre parcels

**Number of Increments** is the numbers of increments used to build the sample submitted for analysis and will be one of the following values:

- 01 = Discrete soil sample based on one increment, value used for the IS sample type
- 05 = Composite sample built from 5 increments, may be used for subplots
- 10 = Composite sample built from 10 increments, may be used for subplots
- 15 = Composite sample built from 15 increments, may be used for subplots or study area
- 30 = Composite sample built from 30 increments, may be used for subplots or study area
- 60 = Composite sample built from 60 increments, may be used for study area

**Sample number** short hand will be different for the individual increment samples (IS) and the composite samples (CS).

For Composite Sample Types

- 01: Primary Sample
- 02: Duplicate Sample
- 03: Triplicate Sample

For Individual Increment Samples

- 01-10: Individual Increment Number Collected

For example, the primary 5 increment sample taken from the ¼-acre parcel PA1 will be designated P2CSPA01-05-01. All replicate composite samples were collected and labeled in the same manner as the primary samples, with the only difference being the last two-digits of sample number (i.e., either 02 or 03).

Sample labels are required to prevent misidentification of samples. Each sample bag was labeled on the outside of the primary sample bag and the outside of the second polyethylene bag.

### 5.1.2 Sample Processing

Samples collected for the Phase 2 study were processed in accordance with the procedures described in Section 3.1.6.2. All samples were sieved prior to laboratory delivery.

## *5.2 Analytical Results*

The results are presented in the analytical data packages for Phase 2 of the Pilot Study as Attachment 2 to this report.

## *5.3 Evaluation of Adequate Number of Increments for Multi-Increment Samples*

### 5.3.1 Approach

For Phase 2 of the Pilot Study, four 1-acre sampling units were selected within a contiguous 4-acre sampling area, denoted as SA. These 1-acre sampling units were denoted as PA, PB, PC, and PD (see Figure 5-1). Within each 1-acre sampling unit, four ¼-acre sub-units were divided. The ¼-acre sampling sub-units in PA, PB, PC, and PD were denoted as PA1 to PA4, PB1 to PB4, PC1 to PC4, and PD1 to PD4, respectively. For four ¼-acre (PA1, PB2, PC3, and PD4) and four 1-acre (PA, PB, PC, and PD) size units, four sets of triplicate incremental sampling (IS) were collected, corresponding to 5, 10, 15, and 30 increments in each triplicate IS. For the 4-acre sampling unit, three sets of IS were collected, corresponding to 15, 30, and 60 increments in each triplicate IS. TEQ concentrations were obtained for each IS in each set.

The influence of varying number of increments on the mean and variability of TEQ concentrations was evaluated. The variability was expressed in terms of the coefficient of variation, RSD (also known as the relative standard deviation), which is defined as the ratio of the standard deviation to the mean. The mean and RSD of the concentrations were plotted against the number of increments for each of the three sampling unit sizes – ¼-acre, 1-acre, and 4 acres. Figures 5-2a through 5-2d show these plots for each of the four ¼-acre sampling sub-units – PA1, PB2, PC3, and PD4, respectively. Figures 5-3a through 5-3d show the plots for each of the four 1-acre sampling units – PA, PB, PC, and PD, respectively. Figure 5-4 shows the plot for the 4-acre sampling unit, SA.

### 5.3.2 Findings

The main findings of the plots shown in Figure 5-2 through 5-4 are as follows:

1. With the exception of the ¼-acre sub-unit PD4, all the sampling units, regardless of the number of increments included in this study would be considered “successful” by the

threshold set by the US Army Corps of Engineers (USACE) guidance which suggests that the field replicate variability would be acceptable if the RSD is less than 30%.

2. At the size of ¼-acre sampling sub-units (Figures 5-2a through 5-2d), both the mean and RSD for the sampling sub-units PB2 and PC3 appear to be stabilized in the range of 15 to 30 increments. For the sampling sub-unit PA1, the mean appears to be stabilized in the range of 15 to 30 increments, but RSD is not stabilized even at 30 increments. For the sampling sub-unit PD4, neither mean nor RSD appears to be stabilized even at 30 increments, as both of these statistics appear to be increasing as the number of increments is increased from 15 to 30. The number of increments necessary to stabilize the mean and RSD will likely depend on the actual size of the sampling unit. For example, some of the housing lots within the potential impact area are likely to be 1/16 to 1/8 of an acre in size. For sampling units smaller than ¼ acre, the data variability would likely be smaller than that for the ¼-acre sub-units that were sampled in Phase 2 of the Pilot Study. Although the mean and RSD can be anticipated to be more stable for these areas between 15 and 30 incremements, the Remedial Decisions for all ¼-acre parcels did not result in any false negative decisions regardless of the numbers of increments.
3. At the size of 1-acre sampling units (Figures 5-3a through 5-3d), both the mean and RSD for the sampling units PC appear to be stabilized in the range of 15 to 30 increments. Furthermore, the mean also appears to be stabilized for the sampling units PA and PD. However, the RSD for the sampling units PA, PB, and PD; and the mean for sampling unit PB do not appear to be stabilized even at 30 increments. As noted above, however these 1-acre parcels would be considered "successful" by the threshold set by the US Army Corps of Engineers (USACE) guidance which suggests that the field replicate variability would be acceptable if the RSD is less than 30%.
4. At the size of 4-acre sampling unit (Figure 5-4), neither the mean nor RSD appears to be stabilized even at 60 increments. This suggests that the data variability in this 4-acre lot is likely to be large and 60+ increments may be necessary to obtain stable estimates of the mean and RSD.

## *5.4 Evaluation of Appropriate Sampling Unit Size*

### 5.4.1 Approach

It may be desirable to sample a larger size of sampling units (1-acre or 4-acre) as a screening step to guide in deciding whether smaller areas (e.g., ¼-acre) within a larger sampling unit (e.g., 1-acre) would need to be sampled further. The methods described below provide the details of the evaluations made to determine if this approach is supportable.

Statistical methods of hypothesis testing were used to assess whether the mean concentrations estimated from a larger sampling unit would be representative of the range of mean concentrations estimated from smaller sub-units within the larger sampling unit. For the 4-acre sampling unit, the mean concentrations in the individual 1-acre units were compared to the mean 4-acre concentration. For each 1-acre unit, the mean concentrations in the individual ¼-acre sub-units were compared to the mean 1-acre concentration.

If the differences in the mean values between a larger unit and smaller sub-units were statistically significant, one would conclude that IS at the scale of the larger size units would not provide reliable estimates of mean concentrations in the sub-units. In that case, multi-incremental sampling at the scale of the sub-units may be necessary. On the other hand, if the differences in the mean concentrations between the sampling unit and sub-units are not statistically significant, IS at the scale of the larger unit would be adequate and further sampling of the sub-units would not be necessary.

Differences between the 4-acre unit (SA) and the four 1-acre sampling units (PA, PB, PC, and PD) were analyzed first. For the 4-acre unit, data from 60-increment triplicate samples were used. For the 1-acre units, data from 30-increment triplicate samples were used. Figure 5-5 shows the box-and-whisker plots of TEQ concentrations over the 4-acre unit and the four 1-acre units. A visual inspection shows that the mean concentrations in PA and PD are substantially smaller than those in PB and PC. Furthermore, the mean concentrations at the scale of SA would under-estimate concentrations in PB and PC, and over-estimate concentrations in PA and PD. These findings were formally confirmed using both parametric and non-parametric statistical methods. The results of the statistical analysis are included in Attachment C1.

One would conclude from these results that 60-increment IS at the scale of a 4-acre sampling unit would not be representative of the range of mean concentrations in the individual 1-acre units contained within this larger 4-acre unit. Furthermore, statistical conclusions drawn for the 1-acre units could be different from those for the larger 4-acre area regarding whether the mean concentration exceeds the applicable action level, as PA and PD are <250 ppt TEQ and PB and PC are >250 ppt TEQ; therefore, a false negative can be identified at the 4-acre scale (assuming the 4-acre sampling unit is composed of smaller scale exposure units).

Next, differences between a 1-acre sampling unit and the ¼-acre sub-unit within that 1-acre unit were analyzed for each of the four sampling units – PA, PB, PC, and PD. Data from 30-increment triplicate samples were used for the 1-acre sampling units as well as for the ¼-acre sub-units. Box-and-whisker plots of the pairwise comparisons for each sampling unit are shown in Figures 5-6 for PA, PB, PC, and PD. Results of the formal statistical testing of these differences are included in Attachment C2. For sampling units PB and PC, the differences between the unit and sub-unit mean values are statistically significant. For sampling units PA and PD, the differences between the unit and sub-unit mean values are statistically not significant.

These results suggest that IS at the scale of 1-acre sampling units may not consistently represent the range of mean concentrations in the individual ¼-acre sub-units contained within the larger 1-acre unit. That is, for some 1-acre units, the mean concentrations in the individual ¼-acre sub-units could be statistically different from the mean 1-acre concentration.

However, even when the 1-acre mean concentration is statistically different from ¼-acre mean concentrations, the remedial decisions could be the same for both the 1-acre unit and ¼-acre sub-units. When the 1-acre mean concentration is substantially higher than a specified action level and the data variability of the triplicate 1-acre multiple-increment samples is relatively small, the likely conclusion would be that the mean 1-acre concentration is statistically higher than the action level. In this situation, if additional sampling data at the scale of ¼-acre were to be

collected, they would likely show that the mean concentrations in the ¼-acre sub-units are also statistically higher than the action level.

Similarly, when the 1-acre mean concentration is substantially lower than a specified action level and the data variability of the triplicate 1-acre multiple-increment samples is relatively small, the likely conclusion would be that the mean 1-acre concentration is statistically lower than the action level. In this situation, if additional sampling data at the scale of ¼-acre were to be collected, they would likely show that the mean concentrations in the ¼-acre sub-units are also statistically lower than the action level.

In both of these situations, it would be reasonable to infer that the conclusion drawn for the 1-acre unit would also hold for the ¼-acre sub-units contained within the 1-acre unit. If such an inference for the ¼-acre sub-units is accepted, the IS data collected for a 1-acre unit would be adequate to draw statistically valid conclusions for the individual ¼-acre sub-units contained within the larger 1-acre unit. No further sampling at the scale of ¼-acre would be necessary, because the ¼-acre sampling would be unlikely to change the conclusion regarding whether the mean concentration in one or more of the ¼-acre sub-units exceed the action level.

On the other hand, if the 1-acre mean concentration is close to the action level and the data variability of the triplicate 1-acre multi-increment samples is relatively large, no definitive conclusion could be reached regarding whether the 1-acre mean concentration is statistically different (higher or lower) than the action level. This would suggest the possibility of mixed conclusions about the ¼-acre sub-units within the 1-acre unit. That is, the action level could be exceeded in some of the ¼-acre sub-units, but not in others. To resolve this uncertainty, one would need additional sampling at the scale of ¼-acre sub-units.

This discussion suggests that a two-stage sampling strategy could be considered for larger, 1+acre sampling units in the potential impact area (such as parks) to optimize the sampling design. In Stage 1, triplicate multiple-increment samples would be collected in the large sampling unit. One would use the “closeness” of the mean concentration estimated for the large unit to the action level and the variability of the triplicate 1-acre sample values to determine

whether additional Stage 2 sampling in smaller sub-units (e.g., ¼-acre in size) would be necessary. A statistically critical interval could be derived using the specified action level and the Stage 1 data variability. The interval should be such that if the large-unit mean concentration is outside that interval, one could assume that the conclusion drawn for the large unit also applies to the smaller sub-units and no Stage 2 sampling in the sub-units would be needed. On the other hand, if the large-unit mean concentration is within the critical interval, no common conclusion regarding the sub-units could be drawn and Stage 2 sampling in the sub-units would be necessary.

Based on the principles of hypothesis testing, one could define the statistically critical interval to be the interval (applicable action level ± minimum detectable difference). The minimum detectable difference (MDD) is the minimum difference from the action level that could be detected at specified probabilities of false positive and false negative errors, for given data variability and sample size. In hypothesis testing, MDD is often referred to as the "gray zone."

The validity of this two-stage sampling approach was tested for the four 1-acre sampling units – PA, PB, PC, and PD. The triplicate IS data collected at the 1-acre scale were considered to be Stage 1 data. Table 5-1 shows the critical interval (applicable action level ± minimum detectable difference) for the mean concentration in each 1-acre unit. The action level was assumed to be 250 ppt. For all four 1-acre units, the mean concentration was outside this critical interval, and hence, the conclusion would be that Stage 2 sampling would not be necessary at the scale of ¼-acre. This conclusion was confirmed using the actual data collected in the ¼-acre sub-units. For each of the four 1-acre units, the remedial decision was found to be the same between the two data sets – the ¼-acre sub-unit data and the corresponding 1-acre unit data (e.g. no false negatives were identified).

### 5.4.2 Findings

The main findings of this evaluation of appropriate sampling unit size are as follows:

1. A false negative was identified between the 1-acre and 4-acre scale sampling unit scale.
2. No false negatives were identified between the 1-acre and ¼-acre scale.

3. Four-acre sampling units may not be appropriate to estimate mean concentrations in the 1-acre units contained within a 4-acre unit. This is because the estimated mean for the 4-acre sampling unit could be significantly different from the means of the individual 1-acre (or ¼-acre) units contained within the larger 4-acre unit. Furthermore, the statistical conclusions drawn for the 4-acre unit could be different from those for the individual 1-acre units regarding whether the specified action level is exceeded in one or more of the individual 1-acre units contained within the larger 4-acre unit. Further site-specific evaluation would be needed in residential areas to support this method.
4. The mean concentration estimated from 1-acre unit data may not accurately represent the range of mean concentrations in the individual ¼-acre sub-units. Furthermore, if the mean 1-acre concentration is close to a specified action level and the data variability of replicate multi-increment samples in the 1-acre unit is large, the conclusion regarding whether the mean concentrations in some of the individual ¼-acre sub-units exceeds the action level could be different from that drawn from the 1-acre IS result.
5. A two-stage sampling plan may be considered to optimize the sampling effort in large (1 to 2 acres) sampling units (such as parks) within the potential impact area. In the first stage, sampling data would be collected over the entire unit. If the mean concentration from the first stage sampling is found to be outside the interval (applicable action level ± minimum detectable difference), a second stage of sampling at a smaller scale (e.g., ¼ acre sub-units) would not be necessary. This is because the additional Stage 2 sampling at the smaller scale would be unlikely to change the Stage 1 conclusion regarding whether the specified action level is exceeded in the individual sub-units. If the mean concentration from Stage 1 sampling is within the aforementioned interval, Stage 2 sampling at a smaller-scale (e.g., ¼-acre sub-units) may be conducted. This is because Stage 1 conclusion regarding whether the specified action level is exceeded in some of the individual ¼-acre sub-units could change depending on the Stage 2 sampling data.

## *5.5 Evaluation of Accuracy of Fast Analysis Method Relative to Laboratory EPA Method*

### 5.5.1 Approach

An assessment was made of whether the fast analysis method would provide accurate estimates of TEQ concentrations relative to the traditional laboratory EPA 1613B method. Each of 30 soil samples was analyzed for congeners concentrations using both methods. The results provided 30 pairs of data, which are shown in Table 5-1.

### 5.5.2 Findings

The difference, $\Delta$ (fast method concentration – laboratory concentration), was calculated for each pair of data. Figure 5-7a shows a plot of $\Delta$ versus the laboratory values. The plot shows that the difference is randomly distributed around the zero difference line, suggesting that the fast method provides unbiased estimates of the laboratory values.

Figure 5-7b shows a plot of the laboratory values (on the Y-axis) versus the fast method values (on the X-axis) and the regression line that was fitted to the data. The plot shows that the regression line provides an excellent fit to the data points. The slope of the regression line is close to 1 and the data are randomly distributed around the regression line, confirming that the fast method provides unbiased estimates of the laboratory values. Furthermore, the squared correlation coefficient ($R^2$) is 0.993 and the root mean square error (RMSE) of the regression line is 12.7, which is suitable. These results suggest that the fast method provides accurate estimates of the laboratory values.

Figure 5-8a shows a moderate bias in the fast method results relative to the laboratory EPA 1613B Extended method. The fast method appears to slightly underestimate low laboratory values and slightly overestimate high laboratory values. However, the correlation between the two methods is high (square of correlation coefficient = 0.99). The regression equation shown in Figure 5-8b can be used to correct for this bias as long as it is used within the range of concentrations in the sample data (i.e., there is no extrapolation beyond this data range).

## *5.6 Comparison of Individual-Increment and Multi-Increment Sample Results*

### 5.6.1 Approach

In the four ¼-acre sampling sub-units PA1, PB2, PC3, and PD4, ten individual-increment (i.e., "grab" or "discrete") samples were collected in addition to the triplicate multi-increment samples. For each sampling sub-unit, the TEQ concentrations were compared in the two data sets – one consisting of ten grab samples and the other consisting of three (i.e., triplicate) 30-increment samples. Figure 5-9 shows box-and-whisker plots of the two data sets in each of the four sampling sub-units.

### 5.6.2 Findings

The main findings of the comparison of the two data sets are as follows:

1. In each of the four sub-units, the mean concentration of the triplicate 30-increment samples was statistically no different from that of the ten grab samples.
2. The range of the 30-increment sample concentrations in each sub-unit was within the range of the ten grab sample concentrations.
3. As would be expected, the variability of the 30-increment samples was substantially lower than that of the grab samples in all sub-units. However, for the sub-unit PD, the variability of the 30-increment samples was only moderately lower than that of the grab samples. This was a result of the fact that the variability of the 30-increment samples in the sub-unit PD was substantially higher than that of the 30-increment samples in the other three sub-units.
4. In the sub-unit PA, one of the grab samples showed an anomalously higher concentration than the rest of the grab samples. Conversely, in the sub-unit PB, one of the grab samples showed an anomalously lower concentration than the rest of the grab samples. In contrast, the 30-increment samples did not show any anomalous values, as would be expected from the averaging effect inherent in a sample-compositing process.

## *5.7 Riffle Splitter*

### 5.7.1 Approach

To evaluate the use of mechanical sub-sampling of composite samples, four approximately 30 g samples from PPSOCS-02 were split and entirely extracted (no sub sampling occurred at the laboratory). The riffle splitter was rinsed with tap water, with the rinseate tested. Ottawa sand

blank sand was run through the splitter as an equipment blank. Results are presented in Table 5-3.

### 5.7.1 Findings

1. Relative Standard Deviation of quadruplicate samples was approximately 11%, which is within the range previously determined at Site O (from 10.4 to 16.7%).
2. Average concentration of riffle splitter replicates was 622 ppt TEQ, compared to 658 ppt TEQ for laboratory soil sample replicates.
2. Significant potential for cross-contamination was not identified in blank samples from the riffle splitter.

**Table 5-1. Conclusions Based On Minimum Detectable Differences**

| Sampling Unit | Size of Sampling Unit | Mean | Standard Deviation | Sample Size | alpha | *Z* (1-alpha) | Beta | *Z* (1-beta) | Minimum Detectable Difference (MDD) | Action Level | Mean - MDD | Mean + MDD | Conclusion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PA | 1 acre | **28.0** | 3.4 | 3 | 0.05 | 1.645 | 0.2 | 0.842 | 6.7 | 250 | **243.3** | **256.7** | Mean concentration does not exceed action level |
| PA1 | 1/4 acre | **32.1** | 4.7 | 3 | 0.05 | 1.645 | 0.2 | 0.842 | 9.2 | 250 | **240.8** | **259.2** | Mean concentration does not exceed action level |
| PB | 1 acre | **382.0** | 19.6 | 3 | 0.05 | 1.645 | 0.2 | 0.842 | 38.0 | 250 | **212.0** | **288.0** | Mean concentration exceeds Action Level |
| PB2 | 1/4 acre | **428.1** | 11.2 | 3 | 0.05 | 1.645 | 0.2 | 0.842 | 21.8 | 250 | **229.2** | **272.8** | Mean concentration exceeds Action Level |
| PC | 1 acre | **343.7** | 6.4 | 3 | 0.05 | 1.645 | 0.2 | 0.842 | 12.3 | 250 | **237.7** | **262.3** | Mean concentration exceeds Action Level |
| PC3 | 1/4 acre | **390.6** | 14.8 | 3 | 0.05 | 1.645 | 0.2 | 0.842 | 28.7 | 250 | **221.3** | **278.7** | Mean concentration exceeds Action Level |
| PD | 1 acre | **48.5** | 10.1 | 3 | 0.05 | 1.645 | 0.2 | 0.842 | 19.6 | 250 | **230.4** | **269.6** | Mean concentration does not exceed action level |
| PD4 | 1/4 acre | **74.2** | 23.4 | 3 | 0.05 | 1.645 | 0.2 | 0.842 | 45.3 | 250 | **204.7** | **295.3** | Mean concentration does not exceed action level |

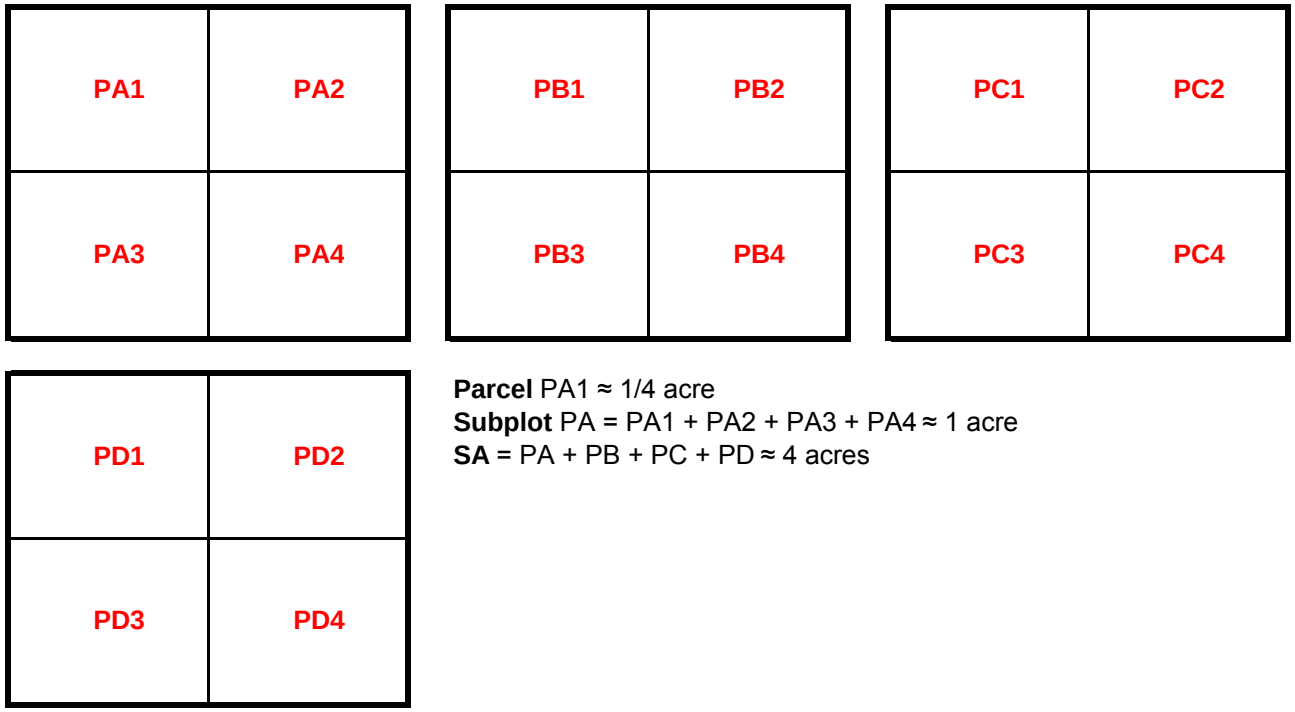
| Table 5-2. Dioxin/Furan TEQ Concentration in ppt | | | |
|---|---|---|---|
| **Sample Description** | **8280 MAS (Fast Analysis)** | **EPA 1613b with confirmation 2378-TCDF only** | **EPA 1613b with EXTENDED confirmation** |
| P2CSPA02-30-01 | 32.76 | 30.4 | 28.7 |
| P2CSPB01-05-01 | 328.65 | 351 | 323 |
| P2CSPB01-10-01 | 294 | 302 | 282 |
| P2CSPB01-15-01 | 317.1 | 335 | 314 |
| P2CSPB01-30-01 | 323.4 | 310 | 293 |
| P2CSPBBB-05-01 | 426 | 441 | 415 |
| P2CSPBBB-10-01 | 448 | 445 | 416 |
| P2CSPCCC-05-01 | 287 | 281 | 261 |
| P2CSPCCC-05-02 | 271 | 264 | 244 |
| P2CSPCCC-05-03 | 287 | 271 | 254 |
| P2CSPCCC-10-01 | 307 | 284 | 268 |
| P2CSPCCC-10-02 | 277 | 278 | 261 |
| P2CSPCCC-10-03 | 275 | 264 | 249 |
| P2CSPD02-30-01 | 51.45 | 52 | 49.1 |
| P2CSPDDD-30-01 | 37.38 | 32.8 | 30.8 |
| P2CSSAAA-15-02 | 149.1 | 147 | 138 |
| P2CSSAAA-15-03 | 118.65 | 138 | 129 |
| P2ISPB02-01-01 | 328.65 | 335 | 307 |
| P2ISPB02-01-02 | 136.5 | 128 | 122 |
| P2ISPB02-01-03 | 330.75 | 345 | 309 |
| P2ISPB02-01-04 | 349.65 | 346 | 325 |
| P2ISPB02-01-05 | 469.35 | 474 | 453 |
| P2ISPB02-01-06 | 355.95 | 336 | 322 |
| P2ISPB02-01-07 | 485.1 | 471 | 448 |
| P2ISPB02-01-08 | 464.1 | 439 | 406 |
| P2ISPB02-01-09 | 483.8 | 489 | 447 |
| P2ISPD04-01-01 | 52.5 | 36.5 | 35.1 |
| P2ISPD04-01-03 | 81.375 | 78.1 | 71.8 |
| P2ISPD04-01-05 | 57.12 | 63.9 | 58.1 |
| P2ISPD04-01-06 | 47.67 | 52.1 | 47.6 |

**Table 5-3. Riffle Splitter Data**

| sample description | ETEQ (ND=0) | | ETEQ (ND=0.5 LoD) | | ETEQ (ND=LoD) |
|---|---|---|---|---|---|
| OPR 12/29/11 | 2080 | | 2080 | | 2080 |
| Method blank 12/29/11 | 0 | | 11 | | 22 |
| PPSOCS-02-R1 | 567 | | 567 | | 567 |
| PPSOCS-02-R2 | 712 | | 712 | | 712 |
| PPSOCS-02-R3 | 639 | | 639 | | 639 |
| PPSOCS-02-R4 | 568 | | 568 | | 568 |
| PPSOCS-02 Rinseate | 0 | | 0 | | 0 |
| Equipment Blank | 0 | | 1 | | 2 |
| Method Blank - Water | 0 | | 0 | | 0 |

| sample description | 2378-TCDF [ng/kg d.w.] | flag | 2378-TCDD [ng/kg d.w.] | flag | 23478-PeCDF [ng/kg d.w.] | flag | 12378-PeCDD [ng/kg d.w.] | flag | 1234(6)78-HxCDF [ng/kg d.w.] | flag | 1234(6)78-HxCDD [ng/kg d.w.] | flag | 123789-HxCDD [ng/kg d.w.] | flag | 1234678-HpCDF [ng/kg d.w.] | flag | 1234678-HpCDD [ng/kg d.w.] | flag | OCDF [ng/kg d.w.] | flag | OCDD [ng/kg d.w.] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OPR 12/29/11 | 349 | | 345 | | 894 | | 915 | | 1550 | | 1580 | | 794 | | 915 | | 935 | | 1530 | | 1400 |
| Method blank 12/29/11 | < 3.10 | J,Y | < 9.30 | J,Y | < 6.67 | J,Y | < 6.63 | J,Y | < 11.5 | J,Y | < 11.5 | J,Y | < 5.13 | J,Y | < 7.40 | J,Y | < 6.90 | J,Y | < 12.9 | J,Y | 5.93 |
| PPSOCS-02-R1 | 94.4 | | 136 | | 168 | | 99.8 | J,Y | 609 | | 292 | J | 128 | J | 5800 | | 6140 | | 13600 | W | 60100 |
| PPSOCS-02-R2 | 80.4 | J | 196 | | 214 | J | 130 | J,Y | 709 | | 366 | J | 147 | J | 6100 | | 7110 | | 14200 | | 72200 |
| PPSOCS-02-R3 | 74.7 | Y | 152 | | 182 | | 136 | J,Y | 631 | | 327 | | 137 | | 5660 | | 6810 | | 14600 | W | 68500 |
| PPSOCS-02-R4 | 74.8 | J | 134 | | 190 | J | 88.9 | J | 653 | | 326 | J | 138 | J | 5600 | | 6440 | | 12600 | W | 58100 |
| PPSOCS-02 Rinseate | < 0.0609 | J,Y | 0.0062 | J,Y | < 0.127 | J,Y | < 0.120 | J,Y | 0.0114 | J,Y | < 0.198 | J,Y | < 0.0878 | J,Y | 0.0754 | J | 0.104 | J | 0.208 | J | 0.72 |
| Equipment Blank | < 0.453 | J,Y | 0.074 | J,Y | < 0.999 | J,Y | < 0.990 | J,Y | < 1.77 | J,Y | < 3.42 | J,Y | < 0.814 | J,Y | < 1.23 | J,Y | < 1.15 | J,Y | < 2.47 | J,Y | 0.305 |
| Method Blank - Water | < 0.0600 | J,Y | < 0.175 | J,Y | < 0.122 | J,Y | < 0.116 | J,Y | < 0.191 | J,Y | < 0.186 | J,Y | < 0.0810 | J,Y | 0.011 | J,Y | 0.011 | J,Y | 0.019 | J,Y | 0.078 |

**Figure 5-1. Pilot Study Area**




**Parcel** PA1 ≈ 1/4 acre
**Subplot** PA = PA1 + PA2 + PA3 + PA4 ≈ 1 acre
**SA** = PA + PB + PC + PD ≈ 4 acres

**Figure 5-2a. Effect of Number of Increments in Sampling Sub-Unit PA1**

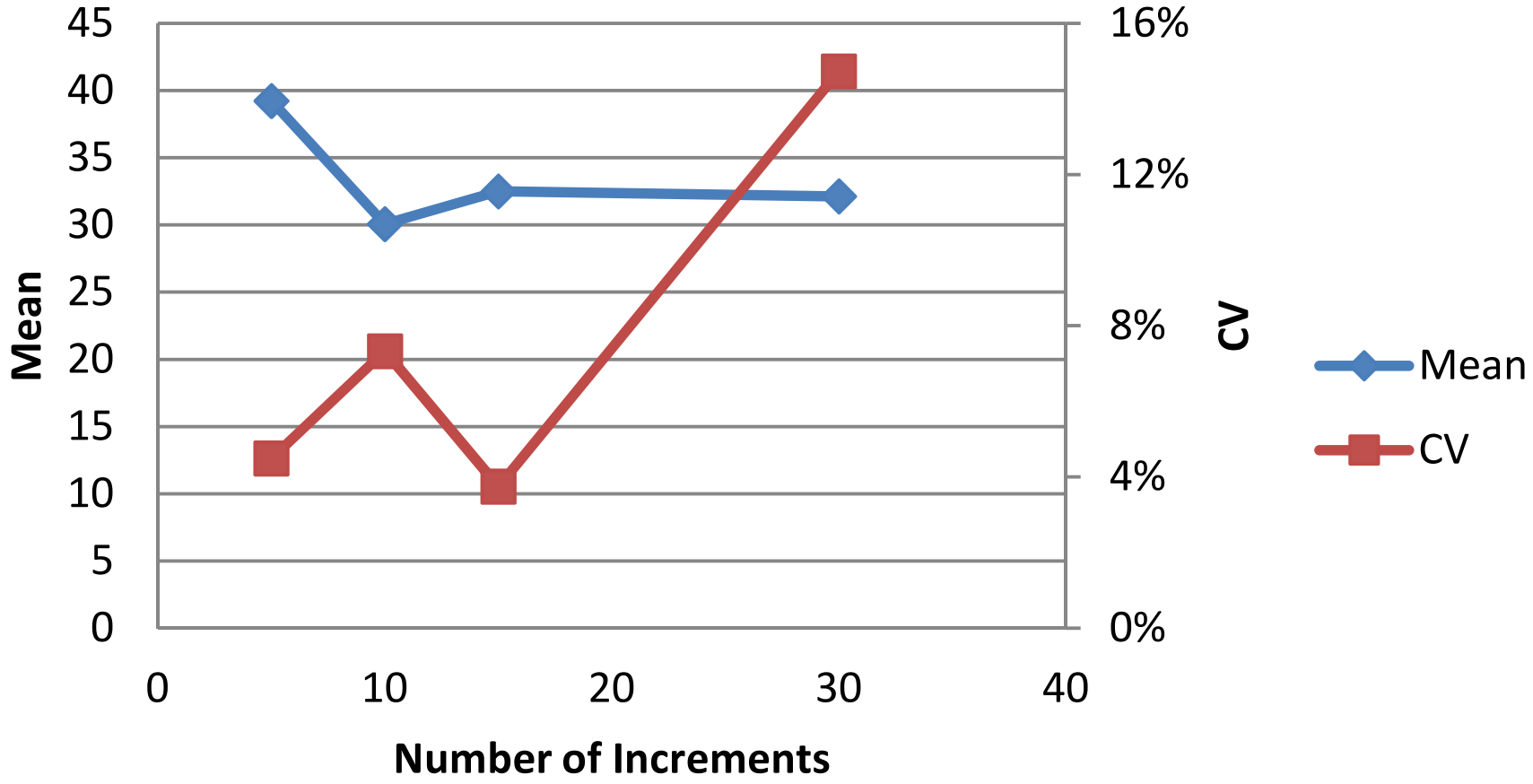


**Figure 5-2b. Effect of Number of Increments in Sampling Sub-Unit PB2**

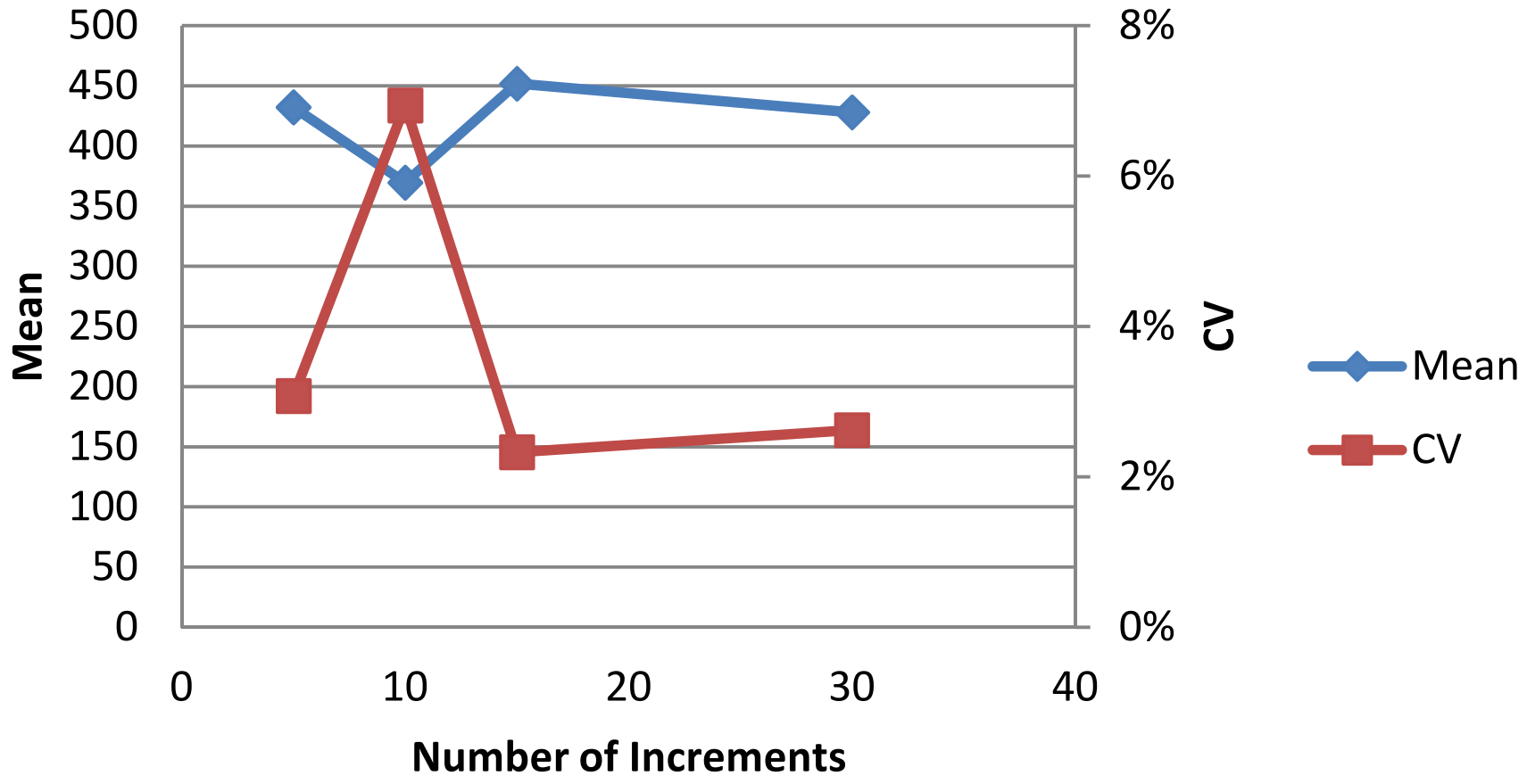


**Figure 5-2c. Effect of Number of Increments in Sampling Sub-Unit PC3**

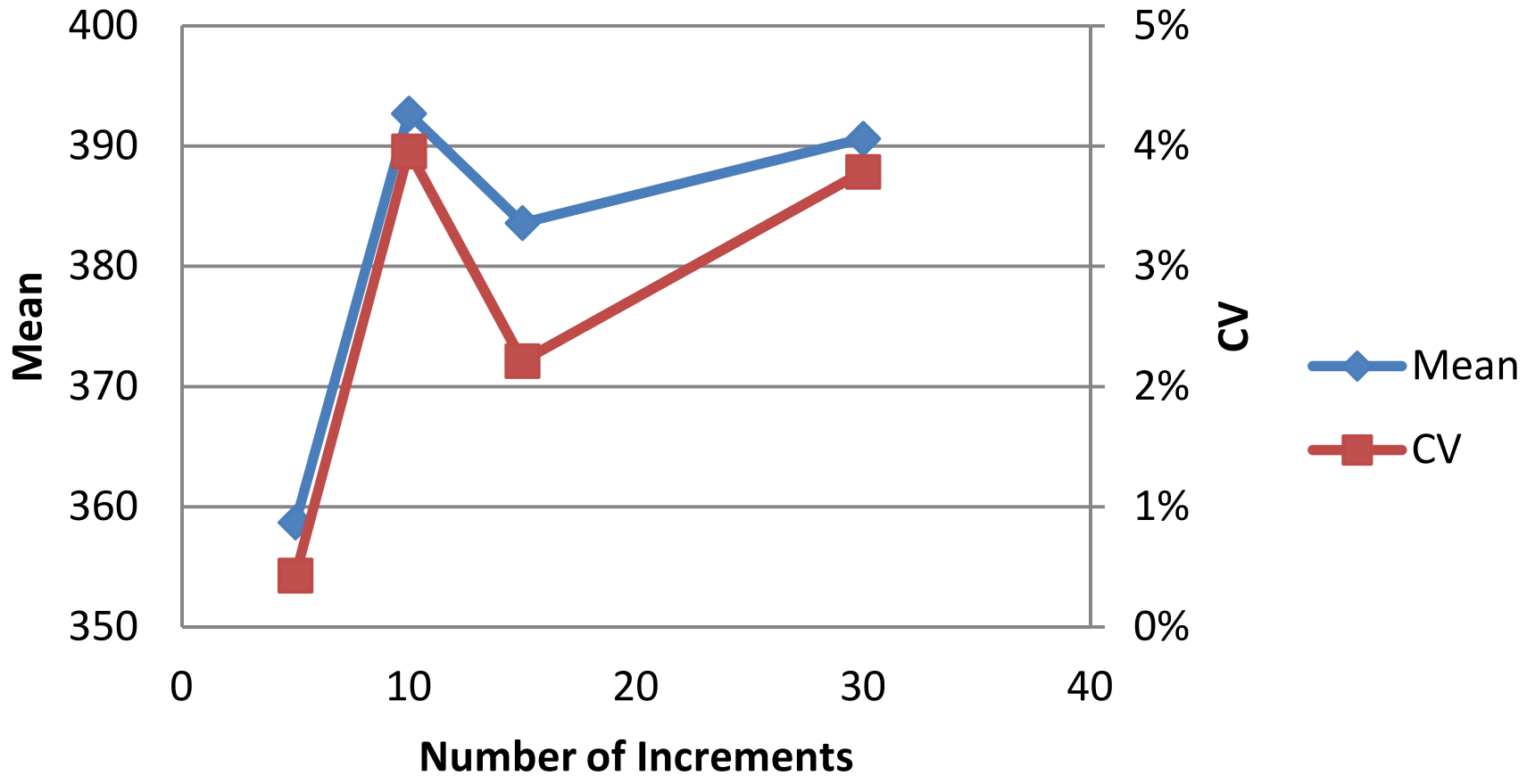


**Figure 5-2d. Effect of Number of Increments in Sampling Sub-Unit PD4**

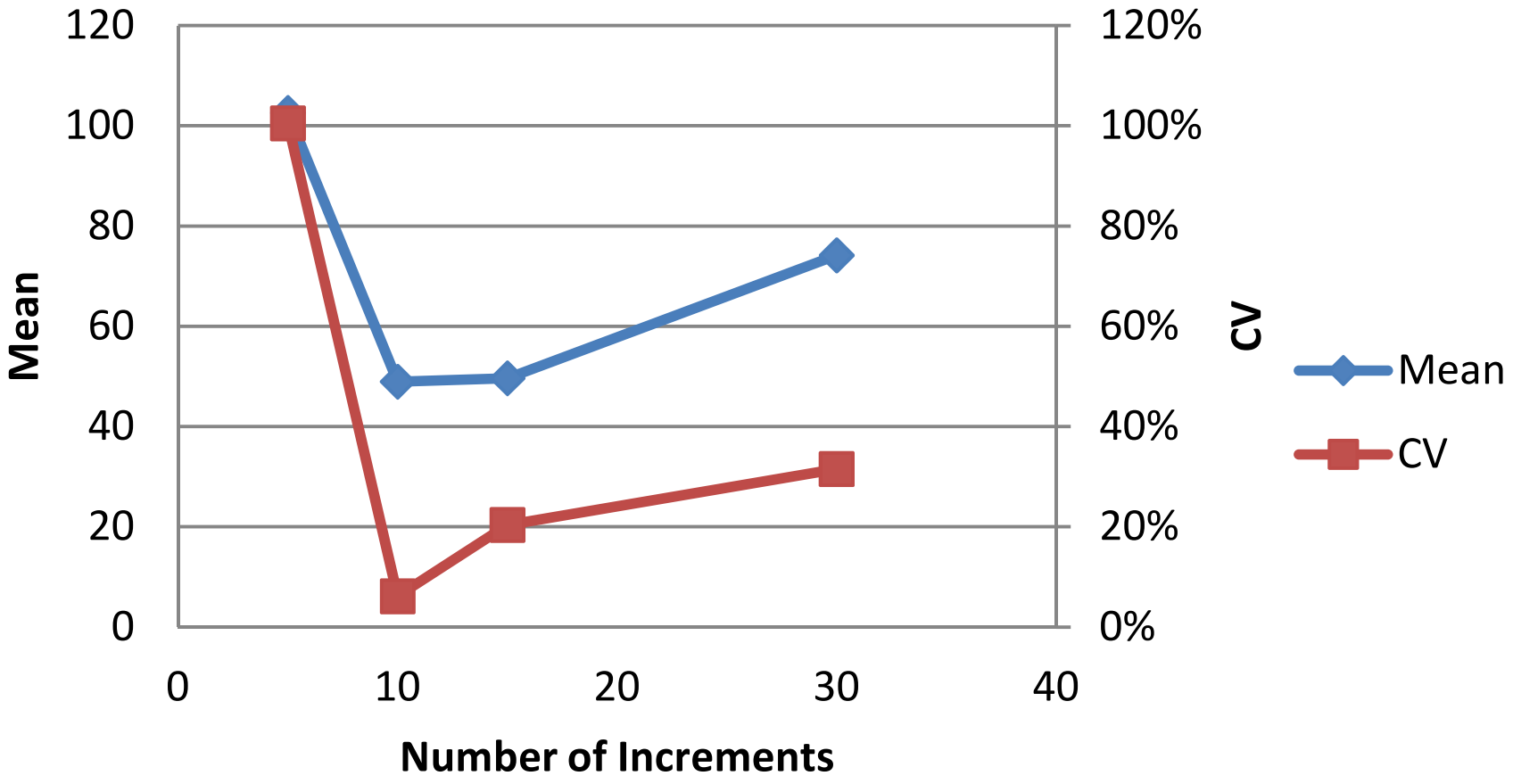


**Figure 5-3a. Effect of Number of Increments in Sampling Unit PA**

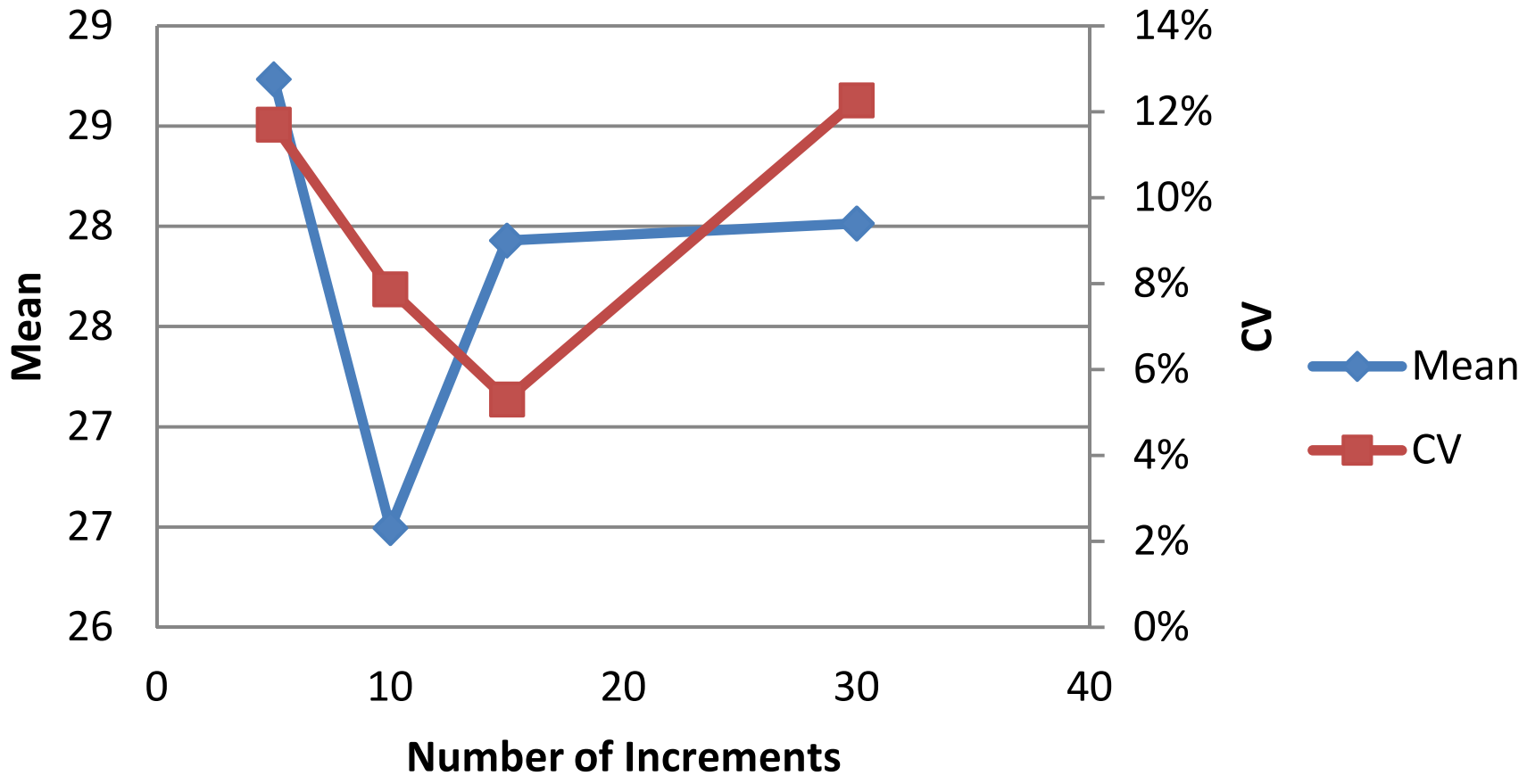


**Figure 5-3b. Effect of Number of Increments in Sampling Unit PB**

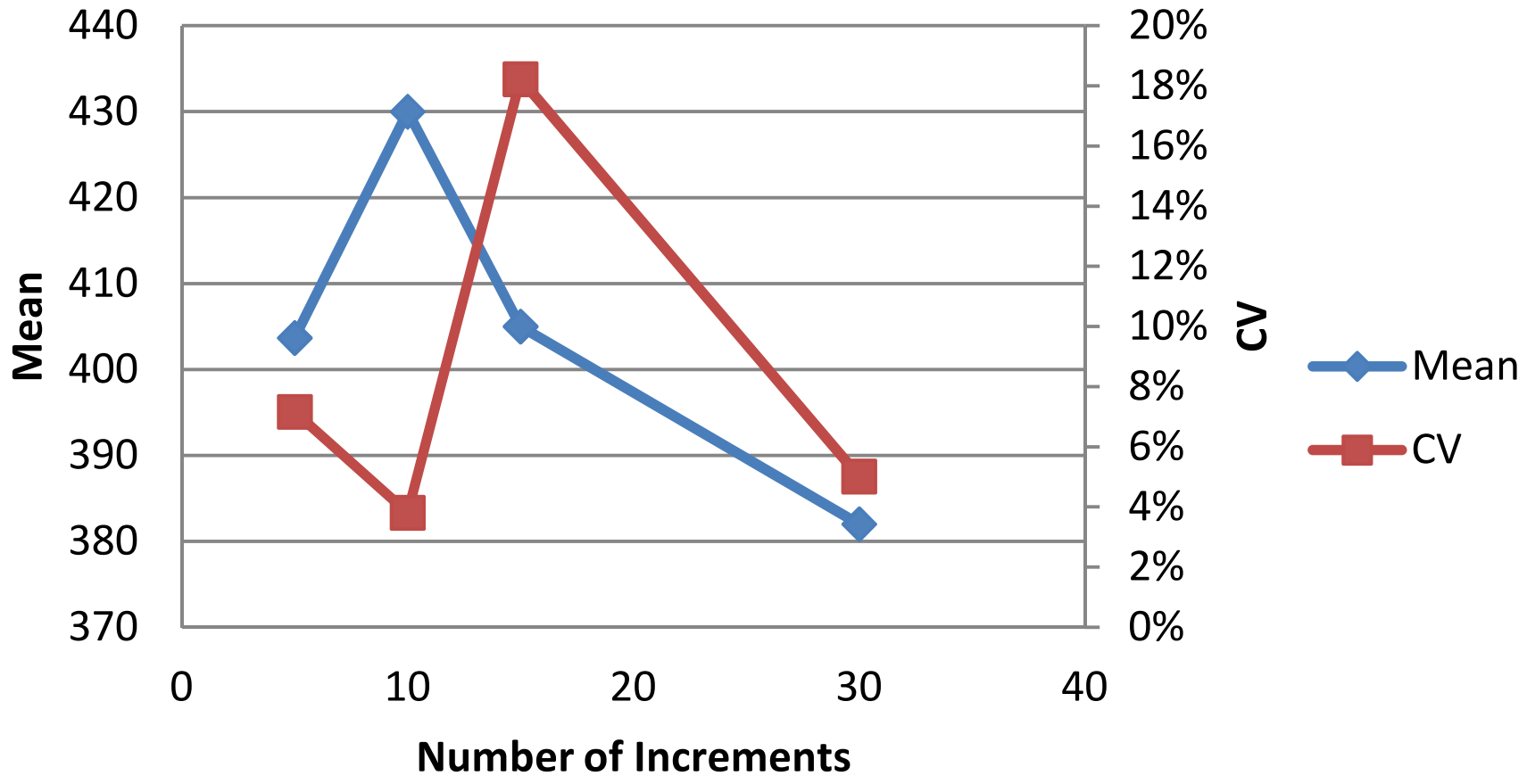
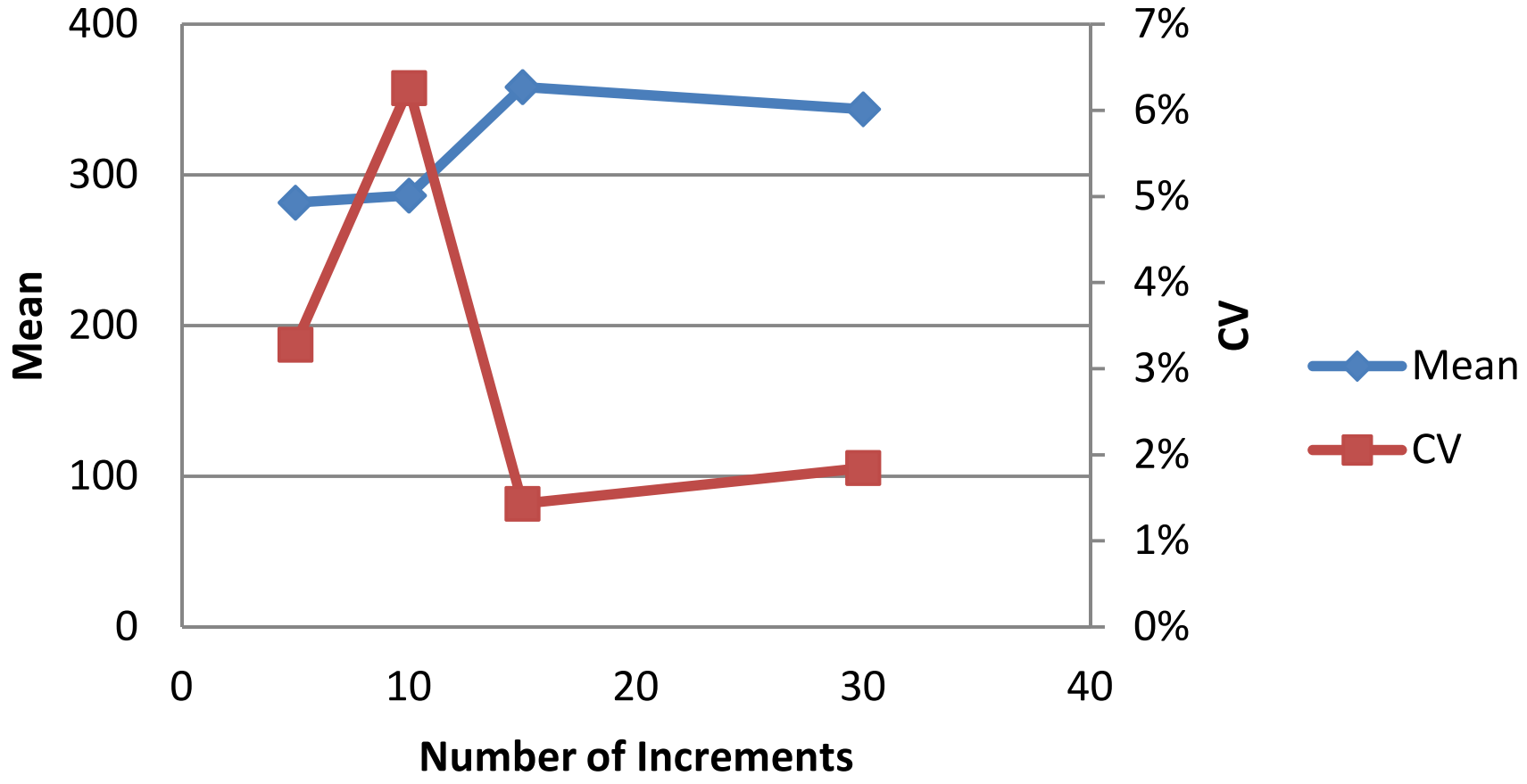


**Figure 5-3c. Efect of Number of Increments in Sampling Unit PC**



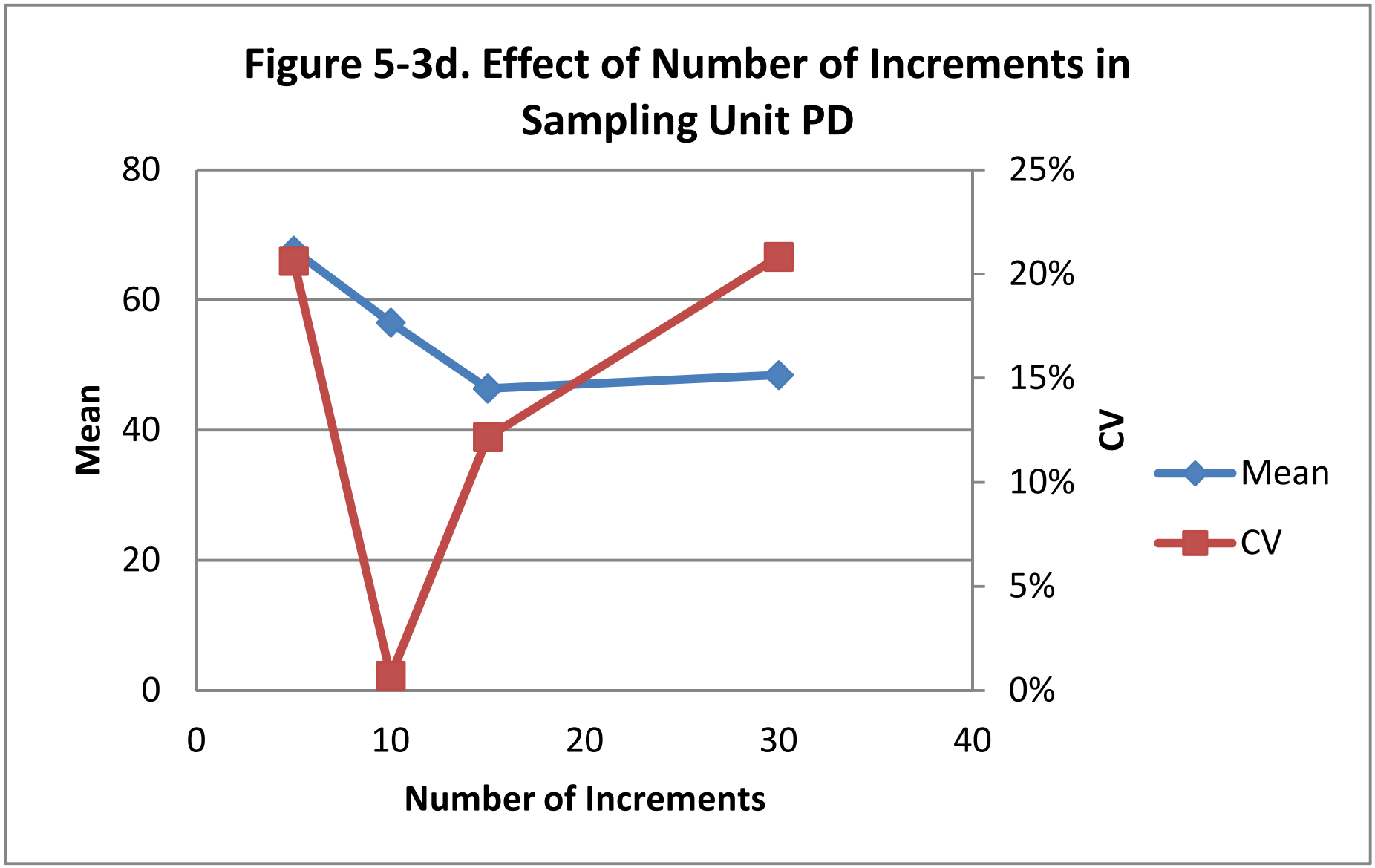
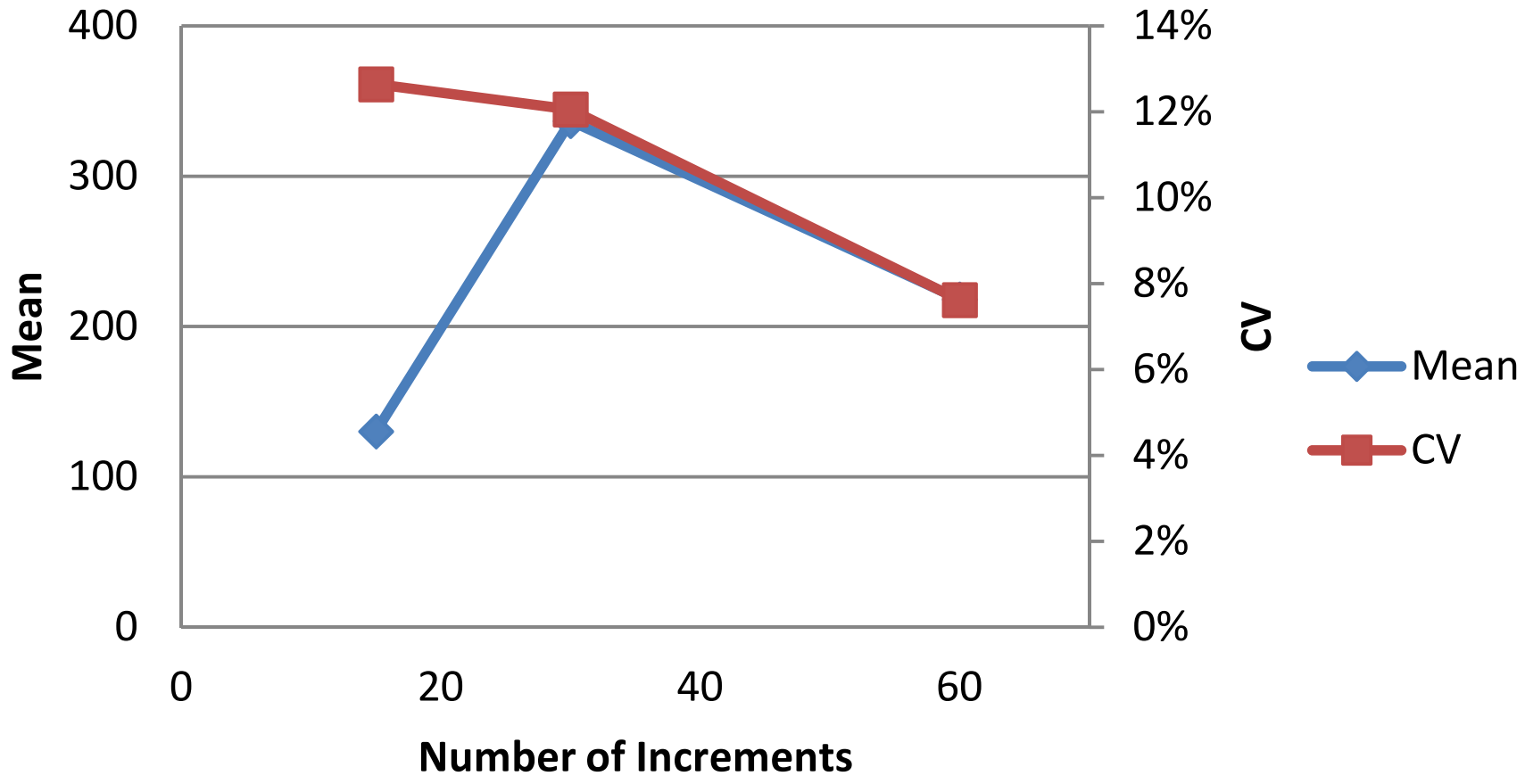
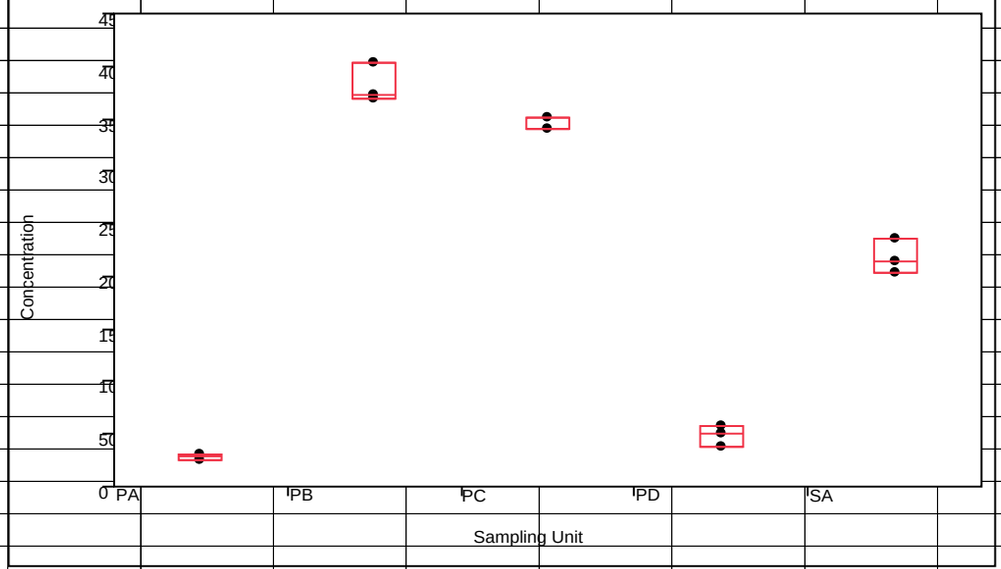


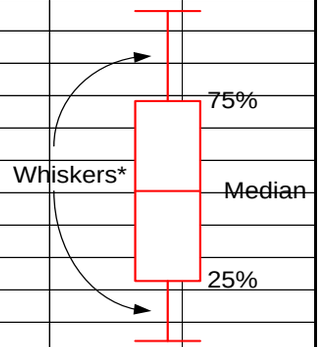
Figure 5-3d. Effect of Number of Increments in Sampling Unit PD
80
60
40
20
0
Mean
25%
20%
15%
10%
5%
0%
CV
0
10
20
30
40
Number of Increments
Mean
CV

**Figure 5-4. Effect of Number of Increments in Sampling Unit SA**






**Box-and-Whisker Plot Legend**




*from the ends of the box to the outermost data point that falls within upper/lower quartile +/- (1.5 × interquartile range)

**Figure 5-5. Box-and-whisker plots of TEQ concentrations of the 4-acre unit (SA; 60-increment) and the four 1-acre units (PA, PB, PC, PD; 30-increment)**

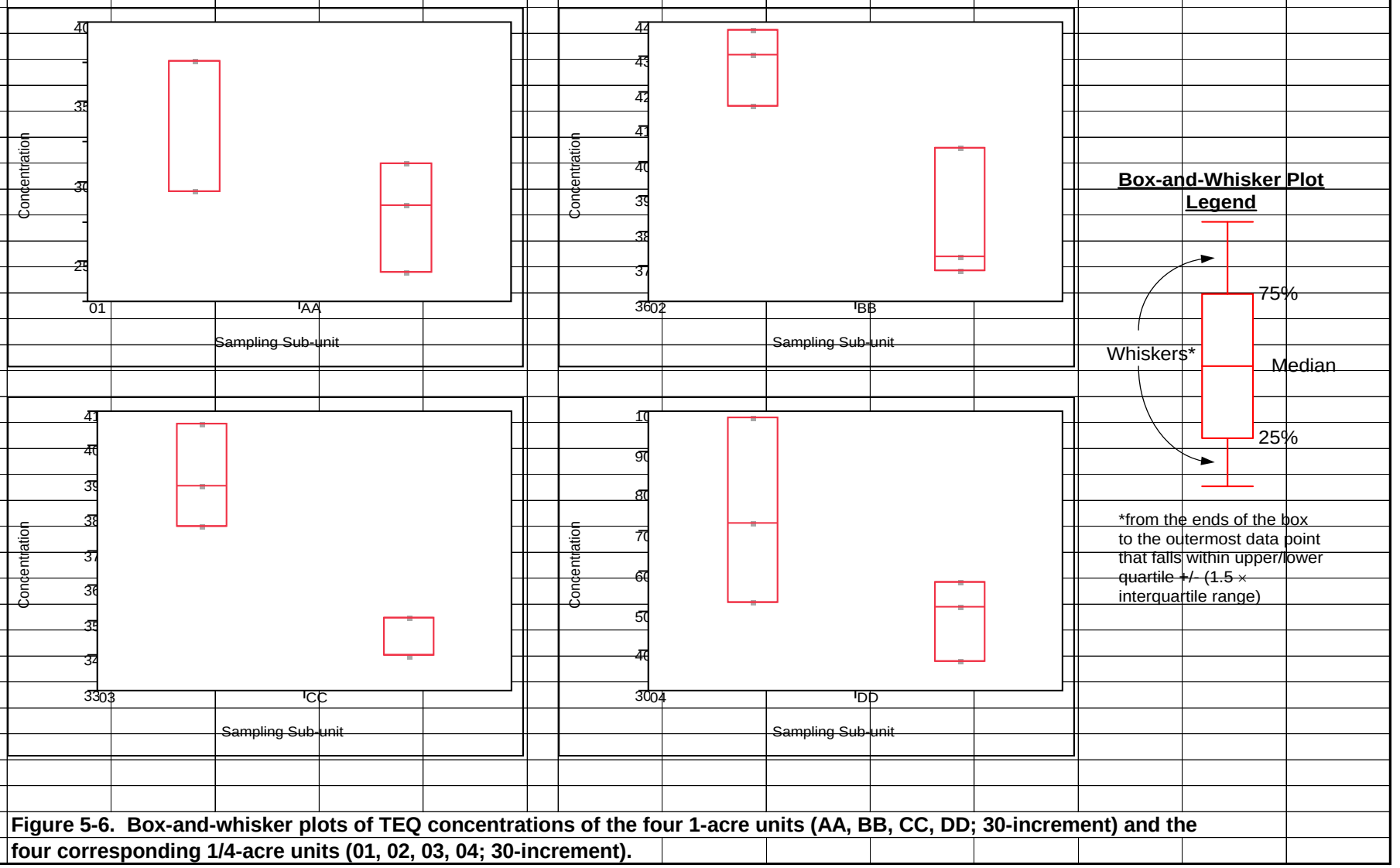



**Figure 5-6. Box-and-whisker plots of TEQ concentrations of the four 1-acre units (AA, BB, CC, DD; 30-increment) and the four corresponding 1/4-acre units (01, 02, 03, 04; 30-increment).**

**Figure 5-7a. Plot of Concentration Differences versus Laboratory Concentration (EPA 1613B)**

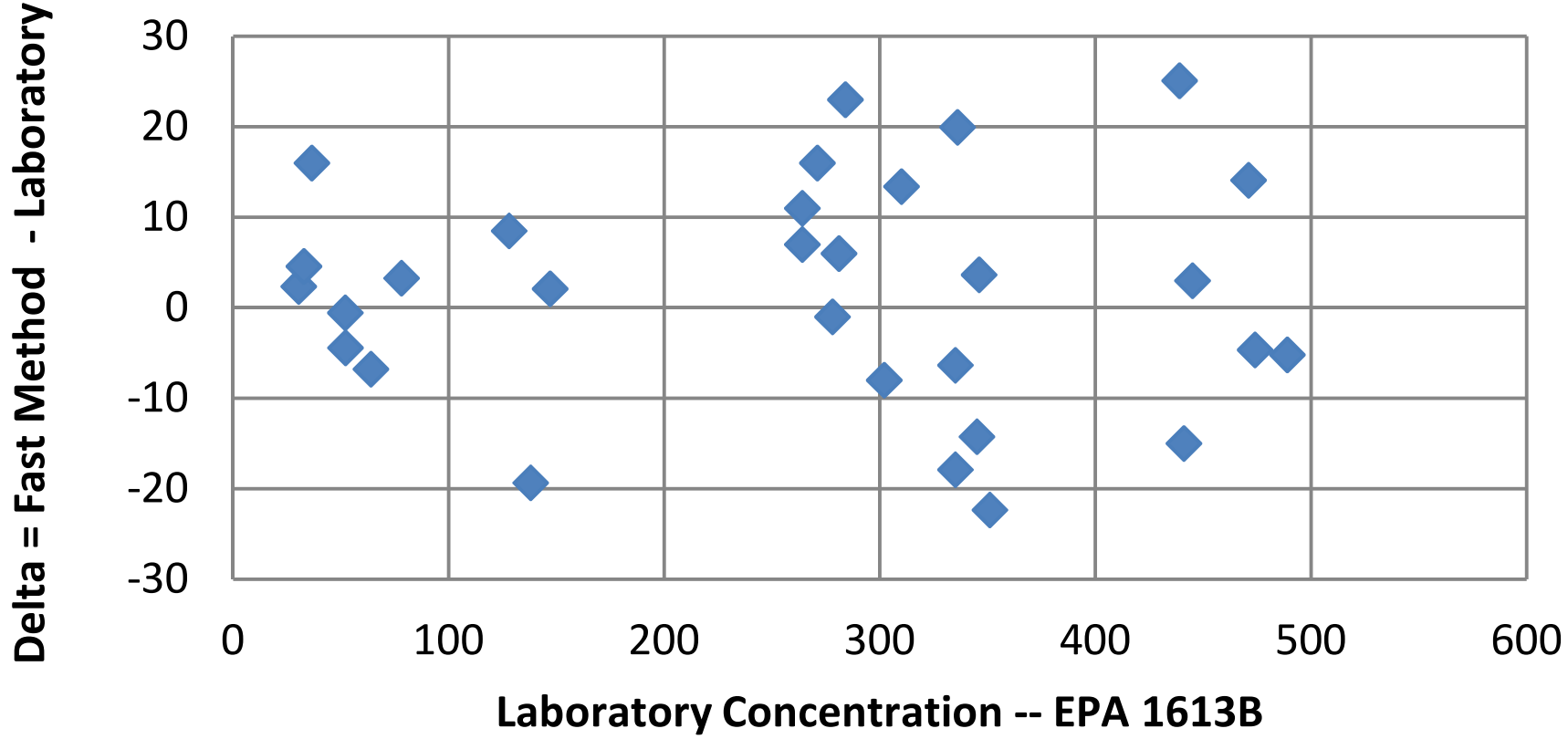


**Figure 5-7b. Regression Line to Estimate Laboratory Values (EPA 1613B) from Fast Method Values**

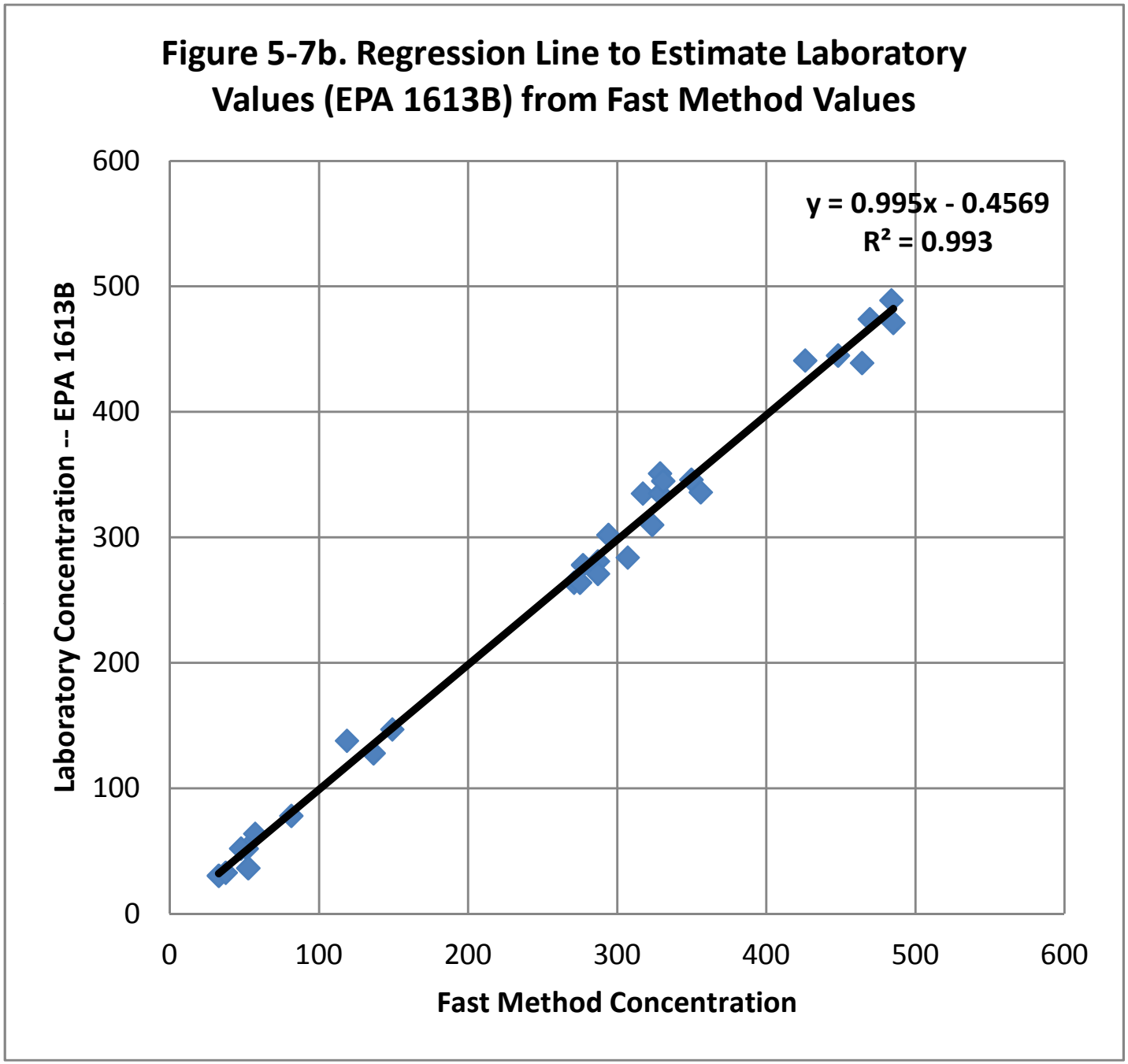


**Figure 5-8a. Plot of Concentration Differences versus Laboratory Concentration (EPA 1613B Extended)**

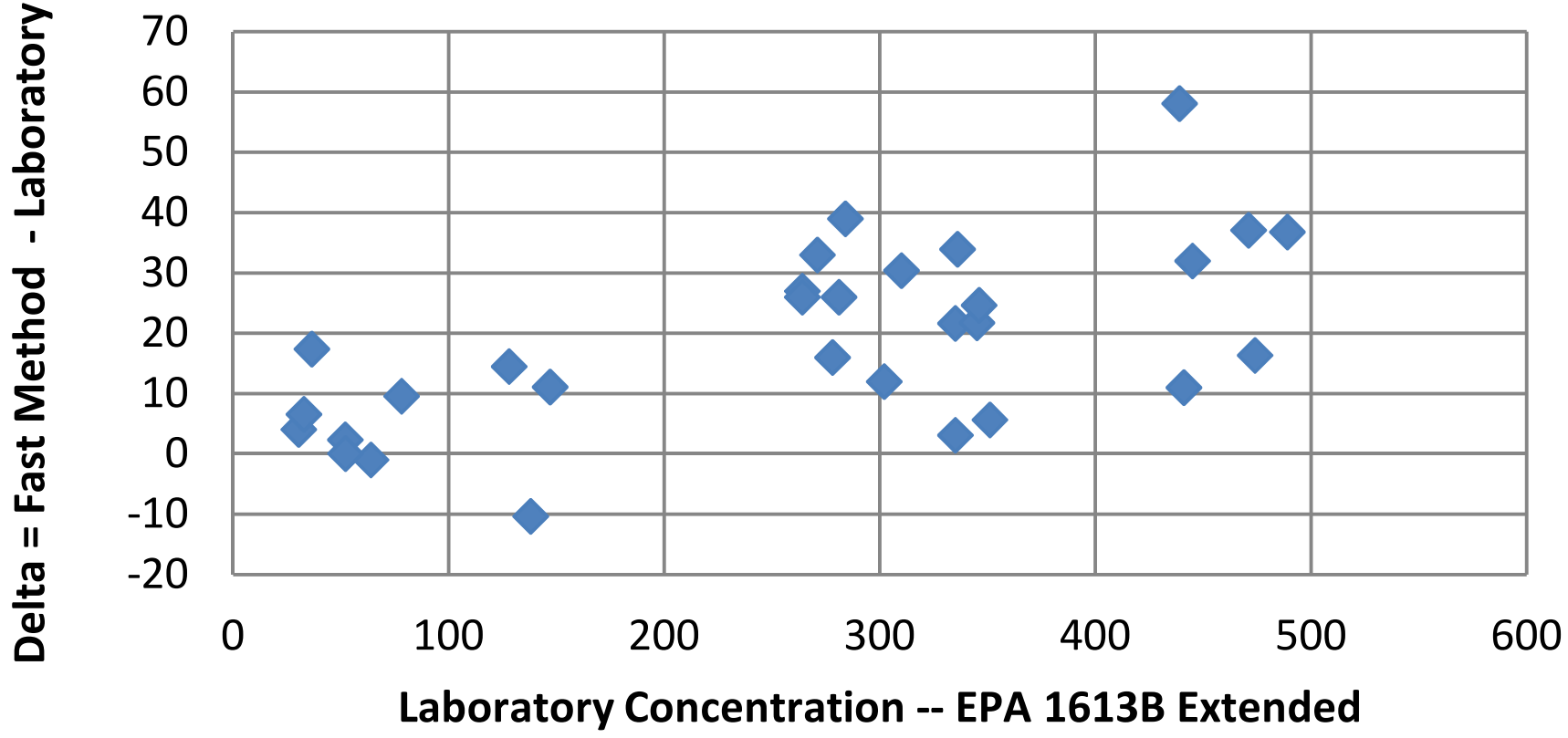
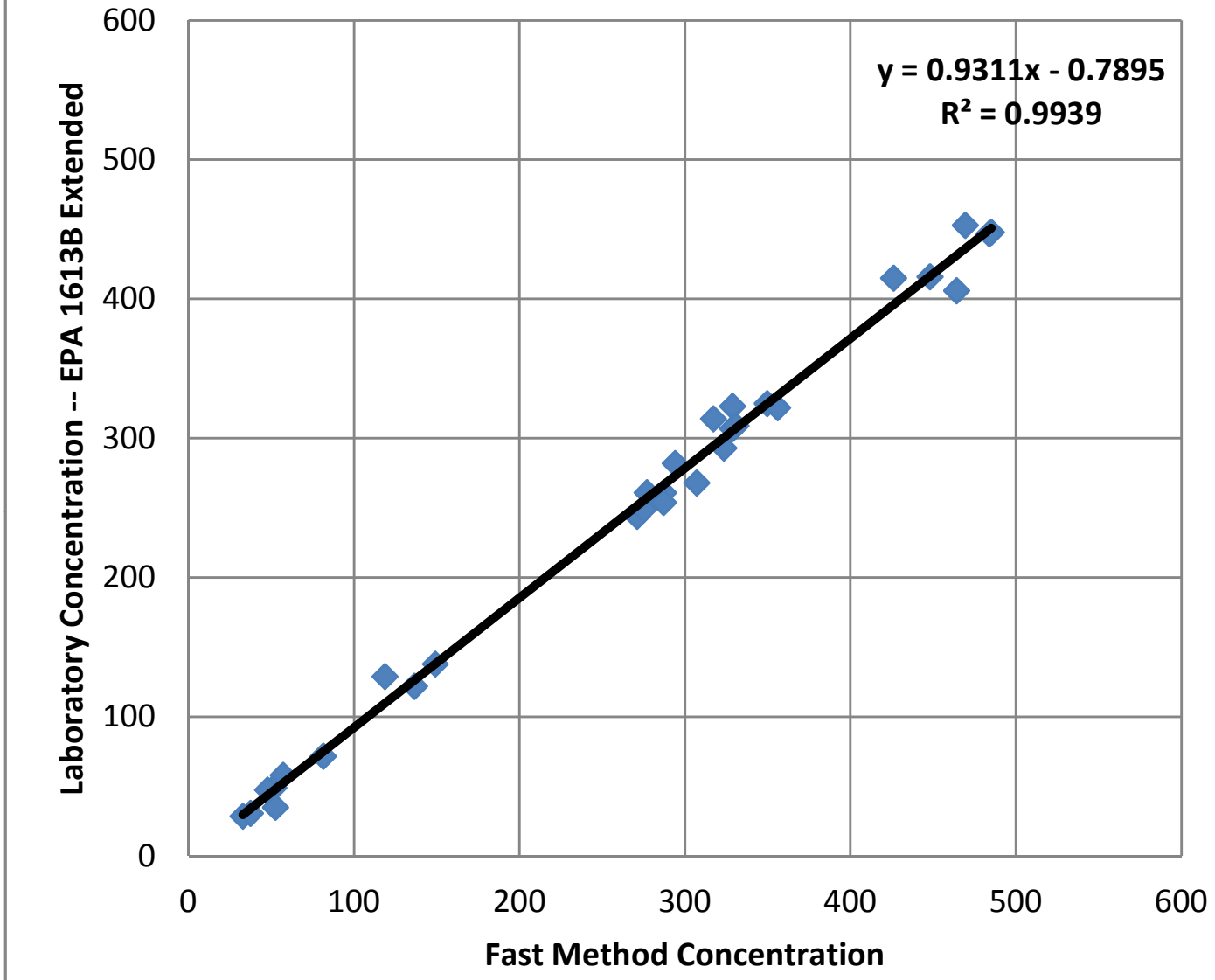


**Figure 5-8b. Regression Line to Estimate Laboratory Values (EPA 1613B Extended) from Fast Method Values**



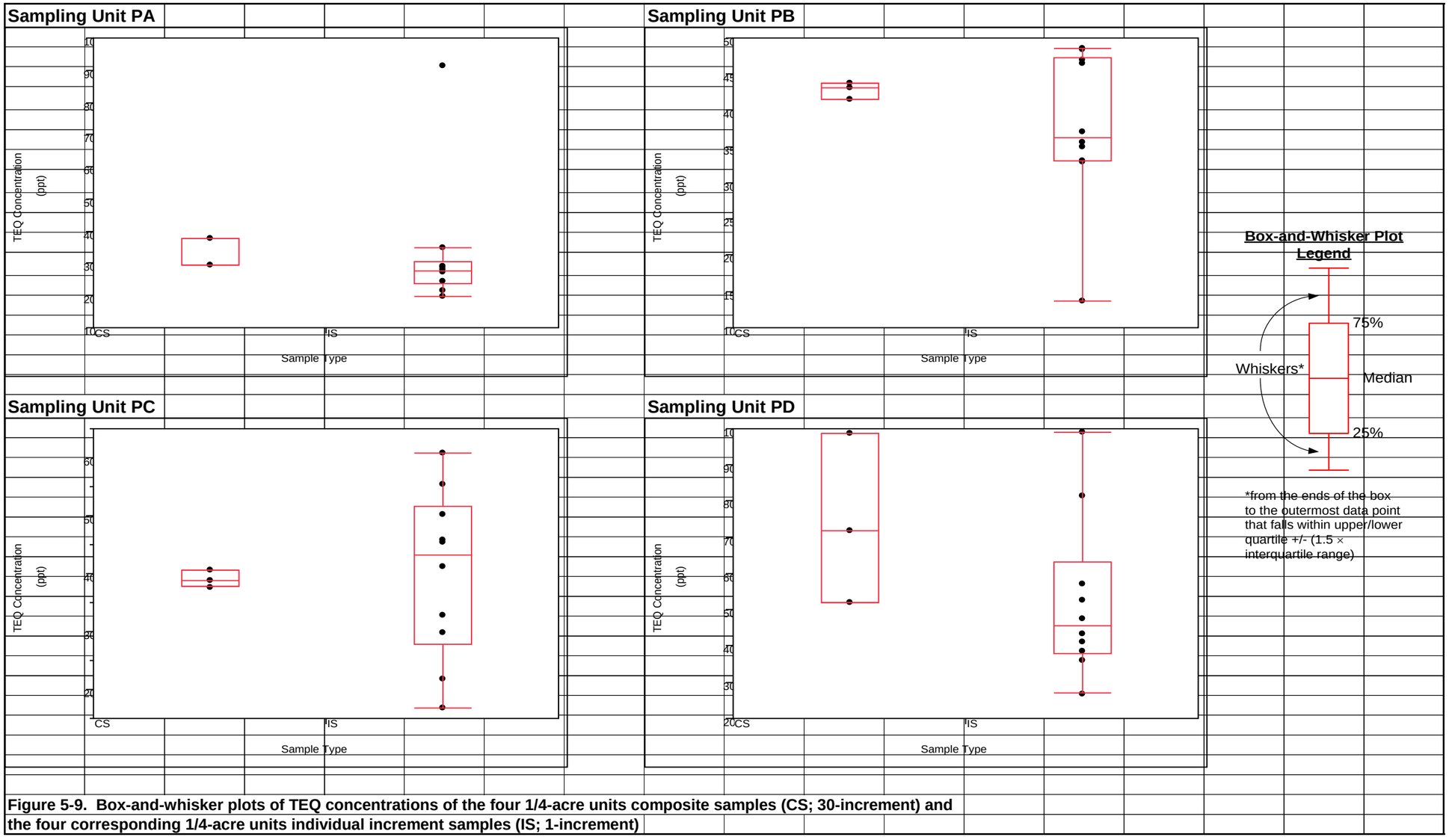



**Figure 5-9. Box-and-whisker plots of TEQ concentrations of the four 1/4-acre units composite samples (CS; 30-increment) and the four corresponding 1/4-acre units individual increment samples (IS; 1-increment)**

# 6.0 Conclusions

A number of conclusions can be made from the key findings obtained during this study, which are summarized below.

During the first phase of the pilot study, variability associated with different aspects of the sampling and analytical process were within suitably low and indicate that the methods employed during sample collection, laboratory sub-sampling, extraction and analysis will provide sufficient reliability during the full-scale implementation.

Results are comparable between composite samples built in the field or later mixed together if collected as individual increments. In general, building composite samples in the field was preferred due to the greatly simplified sample handling and labeling requirements.

During the second phase of the pilot study, replicate composite samples built from varying numbers of increments were within acceptable ranges of variability (< 30%), with exception of 1/4-acre subplot PD4. The number of increments did not appear to effect the Remedial Decision and no false negatives would have resulted from the data obtained in this study.

Composite samples were built from different size sampling units to determine if reliable decisions could be made at those scales (for sub-sampling unit exposure units). The 4-acre decision resulted in a false negative. The 1-acre sampling units successfully made the same remedial decisions that would have been made for the ¼-acre sampling units, even though the results for some were statistically different. Additional data from the residential property areas is needed to further support or refute this approach.

Triplicate sampling and subsequent evaluation of RSD successfully identified areas of higher variability. Based on this finding, these methods are appropriate to determine representativeness of IC sampling results for sampling units at the scales to be utilized during this project.

Results from the riffle splitter device were consistent with previous results, but did not make significant improvements in repeatability with respect to existing laboratory homogenization and sub-sampling methods.

# 7.0 References

URS Corporation (URS). July 2011. Composite Sampling Pilot Study Work Plan. July 15, 2011.

US Army Corps of Engineers (USACE). 20 July 2009. Implementation of Incrmental Sampling (IS) of Soil for the Military Munitions Response Program. Interim Guidance 09-02.

**Attachment 1**
**Phase 1 Analytical Data**

**MAS 8280**
**Fast Analysis**

| Lab ID | sample description | moisture [%] | 2378-TCDF [ng/kg d.w.] | flag | 2378-TCDD [ng/kg d.w.] | flag | 12378-PeCDF [ng/kg d.w.] | flag | 12378-PeCDD [ng/kg d.w.] | flag | 1234(6)78-HxCDF [ng/kg d.w.] | flag | 1234(6)78-HxCDD [ng/kg d.w.] | flag | 123789-HxCDD [ng/kg d.w.] | flag | 1234678-HpCDF [ng/kg d.w.] | flag | 1234678-HpCDD [ng/kg d.w.] | flag | OCDF [ng/kg d.w.] | flag | OCDD [ng/kg d.w.] | flag | ETEQ (ND=0) | ETEQ (ND=0.5 LoD) | ETEQ (ND=LoD) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11P027 | OPR 09/07/11 | 0.0% | 315 | | 311 | | 799 | | 776 | | 1580 | | 1600 | | 778 | | 885 | | 865 | | 1450 | | 1380 | | 1859 | 1859 | 1859 |
| 11M165 | Method blank 09/07/11 | 0.0% | < 5.80 | J,Y | < 16.0 | J,Y | < 9.87 | J,Y | < 8.67 | J,Y | 1.77 | J | < 15.5 | J,Y | < 7.33 | J,Y | < 8.47 | J,Y | 1.47 | J,Y | 2.87 | J | 16.2 | J | 0 | 16 | 32 |
| 111584 | B1-E1-C1-V1 | 8.4% | 370 | | 113 | | 225 | | 65.9 | J | 687 | | 225 | | 87.6 | | 1900 | | 2620 | | 2590 | | 20900 | | 457 | 457 | 457 |
| 111585 | B1-E1-C1-V2 | 8.4% | 359 | | 101 | | 218 | | 69.4 | J | 684 | | 214 | | 82 | | 1960 | | 2560 | | 2580 | | 21400 | | 443 | 443 | 443 |
| 111586 | B1-E1-C1-V3 | 8.4% | 366 | | 107 | | 220 | | 61.4 | J | 688 | | 215 | | 88.4 | | 1970 | | 2580 | | 2600 | | 20800 | | 443 | 443 | 443 |
| 111587 | B1-E1-C2-V1 | 8.4% | 371 | | 100 | | 207 | | 62.9 | J | 685 | | 213 | | 78 | | 1990 | | 2590 | | 2570 | | 21000 | | 434 | 434 | 434 |
| 111588 | B1-E1-C3-V1 | 8.4% | 350 | | 103 | | 213 | | 63.7 | J | 672 | | 217 | | 84.1 | | 1940 | | 2560 | | 2610 | | 20700 | | 436 | 436 | 436 |
| 111589 | B2-E1-C1-V1 | 8.2% | 525 | | 104 | | 277 | | 67.5 | J | 1150 | | 214 | | 84.4 | | 2000 | | 2610 | | 2900 | | 22300 | | 531 | 531 | 531 |
| 111590 | B2-E1-C2-V1 | 8.2% | 532 | | 105 | | 270 | | 62.1 | J | 1140 | | 215 | | 84 | | 2000 | | 2540 | | 2960 | | 22000 | | 523 | 523 | 523 |
| 111591 | B2-E1-C3-V1 | 8.2% | 500 | | 106 | | 298 | | 63.3 | J | 1140 | | 216 | | 88.2 | | 2020 | | 2590 | | 2950 | | 21400 | | 532 | 532 | 532 |
| 111592 | B3-E1-C1-V1 | 8.5% | 350 | | 106 | | 217 | | 69 | J | 617 | | 241 | | 91.5 | | 1850 | | 2680 | | 2570 | | 21500 | | 444 | 444 | 444 |
| 111593 | B3-E2-C1-V1 | 8.6% | 422 | | 102 | | 248 | | 69.4 | J | 760 | | 235 | | 86.5 | | 1890 | | 2780 | | 2820 | | 21800 | | 473 | 473 | 473 |
| 111594 | B3-E3-C1-V1 | 8.6% | 354 | | 99.6 | | 217 | | 63.6 | J | 634 | | 220 | | 86.5 | | 1760 | | 2550 | | 2500 | | 21700 | | 428 | 428 | 428 |
| 111595 | B4-E1-C1-V1 | 9.2% | 451 | | 101 | | 256 | | 65.8 | J | 933 | | 224 | | 87.5 | | 1820 | | 2540 | | 2730 | | 22300 | | 487 | 487 | 487 |
| 111596 | B4-E1-C1-V2 | 9.2% | 411 | | 95.9 | | 258 | | 62.5 | J | 916 | | 217 | | 83.8 | | 1880 | | 2590 | | 2850 | | 22500 | | 474 | 474 | 474 |
| 111597 | B4-E1-C1-V3 | 9.2% | 439 | | 96.6 | | 254 | | 67.6 | J | 945 | | 214 | | 85.1 | | 1860 | | 2540 | | 2790 | | 22200 | | 483 | 483 | 483 |
| 111598 | B4-E1-C2-V1 | 9.2% | 420 | | 97 | | 244 | | 64.2 | J | 934 | | 213 | | 85.5 | | 1810 | | 2530 | | 2740 | | 22500 | | 474 | 474 | 474 |
| 111599 | B4-E1-C3-V1 | 9.2% | 425 | | 98.4 | | 237 | | 67.7 | J | 929 | | 214 | | 87.4 | | 1820 | | 2570 | | 2810 | | 22300 | | 477 | 477 | 477 |
| 111600 | B5-E1-C1-V1 | 8.5% | 613 | | 96.5 | | 303 | | 60.9 | J | 1100 | | 201 | | 75.2 | | 1820 | | 2430 | | 2770 | | 19600 | | 521 | 521 | 521 |
| 111601 | B5-E1-C1-V2 | 8.5% | 615 | | 100 | | 288 | | 60.7 | J | 1120 | | 217 | | 84.3 | | 1830 | | 2440 | | 2710 | | 19300 | | 525 | 525 | 525 |
| 111602 | B5-E1-C1-V3 | 8.5% | 620 | | 101 | | 298 | | 64.9 | J | 1130 | | 221 | | 78.2 | | 1800 | | 2410 | | 2730 | | 19000 | | 533 | 533 | 533 |
| 111603 | B6-E1-C1-V1 | 8.8% | 480 | | 95.3 | | 275 | | 60.7 | J | 1400 | | 196 | | 77.6 | | 2090 | | 2450 | | 3160 | | 22300 | | 532 | 532 | 532 |
| 111604 | B6-E1-C2-V1 | 8.8% | 492 | | 97 | | 282 | | 59.5 | J | 1410 | | 206 | | 76.1 | | 2030 | | 2490 | | 3230 | | 23000 | | 539 | 539 | 539 |
| 111605 | B6-E1-C3-V1 | 8.8% | 514 | | 95.5 | | 292 | | 56.6 | J | 1390 | | 199 | | 76.7 | | 2100 | | 2480 | | 3160 | | 22800 | | 538 | 538 | 538 |
| 111606 | B6-E2-C1-V1 | 8.9% | 502 | | 98.3 | | 286 | | 61.4 | J | 1910 | | 224 | | 83.8 | | 2390 | | 2380 | | 3970 | | 19300 | | 601 | 601 | 601 |
| 111607 | B6-E3-C1-V1 | 9.0% | 393 | | 89.4 | | 255 | | 57.5 | J | 1160 | | 206 | | 81.6 | | 2040 | | 2420 | | 2810 | | 21700 | | 483 | 483 | 483 |
| 111608 | B6-E3-C1-V2 | 9.0% | 424 | | 92.7 | | 245 | | 60.7 | J | 1190 | | 197 | | 74.4 | | 2060 | | 2370 | | 2740 | | 21000 | | 490 | 490 | 490 |
| 111609 | B6-E3-C1-V3 | 9.0% | 436 | | 94.4 | | 244 | | 52 | J | 1170 | | 199 | | 76.2 | | 2040 | | 2360 | | 2690 | | 21500 | | 482 | 482 | 482 |
| 11P026 | OPR 09/06/11 | 0.0% | 335 | | 324 | | 849 | | 832 | | 1690 | | 1710 | | 833 | | 948 | | 954 | | 1530 | | 1440 | | 1985 | 1985 | 1985 |
| 11M163 | Method blank 09/06/11 | 0.0% | < 1.43 | J,Y | < 4.43 | J,Y | < 2.97 | J,Y | < 2.93 | J,Y | < 7.20 | J,Y | < 7.17 | J,Y | < 3.30 | J,Y | < 5.17 | J,Y | < 4.67 | J,Y | < 12.5 | J,Y | 11.7 | J,Y | 0 | 5 | 11 |
| 111545 | B1-E1-C1-V1 | 13.0% | 19.9 | J | 102 | | 47.5 | J | 70.9 | | 164 | | 187 | | 79.7 | | 1900 | | 2490 | | 2600 | | 20300 | | 297 | 297 | 297 |
| 111546 | B1-E1-C1-V2 | 13.0% | 17.9 | J,Y | 105 | | 42.9 | J,Y | 60.3 | J | 165 | | 181 | | 72.7 | Y | 1940 | | 2470 | | 2580 | | 20400 | | 287 | 287 | 287 |
| 111547 | B1-E1-C1-V3 | 13.0% | 19.4 | J,Y | 95.9 | | 46 | J | 70.1 | J | 164 | | 182 | | 80 | | 1900 | | 2470 | | 2600 | | 20500 | | 289 | 289 | 289 |
| 111548 | B1-E1-C2-V1 | 13.0% | 18.1 | J | 96.4 | | 47.6 | J,Y | 73.6 | | 161 | | 190 | | 84.4 | | 1910 | | 2490 | | 2510 | | 20100 | | 294 | 294 | 294 |
| 111549 | B1-E1-C3-V1 | 13.0% | 22.6 | J | 98.9 | | 47.9 | J,Y | 65.1 | | 172 | | 192 | | 79.3 | | 1910 | | 2410 | | 2600 | | 19900 | | 289 | 289 | 289 |
| 111550 | B2-E1-C1-V1 | 17.7% | 20.3 | J | 106 | | 48.1 | J | 65.7 | | 150 | | 181 | | 86 | | 2050 | | 2510 | | 2680 | | 20500 | | 296 | 296 | 296 |
| 111551 | B2-E1-C2-V1 | 17.7% | 18.9 | J | 104 | | 52.3 | J | 70 | | 152 | | 177 | | 79.3 | | 2040 | | 2500 | | 2700 | | 21100 | | 299 | 299 | 299 |
| 111552 | B2-E1-C3-V1 | 17.7% | 21.6 | J | 103 | | 54.6 | J | 69.4 | | 159 | J | 177 | | 79.9 | | 2080 | | 2510 | | 2740 | | 20200 | | 299 | 299 | 299 |
| 111553 | B3-E1-C1-V1 | 13.1% | 22.6 | J | 106 | | 54 | J | 70.4 | | 162 | | 186 | | 88.2 | | 2000 | | 2680 | | 2790 | | 22100 | | 308 | 308 | 308 |
| 111554 | B3-E2-C1-V1 | 13.4% | 21.2 | J | 101 | | 49.5 | J | 62.3 | | 135 | | 168 | | 73 | | 1890 | | 2500 | | 2540 | | 21700 | | 282 | 282 | 282 |
| 111555 | B3-E3-C1-V1 | 13.7% | 20.4 | J,Y | 99.8 | | 47.6 | J | 64 | | 145 | | 188 | | 78.6 | | 1920 | | 2520 | | 2500 | | 20200 | | 286 | 286 | 286 |
| 111556 | B4-E1-C1-V1 | 13.0% | 17.8 | J | 99.5 | | 47.6 | J | 53.3 | Y | 132 | | 163 | | 69.3 | | 1740 | | 2250 | | 2410 | | 18700 | | 265 | 265 | 265 |
| 111557 | B4-E1-C1-V2 | 13.0% | 17.2 | J | 96.1 | | 43.3 | J | 62.2 | | 132 | | 148 | | 69.2 | | 1710 | | 2310 | | 2410 | | 19000 | | 268 | 268 | 268 |
| 111558 | B4-E1-C1-V3 | 13.0% | 16.3 | J,Y | 100 | | 44.1 | J | 57.9 | Y | 131 | | 160 | | 69.9 | | 1720 | | 2320 | | 2430 | | 18700 | | 269 | 269 | 269 |
| 111559 | B4-E1-C2-V1 | 13.0% | 19.1 | J | 94.9 | | 44.2 | J | 66 | J | 138 | J | 161 | J | 71.3 | J | 1740 | | 2280 | | 2500 | | 18800 | | 273 | 273 | 273 |
| 111560 | B4-E1-C3-V1 | 13.0% | 15.8 | J | 97 | | 45.8 | J | 61.2 | | 122 | | 147 | | 68.5 | | 1680 | | 2310 | | 2450 | | 18800 | | 266 | 266 | 266 |
| 111561 | B5-E1-C1-V1 | 12.7% | 20.1 | J | 93.1 | | 48.8 | J | 61 | | 131 | | 159 | | 73.6 | | 1890 | | 2260 | | 2420 | | 19200 | | 268 | 268 | 268 |
| 111562 | B5-E1-C1-V2 | 12.7% | 16.8 | J,Y | 91 | | 45.8 | J | 61.3 | | 127 | | 165 | | 73.2 | | 1870 | | 2290 | | 2430 | | 19000 | | 265 | 265 | 265 |
| 111563 | B5-E1-C1-V3 | 12.7% | 16.4 | J,Y | 93.4 | | 48.5 | J,Y | 62.1 | | 129 | | 167 | | 73.9 | | 1860 | | 2310 | | 2430 | | 18700 | | 270 | 270 | 270 |
| 111564 | B6-E1-C1-V1 | 13.0% | 21.8 | J,Y | 76.5 | J | 45.7 | J | 57.9 | J,Y | 115 | J | 156 | J | 62.8 | J | 1580 | | 2000 | | 2150 | | 16700 | | 236 | 236 | 236 |
| 111565 | B6-E1-C2-V1 | 13.0% | 10.2 | J,Y | 79 | | 23.1 | J,Y | 45.8 | J,Y | 96 | J | 148 | J | 69.6 | J | 1580 | | 2020 | | 2150 | | 17400 | | 216 | 216 | 216 |
| 111566 | B6-E1-C3-V1 | 13.0% | 17.7 | J,Y | 72.8 | Y | 38.2 | J | 43.8 | J,Y | 131 | J | 150 | J | 52.6 | J | 1570 | | 2020 | | 2180 | | 17300 | | 215 | 215 | 215 |
| 111567 | B6-E2-C1-V1 | 13.0% | 14.9 | J,Y | 70.4 | Y | 37.7 | J,Y | 52.7 | J | 106 | J | 145 | J | 66.2 | J | 1480 | | 1970 | | 2160 | | 16300 | | 218 | 218 | 218 |
| 111568 | B6-E3-C1-V1 | 12.6% | 17.3 | J | 70.9 | Y | 28.1 | J,Y | 44.5 | J,Y | 116 | J | 139 | J | 58.6 | J | 1480 | | 1950 | | 2180 | | 16400 | | 207 | 207 | 207 |
| 111569 | B6-E3-C1-V2 | 12.6% | 15.1 | J,Y | 78.9 | | 34.5 | J,Y | 38.4 | J | 116 | J | 135 | J | 59.7 | J | 1530 | | 1950 | | 2330 | | 17700 | | 211 | 211 | 211 |
| 111570 | B6-E3-C1-V3 | 12.6% | 17.2 | J | 74.3 | | 41.6 | J,Y | 47 | J | 115 | J | 130 | J | 62.4 | J | 1500 | | 1980 | | 2220 | | 16700 | | 217 | 217 | 217 |

**Attachment 1**
**Phase 1 Analytical Data**

**MAS 8280**
**Fast Analysis**

| Lab ID | sample description | moisture [%] | 2378-TCDF [ng/kg d.w.] | flag | 2378-TCDD [ng/kg d.w.] | flag | 23478-PeCDF [ng/kg d.w.] | flag | 12378-PeCDD [ng/kg d.w.] | flag | 1234(6)78-HxCDF [ng/kg d.w.] | flag | 1234(6)78-HxCDD [ng/kg d.w.] | flag | 123789-HxCDD [ng/kg d.w.] | flag | 1234678-HpCDF [ng/kg d.w.] | flag | 1234678-HpCDD [ng/kg d.w.] | flag | OCDF [ng/kg d.w.] | flag | OCDD [ng/kg d.w.] | flag | ETEQ (ND=0) | ETEQ (ND=0.5 LoD) | ETEQ (ND=LoD) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11P027 | OPR 09/07/11 | 0.0% | 315 | | 311 | | 799 | | 776 | | 1580 | | 1600 | | 778 | | 885 | | 865 | | 1450 | | 1380 | | 1859 | 1859 | 1859 |
| 11M165 | Method blank 09/07/11 | 0.0% | < 5.80 | J,Y | < 16.0 | J,Y | < 9.87 | J,Y | < 8.67 | J,Y | 1.77 | J | < 15.5 | J,Y | < 7.33 | J,Y | < 8.47 | J,Y | 1.47 | J,Y | 2.87 | J | 16.2 | J | 0 | 16 | 32 |
| 111584 | B1-E1-C1-V1 | 8.4% | 370 | | 113 | | 225 | | 65.9 | J | 687 | | 225 | | 87.6 | | 1900 | | 2620 | | 2590 | | 20900 | | 457 | 457 | 457 |
| 111585 | B1-E1-C1-V2 | 8.4% | 359 | | 101 | | 218 | | 69.4 | J | 684 | | 214 | | 82 | | 1960 | | 2560 | | 2580 | | 21400 | | 443 | 443 | 443 |
| 111586 | B1-E1-C1-V3 | 8.4% | 366 | | 107 | | 220 | | 61.4 | J | 688 | | 215 | | 88.4 | | 1970 | | 2580 | | 2600 | | 20800 | | 443 | 443 | 443 |
| 111587 | B1-E1-C2-V1 | 8.4% | 371 | | 100 | | 207 | | 62.9 | J | 685 | | 213 | | 78 | | 1990 | | 2590 | | 2570 | | 21000 | | 434 | 434 | 434 |
| 111588 | B1-E1-C3-V1 | 8.4% | 350 | | 103 | | 213 | | 63.7 | J | 672 | | 217 | | 84.1 | | 1940 | | 2560 | | 2610 | | 20700 | | 436 | 436 | 436 |
| 111589 | B2-E1-C1-V1 | 8.2% | 525 | | 104 | | 277 | | 67.5 | J | 1150 | | 214 | | 84.4 | | 2000 | | 2610 | | 2900 | | 22300 | | 531 | 531 | 531 |
| 111590 | B2-E1-C2-V1 | 8.2% | 532 | | 105 | | 270 | | 62.1 | J | 1140 | | 215 | | 84 | | 2000 | | 2540 | | 2960 | | 22000 | | 523 | 523 | 523 |
| 111591 | B2-E1-C3-V1 | 8.2% | 500 | | 106 | | 298 | | 63.3 | J | 1140 | | 216 | | 88.2 | | 2020 | | 2590 | | 2950 | | 21400 | | 532 | 532 | 532 |
| 111592 | B3-E1-C1-V1 | 8.5% | 350 | | 106 | | 217 | | 69 | J | 617 | | 241 | | 91.5 | | 1850 | | 2680 | | 2570 | | 21500 | | 444 | 444 | 444 |
| 111593 | B3-E2-C1-V1 | 8.6% | 422 | | 102 | | 248 | | 69.4 | J | 760 | | 235 | | 86.5 | | 1890 | | 2780 | | 2820 | | 21800 | | 473 | 473 | 473 |
| 111594 | B3-E3-C1-V1 | 8.6% | 354 | | 99.6 | | 217 | | 63.6 | J | 634 | | 220 | | 86.5 | | 1760 | | 2550 | | 2500 | | 21700 | | 428 | 428 | 428 |
| 111595 | B4-E1-C1-V1 | 9.2% | 451 | | 101 | | 256 | | 65.8 | J | 933 | | 224 | | 87.5 | | 1820 | | 2540 | | 2730 | | 22300 | | 487 | 487 | 487 |
| 111596 | B4-E1-C1-V2 | 9.2% | 411 | | 95.9 | | 258 | | 62.5 | J | 916 | | 217 | | 83.8 | | 1880 | | 2590 | | 2850 | | 22500 | | 474 | 474 | 474 |
| 111597 | B4-E1-C1-V3 | 9.2% | 439 | | 96.6 | | 254 | | 67.6 | J | 945 | | 214 | | 85.1 | | 1860 | | 2540 | | 2790 | | 22200 | | 483 | 483 | 483 |
| 111598 | B4-E1-C2-V1 | 9.2% | 420 | | 97 | | 244 | | 64.2 | J | 934 | | 213 | | 85.5 | | 1810 | | 2530 | | 2740 | | 22500 | | 474 | 474 | 474 |
| 111599 | B4-E1-C3-V1 | 9.2% | 425 | | 98.4 | | 237 | | 67.7 | J | 929 | | 214 | | 87.4 | | 1820 | | 2570 | | 2810 | | 22300 | | 477 | 477 | 477 |
| 111600 | B5-E1-C1-V1 | 8.5% | 613 | | 96.5 | | 303 | | 60.9 | J | 1100 | | 201 | | 75.2 | | 1820 | | 2430 | | 2770 | | 19600 | | 521 | 521 | 521 |
| 111601 | B5-E1-C1-V2 | 8.5% | 615 | | 100 | | 288 | | 60.7 | J | 1120 | | 217 | | 84.3 | | 1830 | | 2440 | | 2710 | | 19300 | | 525 | 525 | 525 |
| 111602 | B5-E1-C1-V3 | 8.5% | 620 | | 101 | | 298 | | 64.9 | J | 1130 | | 221 | | 78.2 | | 1800 | | 2410 | | 2730 | | 19000 | | 533 | 533 | 533 |
| 111603 | B6-E1-C1-V1 | 8.8% | 480 | | 95.3 | | 275 | | 60.7 | J | 1400 | | 196 | | 77.6 | | 2090 | | 2450 | | 3160 | | 22300 | | 532 | 532 | 532 |
| 111604 | B6-E1-C2-V1 | 8.8% | 492 | | 97 | | 282 | | 59.5 | J | 1410 | | 206 | | 76.1 | | 2030 | | 2490 | | 3230 | | 23000 | | 539 | 539 | 539 |
| 111605 | B6-E1-C3-V1 | 8.8% | 514 | | 95.5 | | 292 | | 56.6 | J | 1390 | | 199 | | 76.7 | | 2100 | | 2480 | | 3160 | | 22800 | | 538 | 538 | 538 |
| 111606 | B6-E2-C1-V1 | 8.9% | 502 | | 98.3 | | 286 | | 61.4 | J | 1910 | | 224 | | 83.8 | | 2390 | | 2380 | | 3970 | | 19300 | | 601 | 601 | 601 |
| 111607 | B6-E3-C1-V1 | 9.0% | 393 | | 89.4 | | 255 | | 57.5 | J | 1160 | | 206 | | 81.6 | | 2040 | | 2420 | | 2810 | | 21700 | | 483 | 483 | 483 |
| 111608 | B6-E3-C1-V2 | 9.0% | 424 | | 92.7 | | 245 | | 60.7 | J | 1190 | | 197 | | 74.4 | | 2060 | | 2370 | | 2740 | | 21000 | | 490 | 490 | 490 |
| 111609 | B6-E3-C1-V3 | 9.0% | 436 | | 94.4 | | 244 | | 52 | J | 1170 | | 199 | | 76.2 | | 2040 | | 2360 | | 2690 | | 21500 | | 482 | 482 | 482 |

**Attachment 2**
**Phase 2 Analytical Data**

**MAS 8280**

**Fast Analysis**

| Lab ID | sample description | moisture [%] | 2378-TCDF [ng/kg d.w.] | flag | 2378-TCDD [ng/kg d.w.] | flag | 23478-PeCDF [ng/kg d.w.] | flag | 12378-PeCDD [ng/kg d.w.] | flag | 1234(6)78-HxCDF [ng/kg d.w.] | flag | 1234(6)78-HxCDD [ng/kg d.w.] | flag | 123789-HxCDD [ng/kg d.w.] | flag | 1234678-HpCDF [ng/kg d.w.] | flag | 1234678-HpCDD [ng/kg d.w.] | flag | OCDF [ng/kg d.w.] | flag | OCDD [ng/kg d.w.] | flag | ETEQ (ND=0) | ETEQ (ND=0.5 LoD) | ETEQ (ND=LoD) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11P031 | OPR 10/28/11 | 0.00% | 364 | | 358 | | 918 | | 935 | | 1850 | | 1790 | | 903 | | 907 | | 924 | | 1870 | | 1810 | | 2184 | 2184 | 2184 |
| 11M194 | Method blank 10/28/11 | 0.00% | < 3.47 | J,Y | < 7.00 | J,Y | < 3.77 | J,Y | < 3.50 | J,Y | 1.3 | J,Y | < 6.73 | J,Y | < 2.20 | J,Y | < 3.87 | J,Y | < 3.73 | J,Y | < 13.9 | J,Y | 8.6 | J | 0 | 7 | 14 |
| 111824 | P2CSPB01-05-01 | 14.50% | 260 | | 64.6 | | 209 | | 54.7 | | 321 | | 178 | | 81.6 | | 1390 | | 2460 | | 2170 | | 25700 | | 329 | 329 | 329 |
| 111825 | P2CSPB01-10-01 | 13.90% | 201 | | 76.3 | | 145 | Y | 57.4 | J | 221 | | 155 | | 69.2 | | 1250 | | 1980 | | 1910 | | 19300 | | 294 | 294 | 294 |
| 111826 | P2CSPB01-15-01 | 14.90% | 212 | | 86.2 | | 171 | | 45.1 | Y | 257 | | 188 | | 86.7 | | 1280 | | 2430 | | 2190 | | 23300 | | 317 | 317 | 317 |
| 111827 | P2CSPB01-30-01 | 15.60% | 218 | | 85.9 | | 164 | Y | 60.2 | J | 253 | | 165 | | 76.9 | | 1120 | | 2280 | | 2190 | | 22600 | | 323 | 323 | 323 |
| 111828 | P2CSPB02-05-01 | 12.80% | 905 | | 44 | | 482 | | 41.1 | | 597 | | 119 | | 49.2 | | 1080 | | 1370 | | 1320 | | 14100 | | 447 | 447 | 447 |
| 111829 | P2CSPB02-05-02 | 12.20% | 934 | | 40.2 | | 487 | | 30.2 | Y | 591 | | 97.3 | | 38.6 | | 815 | | 1230 | | 1100 | | 13000 | | 427 | 427 | 427 |
| 111830 | P2CSPB02-05-03 | 12.40% | 930 | | 38.4 | | 479 | | 28.5 | Y | 581 | | 99.5 | | 42.7 | | 948 | | 1260 | | 1200 | | 12800 | | 422 | 422 | 422 |
| 111831 | P2CSPB02-10-01 | 13.70% | 502 | | 76 | | 300 | | 60.3 | | 405 | | 167 | | 68.6 | | 1380 | | 1980 | | 1930 | | 18100 | | 399 | 399 | 399 |
| 111832 | P2CSPB02-10-02 | 13.10% | 389 | | 85.7 | | 241 | | 50.7 | | 331 | | 162 | | 65.7 | | 1290 | | 1880 | | 1850 | | 18500 | | 358 | 358 | 358 |
| 111833 | P2CSPB02-10-03 | 13.60% | 453 | | 64.5 | | 249 | | 50.5 | | 366 | | 133 | | 54.7 | | 2090 | | 1790 | | 2550 | | 15800 | | 352 | 352 | 352 |
| 111834 | P2CSPB02-15-01 | 14.70% | 621 | | 90.4 | | 338 | | 59.5 | J | 444 | | 166 | | 72.1 | | 1140 | | 1990 | | 2030 | | 21700 | | 441 | 441 | 441 |
| 111835 | P2CSPB02-15-02 | 13.90% | 680 | | 79.8 | | 346 | | 61.2 | J,Y | 458 | | 162 | J | 71.8 | | 2400 | | 1900 | | 2520 | | 18300 | | 453 | 453 | 453 |
| 111836 | P2CSPB02-15-03 | 14.50% | 702 | | 82.3 | | 362 | | 65.5 | | 480 | | 167 | | 76.7 | | 1200 | | 2230 | | 2400 | | 22000 | | 462 | 462 | 462 |
| 111837 | P2CSPB02-30-01 | 13.60% | 580 | | 91.8 | | 317 | | 48 | J,Y | 407 | | 158 | J | 70.5 | | 1280 | | 2050 | | 2070 | | 18800 | | 416 | 416 | 416 |
| 111838 | P2CSPB02-30-02 | 13.90% | 564 | | 91.9 | | 306 | | 53 | J | 418 | | 187 | | 79.4 | | 1370 | | 2490 | | 2310 | | 30900 | | 431 | 431 | 431 |
| 111839 | P2CSPB02-30-03 | 13.50% | 647 | | 83.8 | | 341 | | 56.2 | | 448 | | 168 | | 64 | | 1350 | | 2170 | | 2020 | | 20100 | | 438 | 438 | 438 |
| 11P032 | OPR 10/31/11 | 0.00% | 364 | | 354 | | 901 | | 928 | | 1830 | | 1780 | | 900 | | 867 | | 890 | | 1870 | | 1810 | | 2163 | 2163 | 2163 |
| 11M196 | Method blank 10/31/11 | 0.00% | < 2.03 | J,Y | < 5.67 | J,Y | < 3.73 | J,Y | < 3.30 | J,Y | < 7.83 | J,Y | < 7.47 | J,Y | < 2.77 | J,Y | < 3.90 | J,Y | < 3.83 | J,Y | 0.8 | J,Y | 5.27 | J,Y | 0 | 6 | 13 |
| 111842 | P2CSPA02-30-01 | 17.10% | 42 | | 3.35 | J,Y | 23.5 | J | < 14.4 | J,Y | 34.5 | J | 15.8 | J | 6.77 | J,Y | 90.2 | | 201 | | 180 | | 2410 | | 25 | 33 | 40 |
| 111843 | P2CSPB03-05-01 | 14.40% | 384 | | 55.4 | | 214 | | 48.6 | | 644 | | 164 | | 65.9 | | 1300 | | 2110 | | 2060 | | 20000 | | 352 | 352 | 352 |
| 111844 | P2CSPB03-10-01 | 13.60% | 305 | | 91.9 | | 190 | | 61.7 | | 317 | | 213 | | 79 | | 1520 | | 2820 | | 2950 | | 29300 | | 373 | 373 | 373 |
| 111845 | P2CSPB03-15-01 | 14.90% | 475 | | 84 | | 265 | | 56.1 | | 1060 | | 185 | | 75.3 | | 1720 | | 2460 | | 3180 | | 26100 | | 473 | 473 | 473 |
| 111846 | P2CSPB03-30-01 | 13.90% | 345 | | 110 | | 219 | | 75.7 | | 482 | | 230 | | 94 | | 1710 | | 2760 | | 3030 | | 27900 | | 441 | 441 | 441 |
| 111847 | P2CSPC02-30-01 | 15.10% | 177 | | 62.2 | | 123 | | 41.6 | | 203 | | 123 | | 51.6 | | 1080 | | 1480 | | 1280 | | 14300 | | 238 | 238 | 238 |
| 111848 | P2CSPC03-30-01 | 16.20% | 273 | | 112 | | 182 | | 84.3 | | 298 | | 229 | | 95.2 | | 1400 | | 2510 | | 2410 | | 23500 | | 406 | 406 | 406 |
| 111849 | P2CSPC03-30-02 | 15.70% | 270 | | 108 | | 179 | | 77.4 | | 283 | | 203 | | 82.2 | | 1580 | | 2400 | | 2520 | | 22500 | | 389 | 389 | 389 |
| 111850 | P2CSPD02-30-01 | 17.50% | 34.5 | | 14.1 | J | 16.7 | J | 10.1 | J,Y | 35.3 | J | 37.9 | J | 15.4 | J | 216 | | 391 | | 412 | | 4300 | | 51 | 51 | 51 |
| 111851 | P2CSPDDD-30-01 | 17.50% | 30.8 | | 7.81 | J | 20.2 | J | 7.61 | J,Y | 28.8 | J | 24.9 | J | 10.1 | J | 116 | | 254 | | 247 | | 2900 | | 37 | 37 | 37 |
| 111852 | P2CSPDDD-30-02 | 17.00% | 46.7 | | 10.8 | J | 29.6 | J | 12.3 | J | 48.9 | J | 34.5 | J | 20.1 | J | 190 | | 403 | | 369 | | 4570 | | 57 | 57 | 57 |
| 111853 | P2CSPDDD-30-03 | 16.80% | 44.7 | | 9.88 | J,Y | 32.1 | J | 8.44 | J,Y | 43.8 | J | 30.3 | J | 19.6 | J | 177 | | 359 | | 437 | | 4170 | | 51 | 51 | 51 |
| 111854 | P2CSSAAA-30-02 | 16.10% | 493 | | 47.8 | | 274 | | 33.7 | J | 428 | | 102 | | 41.4 | | 1790 | | 1240 | | 1800 | | 12800 | | 320 | 320 | 320 |
| 111855 | P2CSSAAA-60-01 | 16.00% | 175 | | 56.9 | | 103 | | 39.5 | | 163 | | 106 | | 48.2 | | 889 | | 1380 | | 1300 | | 13500 | | 214 | 214 | 214 |
| 111856 | P2CSSAAA-60-02 | 16.40% | 188 | | 66.7 | | 108 | | 44.8 | | 178 | | 126 | | 49.4 | | 792 | | 1420 | | 1360 | | 13700 | | 236 | 236 | 236 |
| 111857 | P2CSSAAA-60-03 | 16.80% | 171 | | 56.5 | | 95.9 | | 35.5 | | 152 | | 110 | | 48.4 | | 742 | | 1360 | | 1210 | | 13500 | | 204 | 204 | 204 |
| 11P033 | OPR 11/01/11 | 0.0% | 351 | | 352 | | 855 | | 893 | | 1780 | | 1730 | | 865 | | 841 | | 866 | | 1820 | | 1730 | | 2090 | 2090 | 2090 |
| 11M197 | Method blank 11/01/11 | 0.0% | < 2.20 | J,Y | 1.43 | J,Y | < 3.70 | J,Y | < 3.27 | J,Y | < 7.27 | J,Y | < 6.60 | J,Y | 0.567 | J | < 3.47 | J,Y | < 3.00 | J,Y | < 8.77 | J,Y | 11 | J | 2 | 5 | 8 |
| 111858 | P2ISPA01-01-01 | 19.5% | 12.2 | J | 4.2 | J,Y | 5.12 | J,Y | < 12.5 | J,Y | 14.3 | J | 13 | J | 8.03 | J | 99.1 | | 199 | | 209 | | 2460 | | 15 | 22 | 28 |
| 111859 | P2ISPA01-01-02 | 18.4% | 13.9 | J | 5.25 | J | 4.75 | J,Y | < 14.5 | J,Y | 19.6 | J | 14.8 | J,Y | 8 | J,Y | 69.7 | | 222 | | 195 | | 2710 | | 17 | 25 | 32 |
| 111860 | P2ISPA01-01-03 | 17.7% | 16.4 | J,Y | 14.5 | J | 3.21 | J,Y | < 15.1 | J,Y | 19.5 | J | 18.2 | J,Y | 8.91 | J | 78 | | 197 | | 168 | | 3200 | | 27 | 35 | 43 |
| 111861 | P2ISPA01-01-04 | 17.0% | 18.5 | J | 7.01 | J | 9.66 | J,Y | < 14.9 | J,Y | 21.6 | J,Y | 17.1 | J | 8.77 | J | 71.4 | | 208 | | 185 | | 3060 | | 21 | 29 | 37 |
| 111862 | P2ISPA01-01-05 | 19.4% | 28 | | 3.79 | J,Y | 10.3 | J,Y | < 15.1 | J,Y | 25 | J | 14.9 | J,Y | 11.7 | J | 80.1 | Y | 295 | | 267 | | 3840 | | 21 | 29 | 37 |
| 111863 | P2ISPA01-01-06 | 16.7% | 21.4 | J | 4.08 | J | 7.81 | J,Y | < 16.3 | J,Y | 21.2 | J | 15.9 | J | 10.6 | J | 72.8 | | 245 | | 222 | | 3590 | | 19 | 27 | 36 |
| 111864 | P2ISPD04-01-01 | 16.6% | 14.6 | J | 10.3 | J,Y | 12.9 | J,Y | 18.4 | J,Y | 33.8 | J | 41.4 | J | 20.2 | J | 170 | | 338 | | 390 | | 4090 | | 53 | 53 | 53 |
| 111865 | P2ISPD04-01-02 | 17.5% | 72.1 | | 17.9 | J,Y | 34.7 | J,Y | 25.5 | J | 91.5 | J | 71.6 | J | 26.4 | J | 568 | | 634 | | 816 | | 6990 | | 99 | 99 | 99 |
| 111866 | P2ISPD04-01-03 | 13.8% | 74.5 | | 10.6 | J,Y | 59 | | 13.7 | J,Y | 91.9 | J | 55.1 | J | 17.9 | J | 483 | | 487 | | 653 | | 5490 | | 81 | 81 | 81 |
| 111867 | P2ISPD04-01-04 | 16.6% | 7.77 | J,Y | 6.33 | J,Y | < 16.1 | J,Y | < 13.9 | J,Y | 15.5 | J | 19.3 | J | 10 | J,Y | 108 | | 256 | | 259 | | 3030 | | 17 | 27 | 37 |
| 111868 | P2ISPD04-01-05 | 15.9% | 69.9 | | 10.1 | J,Y | 30.6 | J,Y | 6.24 | J,Y | 65.9 | J | 36.2 | J | 20.2 | J | 301 | | 477 | | 571 | | 5440 | | 57 | 57 | 57 |
| 111869 | P2ISPD04-01-06 | 16.7% | 75.4 | | 5.32 | J,Y | 31.3 | J | 5.2 | J,Y | 76.9 | J | 24.1 | J,Y | 12.4 | J,Y | 184 | | 327 | | 332 | | 4510 | | 48 | 48 | 48 |
| 111870 | P2ISPD04-01-07 | 14.4% | 24.5 | | 5.06 | J,Y | 14.7 | J | 9.34 | J | 30.7 | J | 28.2 | J | 11.7 | J,Y | 144 | | 328 | | 302 | | 4020 | | 36 | 36 | 36 |
| 111871 | P2ISPD04-01-08 | 16.3% | 19.9 | J | 10.1 | J | 9.09 | J,Y | 14.2 | J | 26.1 | J | 23.8 | J | 15.4 | J | 137 | | 312 | | 311 | | 3770 | | 43 | 43 | 43 |
| 111872 | P2ISPD04-01-09 | 17.5% | 20.3 | J | 10.4 | J,Y | 10.1 | J,Y | 9.68 | J,Y | 26.7 | J | 36.4 | J | 19.5 | J,Y | 144 | | 331 | | 324 | | 3410 | | 41 | 41 | 41 |
| 111873 | P2ISPD04-01-10 | 17.0% | 23.2 | J | 8.68 | J | 13.2 | J,Y | 10.2 | J,Y | 24.8 | J | 26.7 | J | 15.8 | J | 131 | | 266 | | 269 | | 2900 | | 39 | 39 | 39 |

**Attachment 2**
**Phase 2 Analytical Data**

**MAS 8280**

**Fast Analysis**

| Lab ID | sample description | moisture [%] | 2378-TCDF [ng/kg d.w.] | flag | 2378-TCDD [ng/kg d.w.] | flag | 23478-PeCDF [ng/kg d.w.] | flag | 12378-PeCDD [ng/kg d.w.] | flag | 1234(6)78-HxCDF [ng/kg d.w.] | flag | 1234(6)78-HxCDD [ng/kg d.w.] | flag | 123789-HxCDD [ng/kg d.w.] | flag | 1234678-HpCDF [ng/kg d.w.] | flag | 1234678-HpCDD [ng/kg d.w.] | flag | OCDF [ng/kg d.w.] | flag | OCDD [ng/kg d.w.] | flag | ETEQ (ND=0) | ETEQ (ND=0.5 LoD) | ETEQ (ND=LoD) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11P034 | OPR 11/01/11 | 0.00% | 361 | | 376 | | 866 | | 928 | | 1800 | | 1760 | | 883 | | 848 | | 866 | | 1860 | | 1800 | | 2163 | 2163 | 2163 |
| 11M198 | Method blank 11/01/11 | 0.00% | < 1.57 | J,Y | < 5.73 | J,Y | < 2.87 | J,Y | < 3.17 | J,Y | < 6.83 | J,Y | < 7.47 | J,Y | < 2.83 | J,Y | < 4.03 | J,Y | < 3.70 | J,Y | < 12.5 | J,Y | < 12.5 | J,Y | 0 | 6 | 12 |
| 111874 | P2CSPA03-05-01 | 17.4% | 66.7 | | 9.58 | J,Y | 44.6 | | 6.76 | J,Y | 63.3 | | 31.4 | J | 12.8 | J | 252 | | 330 | | 438 | | 3600 | | 57 | 57 | 57 |
| 111875 | P2CSPA03-10-01 | 19.0% | 34.3 | | 7.37 | J | 19.6 | J,Y | 4.91 | J | 28.9 | J,Y | 21.2 | J,Y | 8.92 | J | 135 | | 303 | | 310 | | 4910 | | 35 | 35 | 35 |
| 111876 | P2CSPA03-15-01 | 17.9% | 44 | | 7.15 | J | 24.9 | Y | 4.33 | J,Y | 35.9 | J | 23.3 | J | 6.21 | J | 163 | | 358 | | 441 | | 4770 | | 39 | 39 | 39 |
| 111877 | P2CSPA03-30-01 | 18.1% | 45.1 | | 7.57 | J | 25.4 | | 4.14 | J,Y | 37.3 | J | 19.6 | J,Y | 9.91 | J | 143 | | 309 | | 367 | | 4910 | | 38 | 38 | 38 |
| 111878 | P2CSPD01-10-01 | 17.0% | 74.2 | | 9.53 | | 34.7 | | 10.8 | J | 45.8 | | 29.2 | J | 17.1 | | 148 | | 429 | | 396 | | 5120 | | 58 | 58 | 58 |
| 111879 | P2ISPB02-01-01 | 14.3% | 584 | | 53.7 | | 320 | | 12.9 | J,Y | 455 | | 127 | | 46.7 | | 1440 | Y | 1110 | | 1380 | | 11700 | | 329 | 329 | 329 |
| 111880 | P2ISPB02-01-02 | 9.7% | 112 | | 40.5 | | 62.3 | | 22.8 | J | 87.2 | | 68.8 | J | 30.2 | | 251 | | 1130 | | 728 | | 12600 | | 137 | 137 | 137 |
| 111881 | P2ISPB02-01-03 | 13.6% | 746 | | 23.9 | | 393 | | 18.5 | J | 546 | | 71.4 | J | 21.5 | J | 861 | | 551 | | 1260 | | 5320 | | 331 | 331 | 331 |
| 111882 | P2ISPB02-01-04 | 14.1% | 445 | | 79.8 | | 242 | | 59.4 | | 329 | | 122 | | 51.3 | | 788 | | 1400 | | 1380 | | 13400 | | 350 | 350 | 350 |
| 111883 | P2ISPB02-01-05 | 17.6% | 317 | | 150 | | 200 | | 88.9 | | 348 | | 223 | | 82.6 | Y | 1660 | | 2530 | | 3480 | | 26200 | | 469 | 469 | 469 |
| 111884 | P2ISPB02-01-06 | 12.8% | 176 | | 124 | | 122 | | 75.7 | | 195 | | 188 | | 75.6 | | 963 | | 2270 | | 2250 | | 21300 | | 356 | 356 | 356 |
| 111885 | P2ISPB02-01-07 | 15.8% | 318 | | 139 | | 202 | | 93.4 | | 387 | | 261 | | 93.6 | | 2600 | | 2790 | | 3140 | | 27100 | | 485 | 485 | 485 |
| 111886 | P2ISPB02-01-08 | 14.2% | 629 | | 90 | | 376 | | 57.6 | J,Y | 453 | | 205 | | 73.2 | | 1320 | | 2440 | | 2250 | | 24500 | | 464 | 464 | 464 |
| 111887 | P2ISPB02-01-09 | 12.7% | 851 | | 41.4 | Y,W | 501 | | 35 | J,Y | 880 | | 156 | J | 67.7 | | 1530 | | 1810 | | 1660 | | 16700 | | 484 | 484 | 484 |
| 111889 | P2CSPAAA-30-01 | 17.6% | 31.2 | | 7.48 | J | 12.7 | J | 4.4 | J,Y | 31.4 | J | 19.3 | J | 8.41 | J | 129 | | 267 | | 278 | | 3070 | | 31 | 31 | 31 |
| 111890 | P2CSPAAA-30-02 | 17.8% | 30.4 | | 4.02 | J,Y | 14 | J,Y | 2.87 | J,Y | 32.9 | J | 16.1 | J,Y | 6.58 | J | 84.5 | | 189 | | 185 | | 2460 | | 24 | 24 | 24 |
| 11P035 | OPR 11/02/11 | 0.00% | 368 | | 356 | | 905 | | 912 | | 1800 | | 1800 | | 859 | | 864 | | 876 | | 1900 | | 1940 | | 2142 | 2142 | 2142 |
| 11M200 | Method blank 11/02/11 | 0.00% | < 2.73 | J,Y | < 8.50 | J,Y | < 5.10 | J,Y | < 5.03 | J,Y | < 10.3 | J,Y | < 9.10 | J,Y | < 3.47 | J,Y | < 4.57 | J,Y | < 4.37 | J,Y | < 10.4 | J,Y | < 11.3 | J,Y | 0 | 9 | 19 |
| 111898 | P2CSPA01-30-01 | 20.10% | 37.9 | | 5.2 | J | 21.5 | | < 5.82 | J,Y | 32.1 | J | 13.5 | J | 8.17 | J | 81 | | 244 | | 211 | | 3250 | | 26 | 29 | 32 |
| 111899 | P2CSPA01-30-02 | 19.50% | 40.8 | | < 8.85 | J,Y | 22.7 | | < 6.56 | J,Y | 32.1 | J | 15.2 | J | < 6.96 | J,Y | 61.3 | Y | 258 | | 233 | | 3680 | | 21 | 29 | 38 |
| 111900 | P2CSPC03-15-03 | 15.90% | 253 | | 121 | | 195 | | 61.4 | | 296 | | 180 | | 79.2 | | 1240 | | 2160 | | 2360 | | 23700 | | 382 | 382 | 382 |
| 111901 | P2CSPC04-15-01 | 15.90% | 229 | | 82 | | 219 | | 55.2 | Y | 238 | | 157 | | 65.7 | | 1530 | Y | 1920 | | 2180 | | 19000 | | 329 | 329 | 329 |
| 111902 | P2CSPC04-30-01 | 16.00% | 442 | | 69.3 | | 267 | | 53 | Y | 308 | | 148 | | 63.5 | | 1480 | | 1860 | | 2020 | | 19800 | | 356 | 356 | 356 |
| 111903 | P2CSPD02-10-01 | 16.90% | 43.7 | | 10 | | 28.1 | | < 6.07 | J,Y | 36.7 | J | 25.7 | J | 9.81 | J,Y | 244 | | 367 | | 406 | | 4380 | | 39 | 43 | 46 |
| 111904 | P2CSPD04-15-03 | 15.90% | 33.7 | | 8.46 | | 25.3 | | < 5.79 | J,Y | 39.8 | | 26.4 | J | 14.2 | J | 144 | | 333 | | 361 | | 4030 | | 35 | 38 | 41 |
| 111905 | P2ISPA01-01-07 | 17.10% | 37.1 | | < 8.64 | J,Y | 19.6 | | 5.67 | J,Y | 24.8 | J | < 13.0 | J,Y | < 6.18 | J,Y | 50.3 | Y | 204 | | 178 | | 3000 | | 22 | 28 | 33 |
| 111906 | P2ISPA01-01-08 | 20.90% | 26.3 | | < 10.1 | J,Y | 16.9 | J | < 6.67 | J,Y | 23.9 | J | 18.4 | J | < 6.90 | J,Y | 83.9 | | 296 | | 264 | | 4340 | | 18 | 27 | 36 |
| 111907 | P2ISPA01-01-09 | 14.80% | 176 | | 8.02 | J | 99.1 | | < 7.72 | J,Y | 114 | | 34.6 | J | 19.2 | J | 307 | Y | 574 | | 528 | | 6720 | | 87 | 91 | 95 |
| 111908 | P2ISPA01-01-10 | 9.50% | 32 | | < 8.16 | J,Y | 17 | J | < 5.96 | J,Y | 17.6 | J | < 9.76 | J,Y | < 6.00 | J,Y | 17.2 | J | 45.2 | | 47 | J | 519 | | 11 | 20 | 28 |
| 111909 | P2CSPAAA-15-01 | 17.50% | 26.1 | | 5.32 | J,Y | 17.7 | J | < 7.49 | J,Y | 25.6 | J | 19 | J | < 6.65 | J,Y | 91.7 | | 420 | | 491 | | 3520 | | 25 | 30 | 34 |
| 111910 | P2CSPAAA-15-02 | 17.90% | 29.1 | | < 10.7 | J,Y | 17.9 | J | < 7.64 | J,Y | 23.6 | J | < 16.6 | J,Y | < 7.76 | J,Y | 89.5 | | 242 | | 233 | | 2960 | | 16 | 27 | 37 |
| 111911 | P2CSPAAA-15-03 | 18.30% | 28.6 | | < 11.3 | J,Y | 17.1 | J | < 7.03 | J,Y | 26.7 | J | 19.2 | J | < 6.77 | J,Y | 85.8 | | 245 | | 231 | | 3090 | | 18 | 28 | 38 |
| 111912 | P2CSSAAA-15-02 | 14.80% | 142 | | 31.4 | | 90.3 | | 26.4 | | 127 | | 77.8 | | 35.5 | | 522 | | 1010 | | 853 | | 10300 | | 149 | 149 | 149 |
| 111913 | P2CSSAAA-15-03 | 14.90% | 132 | | 28.8 | | 88.9 | | < 6.85 | J,Y | 105 | | 74.6 | | 34.1 | | 581 | | 983 | | 840 | | 11100 | | 114 | 119 | 122 |
| 11P036 | OPR 11/03/11 | 0.0% | 326 | | 339 | | 800 | | 826 | | 1620 | | 1600 | | 791 | | 784 | | 790 | | 1680 | | 1600 | | 1943 | 1943 | 1943 |
| 11M201 | Method blank 11/03/11 | 0.0% | < 2.27 | J,Y | < 5.63 | J,Y | < 4.20 | J,Y | < 4.27 | J,Y | < 9.63 | J,Y | < 8.90 | J,Y | < 4.13 | J,Y | < 5.63 | J,Y | < 5.80 | J,Y | < 16.0 | J,Y | < 21.2 | J,Y | 0 | 7 | 14 |
| 111914 | P2CSPC03-05-03 | 15.0% | 197 | | 123 | | 142 | | 68.5 | J | 218 | J | 178 | J | 85.6 | J | 1150 | | 2120 | | 2330 | | 23900 | | 359 | 359 | 359 |
| 111915 | P2CSPC03-10-01 | 16.1% | 326 | | 118 | | 187 | | 70.8 | J | 307 | | 193 | J | 79 | J | 1490 | | 2250 | | 2470 | | 23100 | | 400 | 400 | 400 |
| 111916 | P2CSPC03-10-02 | 15.2% | 254 | | 105 | | 148 | | 81.7 | J | 271 | | 215 | J | 84.4 | J | 1500 | | 2200 | | 2490 | | 20800 | | 375 | 375 | 375 |
| 111917 | P2CSPC03-10-03 | 16.4% | 308 | | 122 | | 196 | | 68.1 | J | 285 | | 209 | J | 89.2 | J | 1600 | | 2290 | | 2540 | | 22700 | | 403 | 403 | 403 |
| 111918 | P2CSPD03-15-01 | 17.4% | 37.9 | | 7.58 | J | 22.4 | J | < 11.8 | J,Y | 35.2 | J | 23 | J | 12.2 | J | 156 | | 333 | | 356 | | 3930 | | 33 | 39 | 45 |
| 111919 | P2CSPD04-05-02 | 16.0% | 38.3 | | 13.2 | J | 41.9 | J | 124 | | 171 | | 195 | | 114 | | 265 | | 559 | | 421 | | 4410 | | 222 | 222 | 222 |
| 111920 | P2ISPC03-01-01 | 20.1% | 312 | | 120 | | 201 | | 90.8 | J | 409 | | 256 | J | 104 | J | 2370 | | 2560 | | 2960 | | 26200 | | 459 | 459 | 459 |
| 111921 | P2ISPC03-01-02 | 18.9% | 401 | | 147 | | 281 | | 118 | J | 512 | | 393 | | 148 | | 3090 | | 3980 | | 4890 | | 37700 | | 608 | 608 | 608 |
| 111922 | P2ISPC03-01-03 | 14.4% | 190 | | 104 | | 115 | | 49.3 | J | 196 | | 147 | | 67.9 | | 1020 | | 1860 | | 1710 | | 18900 | | 297 | 297 | 297 |
| 111923 | P2ISPC03-01-04 | 18.3% | 258 | | 187 | | 183 | | 86.1 | J | 284 | | 273 | J | 117 | J | 2030 | | 2790 | | 3030 | | 26400 | | 503 | 503 | 503 |
| 111924 | P2ISPC03-01-05 | 17.5% | 262 | | 127 | | 146 | W | 77.3 | J | 322 | | 238 | J | 103 | | 1810 | | 2510 | | 3120 | | 25200 | | 412 | 412 | 412 |
| 111925 | P2ISPC03-01-06 | 12.8% | 205 | | 53.4 | | 115 | | 33.9 | J | 203 | | 102 | J | 51.3 | J | 1110 | | 1370 | | 1290 | | 14500 | | 218 | 218 | 218 |
| 111926 | P2ISPC03-01-07 | 15.4% | 161 | | 213 | | 112 | | 71.1 | | 204 | | 198 | | 87.7 | | 1560 | | 2550 | | 2460 | | 25300 | | 454 | 454 | 454 |
| 111927 | P2ISPC03-01-08 | 19.2% | 322 | | 201 | | 166 | W | 110 | J | 338 | | 263 | J | 127 | | 2010 | | 3040 | | 3560 | | 30600 | | 553 | 553 | 553 |
| 111928 | P2ISPC03-01-09 | 15.6% | 216 | | 103 | | 140 | | 58.7 | J | 213 | J | 176 | J | 84.9 | J | 928 | | 2250 | | 2040 | | 24400 | | 329 | 329 | 329 |
| 111929 | P2ISPC03-01-10 | 15.5% | 355 | | 18.9 | | 180 | | < 10.9 | J,Y | 254 | | 54.6 | J | 22.3 | J | 466 | Y | 649 | | 695 | | 6770 | | 163 | 168 | 174 |

**Attachment 2**
**Phase 2 Analytical Data**

**MAS 8280**

**Fast Analysis**

| Lab ID | sample description | moisture [%] | 2378-TCDF [ng/kg d.w.] | flag | 2378-TCDD [ng/kg d.w.] | flag | 23478-PeCDF [ng/kg d.w.] | flag | 12378-PeCDD [ng/kg d.w.] | flag | 1234(6)78-HxCDF [ng/kg d.w.] | flag | 1234(6)78-HxCDD [ng/kg d.w.] | flag | 123789-HxCDD [ng/kg d.w.] | flag | 1234678-HpCDF [ng/kg d.w.] | flag | 1234678-HpCDD [ng/kg d.w.] | flag | OCDF [ng/kg d.w.] | flag | OCDD [ng/kg d.w.] | flag | ETEQ (ND=0) | ETEQ (ND=0.5 LoD) | ETEQ (ND=LoD) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11P038 | OPR 11/08/11 | 0.00% | 349 | | 343 | | 845 | | 864 | | 1720 | | 1670 | | 832 | | 802 | | 820 | | 1780 | | 1720 | | 2027 | 2027 | 2027 |
| 11M204 | Method blank 11/08/11 | 0.00% | < 2.43 | J,Y | < 7.10 | J,Y | < 4.00 | J,Y | < 3.57 | J,Y | < 9.13 | J,Y | < 8.83 | J,Y | < 3.27 | J,Y | < 4.37 | J,Y | < 4.07 | J,Y | < 11.2 | J,Y | 6.43 | J,Y | 0 | 8 | 15 |
| 111938 | P2CSPC03-15-01 | 15.80% | 293 | | 113 | | 176 | | 60.9 | J,Y | 306 | | 189 | J | 93.4 | | 1290 | | 2280 | | 2490 | | 24400 | | 376 | 376 | 376 |
| 111939 | P2CSPC03-15-02 | 16.10% | 285 | | 117 | | 148 | Y | 72.2 | J | 314 | | 201 | J | 94.5 | | 1640 | | 2420 | | 2750 | | 30600 | | 393 | 393 | 393 |
| 111940 | P2CSPD01-05-01 | 16.30% | 69.8 | | 9.58 | J | 36.7 | J | < 14.1 | J,Y | 51.1 | J | 28.1 | J | 14.9 | J,Y | 161 | | 349 | | 392 | | 3860 | | 45 | 53 | 60 |
| 111941 | P2CSPD01-15-01 | 16.30% | 99 | | 8.02 | J,Y | 38.8 | J | < 14.1 | J,Y | 45.5 | J | 24.4 | J,Y | 15.1 | J,Y | 151 | | 346 | | 364 | Y | 4290 | | 47 | 54 | 61 |
| 111942 | P2CSPD02-15-01 | 17.20% | 45.9 | | 18.8 | J,Y | 32.7 | J | 16.8 | J | 51.1 | J | 32.3 | J | 20.2 | J | 234 | | 387 | | 408 | | 4670 | | 71 | 71 | 71 |
| 111943 | P2CSPD03-05-01 | 17.40% | 39.3 | | 10.5 | J,Y | 28.8 | J,Y | < 14.6 | J,Y | 50.6 | J | 32.9 | J | 19.2 | J | 204 | Y | 409 | | 440 | | 4860 | | 43 | 51 | 58 |
| 111944 | P2CSPD03-10-01 | 16.90% | 32.6 | | 8.06 | J,Y | 17.8 | J,Y | 13.3 | J | 40.5 | J | 30 | J | 19.1 | J | 184 | | 380 | | 398 | | 4960 | | 49 | 49 | 49 |
| 111945 | P2CSPD03-30-01 | 16.00% | 87 | | 6.22 | J,Y | 45.5 | J | < 15.8 | J,Y | 83.2 | J | 32.8 | J | 24.5 | J | 227 | | 339 | | 365 | | 3750 | | 52 | 60 | 69 |
| 111946 | P2CSPD04-05-01 | 15.90% | 39.3 | | 7.34 | J,Y | 29.9 | J,W | < 14.7 | J,Y | 49.7 | J | 29 | J,Y | 16.7 | J | 206 | | 375 | | 392 | | 4940 | | 39 | 47 | 54 |
| 111947 | P2CSPD04-05-03 | 16.20% | 26.5 | | 7.41 | J | 22 | J | < 14.2 | J,Y | 32.4 | J | 28.1 | J | 16.5 | J | 171 | | 315 | | 329 | | 3830 | | 32 | 39 | 47 |
| 111948 | P2CSPD04-10-01 | 16.10% | 36.2 | | 6.22 | J,Y | 27.6 | J | 12.9 | J,Y | 47.9 | J | 40.5 | J | 21.8 | J,Y | 245 | | 371 | | 390 | | 5170 | | 52 | 52 | 52 |
| 111949 | P2CSPAAA-05-01 | 18.90% | 23.9 | | 8.13 | J | 12.1 | J,Y | < 10.4 | J,Y | 27.4 | J | 17.3 | J | 7.97 | J | 85.8 | | 203 | | 174 | | 2660 | | 24 | 30 | 35 |
| 111950 | P2CSPAAA-05-02 | 17.40% | 22.8 | | 4.99 | J,Y | 13.5 | J,Y | < 9.15 | J,Y | 22.2 | J | 14.5 | J,Y | 7.95 | J | 67.3 | Y | 192 | | 175 | | 2610 | | 20 | 25 | 30 |
| 111951 | P2CSPAAA-05-03 | 17.50% | 29.2 | | 6.69 | J | 16.4 | J,Y | < 14.8 | J,Y | 21.9 | J | 15.3 | J | 8.31 | J | 82 | | 196 | | 173 | | 2370 | | 24 | 32 | 39 |
| 111952 | P2CSPAAA-10-01 | 18.60% | 23.4 | | 6.08 | J | 13.4 | J | < 8.15 | J,Y | 21.7 | J | 14.6 | J | 5.19 | J,Y | 87.5 | | 228 | | 213 | | 3070 | | 22 | 26 | 30 |
| 111953 | P2CSPAAA-10-02 | 17.40% | 25.6 | | 4.81 | J,Y | 13.2 | J,Y | < 14.5 | J,Y | 24 | J | 15.6 | J | 9.4 | J | 83.3 | | 217 | | 203 | | 2790 | | 21 | 29 | 36 |
| 111954 | P2CSPAAA-10-03 | 17.70% | 22 | | 4.07 | J | 11.5 | J,Y | < 8.91 | J,Y | 24.4 | J | 14 | J,Y | 6.36 | J,Y | 88.5 | | 270 | | 326 | | 3840 | | 20 | 25 | 29 |
| 11P039 | OPR 11/08/11 | 0.00% | 346 | | 342 | | 794 | | 875 | | 1730 | | 1670 | | 809 | | 808 | | 831 | | 1790 | | 1740 | | 2030 | 2030 | 2030 |
| 11M205 | Method blank 11/08/11 | 0.00% | < 2.43 | J,Y | < 7.67 | J,Y | < 4.73 | J,Y | < 4.33 | J,Y | < 8.87 | J,Y | < 9.03 | J,Y | < 3.20 | J,Y | < 4.70 | J,Y | 0.967 | J,Y | < 11.2 | J,Y | 10 | J,Y | 0 | 8 | 17 |
| 111955 | P2CSPA01-30-03 | 20.30% | 57.6 | | 5.35 | J | 30.2 | | 4.89 | J,Y | 39.5 | | 15.5 | J | 7.7 | J | 99.6 | | 248 | | 234 | | 3040 | | 38 | 38 | 38 |
| 111956 | P2CSPA02-15-01 | 18.30% | 25.1 | | 4.38 | J,Y | 14 | J | < 6.87 | J,Y | 26.7 | J | 15 | J | 7.52 | J | 70.8 | Y | 216 | | 206 | | 2680 | | 21 | 24 | 28 |
| 111957 | P2CSPC03-30-03 | 16.00% | 252 | | 102 | | 183 | Y | 72.9 | Y | 287 | | 194 | | 86 | | 1490 | | 2310 | | 2550 | | 26900 | | 377 | 377 | 377 |
| 111958 | P2CSPC04-10-01 | 16.50% | 272 | | 92.7 | | 203 | | 63.6 | Y | 286 | | 172 | | 70 | | 1370 | | 1850 | | 2060 | | 18500 | | 353 | 353 | 353 |
| 111959 | P2CSPD02-05-01 | 17.30% | 71 | | 12.2 | Y | 42 | | 12.1 | J,Y | 55.7 | | 36.6 | J | 15 | J,Y | 281 | | 369 | | 471 | | 4240 | | 66 | 66 | 66 |
| 111960 | P2CSPD04-15-01 | 16.20% | 39.3 | | 8.58 | J,Y | 28.3 | | 13.2 | J,Y | 44.1 | | 31 | J | 15 | J | 222 | | 347 | | 403 | | 4090 | | 53 | 53 | 53 |
| 111961 | P2CSPD04-15-02 | 16.00% | 40.2 | | 9.53 | | 29.2 | | 13.8 | J | 63.7 | | 31.8 | J | 17.2 | J | 246 | | 371 | | 445 | | 4400 | | 58 | 58 | 58 |
| 111962 | P2CSPD04-30-03 | 16.20% | 39 | | 12.9 | | 105 | | 15.6 | J | 132 | | 49.2 | | 23.6 | | 329 | | 445 | | 453 | | 5020 | | 99 | 99 | 99 |
| 111963 | P2CSPDDD-05-01 | 18.00% | 36.1 | | 11.9 | | 25.5 | | 11.1 | J,Y | 40.6 | J,Y | 33.7 | J | 14 | J,Y | 207 | | 464 | | 414 | | 9230 | | 55 | 55 | 55 |
| 111964 | P2CSPDDD-05-03 | 17.10% | 39.4 | | 10.4 | | 33.5 | | 32.4 | | 55.9 | | 51.4 | | 29.2 | | 303 | | 400 | | 393 | | 4490 | | 83 | 83 | 83 |
| 111965 | P2CSPDDD-10-01 | 17.70% | 62.1 | | 8.57 | J,Y | 35.7 | | 10.5 | J,Y | 51.2 | | 26.4 | J,Y | 15 | J | 223 | | 425 | | 485 | | 5810 | | 56 | 56 | 56 |
| 111966 | P2CSPDDD-10-02 | 17.00% | 52.8 | | 7.52 | J,Y | 34.6 | | 13.3 | J | 55.9 | | 29.2 | J | 17.5 | J | 211 | | 401 | | 365 | | 4460 | | 57 | 57 | 57 |
| 111967 | P2CSPDDD-10-03 | 16.70% | 59.8 | | 8.93 | J,Y | 39.2 | | 9.84 | J | 54.2 | | 29.9 | J | 15.8 | J | 160 | Y | 396 | | 427 | | 4570 | | 56 | 56 | 56 |
| 111968 | P2CSPDDD-15-01 | 18.00% | 44 | | 8.8 | | 26.7 | | 7.9 | J | 41.7 | J | 21.9 | J,Y | 12.4 | J | 141 | | 323 | | 348 | | 3920 | | 45 | 45 | 45 |
| 111969 | P2CSSAAA-30-01 | 16.50% | 632 | | 46.4 | | 372 | | 36.8 | Y | 519 | | 106 | | 42.8 | | 2390 | | 1160 | | 2010 | | 11900 | | 383 | 383 | 383 |
| 111970 | P2CSSAAA-30-03 | 16.40% | 484 | | 44.6 | | 282 | | 21.5 | Y | 414 | | 98.2 | | 42.7 | | 2000 | | 1300 | | 1920 | | 13300 | | 307 | 307 | 307 |
| 11P040 | OPR 11/10/11 | 0.0% | 341 | | 323 | | 843 | | 874 | | 1670 | | 1640 | | 814 | | 787 | | 792 | | 1780 | | 1670 | | 2010 | 2010 | 2010 |
| 11M207 | Method blank 11/10/11 | 0.0% | < 3.80 | J,Y | < 10.2 | J,Y | < 7.50 | J,Y | < 6.10 | J,Y | < 16.1 | J,Y | < 18.4 | J,Y | < 7.50 | J,Y | < 8.87 | J,Y | < 9.00 | J,Y | < 27.6 | J,Y | < 29.5 | J,Y | 0 | 12 | 25 |
| 111975 | P2CSPA02-05-01 | 22.8% | 23.6 | | 3.08 | J,Y | 12.3 | J,Y | < 6.78 | J,Y | 21.2 | J | 14.5 | J,Y | 6.12 | J | 82.4 | | 217 | | 203 | | 2840 | | 18 | 22 | 25 |
| 111976 | P2CSPA02-10-01 | 18.3% | 18.1 | | 4.63 | J | 9.59 | J,Y | < 7.27 | J,Y | 22.5 | J | 23.1 | J | 8.11 | J,Y | 104 | | 773 | | 530 | | 8910 | | 28 | 31 | 35 |
| 111977 | P2CSPC01-05-01 | 14.0% | 218 | | 53 | Y | 164 | | 47.9 | Y | 220 | | 120 | | 58.7 | | 1030 | | 1620 | | 1550 | | 17800 | | 256 | 256 | 256 |
| 111978 | P2CSPC01-10-01 | 17.3% | 256 | | 75.9 | | 205 | | 52.4 | Y | 285 | | 164 | | 62.1 | | 1390 | | 2090 | | 2300 | | 20900 | | 323 | 323 | 323 |
| 111979 | P2CSPC01-15-01 | 15.7% | 274 | | 63.5 | | 193 | | 53.3 | Y | 295 | | 157 | | 74.1 | | 1370 | | 1710 | | 1900 | | 17900 | | 306 | 306 | 306 |
| 111980 | P2CSPC03-05-01 | 15.8% | 190 | | 116 | | 163 | | 65 | Y | 250 | | 177 | | 82.1 | | 1100 | | 2200 | | 2440 | | 22300 | | 357 | 357 | 357 |
| 111981 | P2CSPC03-05-02 | 14.6% | 180 | | 108 | | 156 | | 74 | | 245 | | 189 | | 82.6 | | 1210 | | 2350 | | 2410 | | 25200 | | 360 | 360 | 360 |
| 111982 | P2CSPC04-05-01 | 17.2% | 241 | | 64.9 | Y | 207 | | 70.6 | | 256 | | 156 | | 69.1 | | 1430 | | 2000 | | 2210 | | 21300 | | 327 | 327 | 327 |
| 111983 | P2CSPD01-30-01 | 16.4% | 80.2 | | 10.1 | | 33.7 | Y | < 6.78 | J,Y | 47.1 | J,Y | 27.8 | J | 13.6 | J,Y | 115 | Y | 333 | | 356 | | 4230 | | 45 | 49 | 52 |
| 111984 | P2CSPD04-10-02 | 16.6% | 31.5 | | 8.9 | J | 26.3 | | 8.31 | J,Y | 47.3 | | 36.5 | J | 18.8 | J,Y | 207 | | 350 | | 418 | | 4470 | | 48 | 48 | 48 |
| 111985 | P2CSPD04-10-03 | 15.7% | 38.6 | | 7.4 | J,Y | 31.1 | | 7.07 | J,Y | 48.8 | | 26.8 | J,Y | 16 | J,Y | 214 | | 391 | | 455 | | 4980 | | 47 | 47 | 47 |
| 111986 | P2CSPAAA-30-03 | 17.5% | 33.1 | | 4.41 | J,Y | 21.4 | J | < 6.51 | J,Y | 27.8 | J | 15.5 | J,Y | 7.35 | J | 65.2 | Y | 260 | | 277 | | 4450 | | 25 | 29 | 32 |
| 111987 | P2CSPDDD-05-02 | 17.2% | 42.5 | | 9.55 | | 26.6 | | 23.5 | Y | 41 | J | 29.1 | J,Y | 14.6 | J,Y | 259 | Y | 367 | | 420 | | 4870 | | 65 | 65 | 65 |
| 111988 | P2CSPDDD-15-02 | 18.1% | 59.8 | | 6.32 | J | 35.7 | | 8.61 | J | 52.3 | | 31.9 | J,Y | 11.9 | J | 198 | | 500 | | 522 | | 6010 | | 53 | 53 | 53 |
| 111989 | P2CSPDDD-15-03 | 17.9% | 43.9 | | 5.87 | J,Y | 27.2 | Y | 7 | J,Y | 41.8 | J | 24.8 | J | 10.1 | J,Y | 159 | | 358 | | 394 | | 4640 | | 42 | 42 | 42 |
| 111990 | P2CSSAAA-15-01 | 15.6% | 122 | | 26.7 | | 82.9 | | 10.3 | J,Y | 123 | | 68.5 | Y | 24.6 | Y | 642 | | 1050 | | 969 | | 12200 | | 123 | 123 | 123 |

**Attachment 2**
**Phase 2 Analytical Data**

**MAS 8280**

**Fast Analysis**

| Lab ID | sample description | moisture [%] | 2378-TCDF [ng/kg d.w.] | flag | 2378-TCDD [ng/kg d.w.] | flag | 23478-PeCDF [ng/kg d.w.] | flag | 12378-PeCDD [ng/kg d.w.] | flag | 1234(6)78-HxCDF [ng/kg d.w.] | flag | 1234(6)78-HxCDD [ng/kg d.w.] | flag | 123789-HxCDD [ng/kg d.w.] | flag | 1234678-HpCDF [ng/kg d.w.] | flag | 1234678-HpCDD [ng/kg d.w.] | flag | OCDF [ng/kg d.w.] | flag | OCDD [ng/kg d.w.] | flag | ETEQ (ND=0) | ETEQ (ND=0.5 LoD) | ETEQ (ND=LoD) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11P041 | OPR 11/14/11 | 0.0% | 338 | | 332 | | 821 | | 831 | | 1660 | | 1620 | | 816 | | 807 | | 816 | | 1680 | | 1650 | | 1960 | 1960 | 1960 |
| 11M209 | Method blank 11/14/11 | 0.0% | < 3.13 | J,Y | < 9.93 | J,Y | < 6.10 | J,Y | < 5.60 | J,Y | < 13.2 | J,Y | < 12.2 | J,Y | < 4.47 | J,Y | < 6.87 | J,Y | < 6.83 | J,Y | < 20.4 | J,Y | 7 | J,Y | 0 | 11 | 22 |
| 111999 | P2CSPA01-05-01 | 20.4% | 55.3 | | 4.09 | J,Y | 31.9 | | < 6.56 | J,Y | 44.5 | J | 19.8 | J | 9.65 | J | 107 | Y | 346 | | 303 | | 4300 | | 34 | 38 | 41 |
| 112000 | P2CSPA01-05-02 | 20.3% | 63.6 | | 3.43 | J,Y | 34.6 | | < 6.56 | J,Y | 55.4 | | 20.4 | J | 8.02 | J | 145 | Y | 421 | | 315 | | 5010 | | 38 | 41 | 45 |
| 112001 | P2CSPA01-05-03 | 19.5% | 56.6 | | 3.83 | J,Y | 36.7 | | < 5.91 | J,Y | 57.5 | | 17.3 | J | 3.83 | J,Y | 137 | Y | 315 | | 269 | | 3950 | | 36 | 39 | 42 |
| 112002 | P2CSPA01-10-01 | 16.2% | 37.1 | | 5.23 | J | 19.8 | | 4.28 | J,Y | 33.6 | J | 13.7 | J,Y | 6.18 | J,Y | 86 | | 245 | | 218 | | 3130 | | 30 | 30 | 30 |
| 112003 | P2CSPA01-10-02 | 16.4% | 39.4 | | 4.36 | J | 20.5 | Y | 5.75 | J,Y | 34.2 | J | 16.6 | J | 7.49 | J,Y | 88.6 | | 245 | | 205 | | 4110 | | 32 | 32 | 32 |
| 112004 | P2CSPA01-10-03 | 16.3% | 41 | | 4.03 | J,Y | 21.8 | | < 5.89 | J,Y | 33.1 | J | 12.7 | J,Y | 3.95 | J,Y | 50.7 | Y | 244 | | 211 | | 2980 | | 25 | 28 | 31 |
| 112005 | P2CSPA01-15-01 | 19.0% | 35 | | 5.52 | J,Y | 21.4 | J | < 6.34 | J,Y | 31 | J,Y | 21.9 | J | 8.63 | J,Y | 96.8 | | 425 | | 248 | | 4780 | | 30 | 33 | 36 |
| 112006 | P2CSPA01-15-02 | 18.4% | 35.3 | | 5.01 | J | 21.2 | | 6.15 | J,Y | 31.5 | J | 17.5 | J | 8.31 | J | 84.4 | Y | 294 | | 243 | | 3720 | | 33 | 33 | 33 |
| 112007 | P2CSPA01-15-03 | 19.1% | 37.2 | | 5.85 | J | 20.9 | J | < 6.83 | J,Y | 34.2 | J | 15.6 | J | 5.11 | J,Y | 84.5 | Y | 281 | | 231 | | 3770 | | 28 | 31 | 35 |
| 112008 | P2CSPB04-05-01 | 14.9% | 532 | | 98.4 | | 260 | | 61.8 | Y | 321 | | 168 | | 63.8 | | 1220 | | 2030 | | 1850 | | 21500 | | 405 | 405 | 405 |
| 112009 | P2CSPC01-30-01 | 15.1% | 238 | | 77.5 | | 173 | Y | 66.2 | Y | 264 | | 149 | | 56.3 | | 1320 | | 1850 | | 1950 | | 22400 | | 320 | 320 | 320 |
| 112010 | P2CSPC02-05-01 | 14.6% | 175 | | 60 | | 111 | | 34.5 | Y | 175 | | 119 | | 52.9 | | 827 | | 1380 | | 1120 | | 13000 | | 216 | 216 | 216 |
| 112011 | P2CSPC02-10-01 | 14.5% | 201 | | 70.5 | | 138 | | 62.3 | Y | 236 | | 149 | | 59.9 | | 1280 | | 1560 | | 1870 | | 16600 | | 287 | 287 | 287 |
| 112012 | P2CSPC02-15-01 | 15.2% | 198 | | 76.8 | | 144 | | 56.8 | Y | 222 | | 149 | | 63.6 | | 1130 | | 1990 | | 1770 | | 19000 | | 291 | 291 | 291 |
| 112013 | P2CSPD04-30-01 | 16.6% | 46.9 | | 11.4 | | 35.2 | Y | 15.5 | J | 68.8 | | 65.3 | | 28.1 | | 305 | | 530 | | 478 | | 5410 | | 72 | 72 | 72 |
| 112014 | P2CSPD04-30-02 | 16.3% | 36.1 | | 7.82 | J,Y | 28.7 | | 11.5 | J | 47.3 | J | 32.3 | J | 17.9 | J | 262 | | 395 | | 417 | | 5160 | | 52 | 52 | 52 |
| 11P042 | OPR 11/16/11 | 0.0% | 333 | | 326 | | 835 | | 875 | | 1710 | | 1650 | | 893 | | 830 | | 835 | | 1740 | | 1720 | | 2030 | 2030 | 2030 |
| 11M210 | Method blank 11/16/11 | 0.0% | < 2.63 | J,Y | < 7.60 | J,Y | < 5.93 | J,Y | < 5.53 | J,Y | < 12.3 | J,Y | < 12.9 | J,Y | < 4.70 | J,Y | < 7.27 | J,Y | < 6.60 | J,Y | < 17.3 | J,Y | < 21.7 | J,Y | 0 | 10 | 19 |
| 112019 | P2CSPBBB-05-01 | 16.7% | 472 | | 112 | | 250 | | 72.8 | Y | 319 | | 190 | | 73.9 | | 928 | Y | 2370 | | 2560 | | 22900 | | 426 | 426 | 426 |
| 112020 | P2CSPBBB-05-02 | 16.5% | 346 | | 110 | | 219 | | 80.7 | Y | 365 | | 184 | | 73.8 | | 1200 | Y | 2120 | | 2140 | | 22400 | | 414 | 414 | 414 |
| 112021 | P2CSPBBB-05-03 | 15.7% | 333 | | 95.1 | | 211 | | 65.9 | Y | 302 | | 174 | | 68 | | 1350 | | 2070 | | 2140 | | 21100 | | 371 | 371 | 371 |
| 112022 | P2CSPBBB-10-01 | 15.8% | 461 | | 112 | | 266 | | 82.5 | Y | 356 | | 179 | | 74.2 | | 1460 | | 2320 | | 2420 | | 23800 | | 448 | 448 | 448 |
| 112023 | P2CSPCCC-05-01 | 14.8% | 194 | | 65.2 | | 148 | | 68.9 | Y | 230 | | 153 | | 60.7 | | 1010 | | 1540 | | 1630 | | 16700 | | 287 | 287 | 287 |
| 112024 | P2CSPCCC-05-02 | 14.3% | 205 | | 58.9 | | 162 | | 60.9 | Y | 218 | | 130 | | 54.2 | | 920 | | 1440 | | 1540 | | 15500 | | 271 | 271 | 271 |
| 112025 | P2CSPCCC-05-03 | 14.0% | 202 | | 67.7 | | 156 | | 62.5 | Y | 226 | | 136 | | 58.3 | | 1070 | | 1670 | | 1680 | | 18300 | | 287 | 287 | 287 |
| 112026 | P2CSPCCC-10-01 | 13.8% | 209 | | 75.9 | | 143 | Y | 75.2 | Y | 222 | | 145 | | 61.3 | | 1130 | | 1720 | | 1900 | | 18200 | | 307 | 307 | 307 |
| 112027 | P2CSPCCC-10-02 | 14.1% | 201 | | 62.7 | Y | 141 | | 65.2 | Y | 209 | | 154 | | 53.1 | Y | 896 | Y | 1740 | | 1730 | | 17200 | | 277 | 277 | 277 |
| 112028 | P2CSPCCC-10-03 | 14.1% | 223 | | 61.9 | | 151 | | 62.4 | Y | 208 | | 125 | | 45.6 | Y | 922 | | 1690 | | 1570 | | 16900 | | 275 | 275 | 275 |
| 112029 | P2CSPCCC-15-01 | 15.5% | 245 | | 85.5 | | 176 | Y | 85.4 | Y | 300 | | 190 | | 70.5 | | 1460 | | 2110 | | 2300 | | 22100 | | 364 | 364 | 364 |
| 112030 | P2CSPCCC-15-02 | 15.6% | 264 | | 85.9 | | 168 | | 81.5 | Y | 285 | | 178 | | 69.4 | | 1360 | Y | 2210 | | 2300 | | 22100 | | 357 | 357 | 357 |
| 112031 | P2CSPCCC-15-03 | 15.8% | 255 | | 86.1 | | 191 | | 70.3 | Y | 283 | | 182 | | 74.9 | | 1710 | | 2010 | | 2040 | | 20200 | | 354 | 354 | 354 |
| 112032 | P2CSPCCC-30-01 | 15.0% | 216 | | 91.9 | | 164 | | 73.4 | Y | 236 | | 178 | | 73.1 | | 1190 | | 2020 | | 2140 | | 20200 | | 340 | 340 | 340 |
| 112033 | P2CSPCCC-30-02 | 15.0% | 233 | | 85.8 | | 186 | | 68.2 | | 279 | | 160 | | 70.9 | | 1220 | | 2070 | | 2070 | | 21100 | | 340 | 340 | 340 |
| 112034 | P2CSPCCC-30-03 | 15.6% | 211 | | 83.1 | | 189 | | 81.5 | | 258 | | 170 | | 77.5 | | 1190 | | 2220 | | 2130 | | 20900 | | 351 | 351 | 351 |
| 11P043 | OPR 11/16/11 | 0.00% | 330 | | 320 | | 822 | | 812 | | 1670 | | 1620 | | 777 | | 806 | | 809 | | 1690 | | 1630 | | 1930 | 1930 | 1930 |
| 11M212 | Method blank 11/16/11 | 0.00% | < 3.03 | J,Y | < 9.53 | J,Y | < 6.00 | J,Y | < 5.43 | J,Y | < 12.6 | J,Y | < 11.4 | J,Y | < 4.20 | J,Y | 6.93 | J,Y | 17.1 | J | 16.3 | J | 198 | | 0 | 11 | 21 |
| 112048 | P2CSPA04-05-01 | 17.70% | 27.2 | | < 11.3 | J,Y | 17 | J | < 7.11 | J,Y | 27.7 | J | 14.4 | J | < 6.55 | J,Y | 104 | | 222 | | 213 | | 2750 | | 17 | 27 | 37 |
| 112049 | P2CSPA04-10-01 | 18.30% | 20.6 | | < 10.8 | J,Y | 11.9 | J,Y | < 6.76 | J,Y | 22 | J | 15.5 | J | 6.95 | J,Y | 108 | | 203 | | 194 | | 2690 | | 15 | 24 | 33 |
| 112050 | P2CSPA04-15-01 | 17.80% | 26.1 | | < 11.7 | J,Y | 17.6 | J | < 7.43 | J,Y | 29 | J | 18.6 | J | < 6.56 | J,Y | 133 | | 222 | | 212 | | 2540 | | 18 | 28 | 39 |
| 112051 | P2CSPA04-30-01 | 16.50% | 18.4 | | < 11.4 | J,Y | 14 | J | < 7.09 | J,Y | 24.4 | J | 13.8 | J | < 6.34 | J,Y | 109 | | 162 | | 164 | | 1880 | | 14 | 24 | 34 |
| 112052 | P2CSPB04-10-01 | 14.20% | 274 | | 91.8 | | 176 | | 63.3 | Y | 251 | | 163 | | 62.9 | | 1080 | Y | 2210 | | 2150 | | 22000 | | 339 | 339 | 339 |
| 112053 | P2CSPB04-15-01 | 14.20% | 637 | | 98.8 | | 291 | | 77.6 | | 376 | | 196 | | 69.4 | | 1470 | | 2170 | | 2090 | | 28700 | | 459 | 459 | 459 |
| 112054 | P2CSPB04-30-01 | 13.70% | 466 | | 85.6 | | 249 | | 57.6 | | 343 | | 163 | | 69.3 | | 1020 | | 1910 | | 1750 | | 20100 | | 376 | 376 | 376 |
| 112055 | P2ISPB02-01-10 | 13.10% | 248 | | 103 | | 190 | | 70.2 | Y | 271 | | 194 | | 79.9 | | 1430 | | 2170 | | 2170 | | 21800 | | 370 | 370 | 370 |
| 112056 | P2CSPBBB-10-02 | 16.30% | 441 | | 112 | | 248 | | 68.3 | Y | 346 | | 187 | | 80.1 | | 1330 | | 2420 | | 2350 | | 24900 | | 426 | 426 | 426 |
| 112057 | P2CSPBBB-10-03 | 16.20% | 410 | | 103 | | 249 | | 75.7 | Y | 337 | | 188 | | 71.6 | | 1020 | | 2420 | | 2390 | | 22700 | | 416 | 416 | 416 |
| 112058 | P2CSPBBB-15-01 | 15.00% | 346 | | 201 | | 210 | | 66.2 | Y | 332 | | 186 | | 72.2 | | 1420 | | 2140 | | 2090 | | 22600 | | 490 | 490 | 490 |
| 112059 | P2CSPBBB-15-02 | 14.70% | 329 | | 78.4 | | 218 | | 70 | | 344 | | 184 | | 69 | | 1260 | | 2370 | | 2090 | | 22100 | | 368 | 368 | 368 |
| 112060 | P2CSPBBB-15-03 | 15.00% | 321 | | 80.8 | | 197 | | 61.3 | Y | 334 | | 187 | | 74.9 | | 1610 | | 2320 | | 2350 | | 24300 | | 357 | 357 | 357 |
| 112061 | P2CSPBBB-30-01 | 16.10% | 393 | | 89.7 | | 247 | | 65.5 | Y | 393 | | 204 | | 75.1 | | 1610 | | 2480 | | 2410 | | 23800 | | 404 | 404 | 404 |
| 112062 | P2CSPBBB-30-02 | 15.50% | 361 | | 88.1 | | 211 | | 69.8 | Y | 302 | | 170 | | 75.5 | | 1110 | | 2450 | | 2140 | | 22800 | | 373 | 373 | 373 |
| 112063 | P2CSPBBB-30-03 | 15.50% | 344 | | 87.9 | | 208 | | 64.1 | Y | 323 | | 181 | | 74.2 | | 1370 | | 2280 | | 2290 | | 23100 | | 369 | 369 | 369 |

**Attachment 2**
**Phase 2 Analytical Data**

**EPA 1613b**
**2378-TCDF Confirmation**

| Sample ID | unit | Total TCDDs | 2378-TCDD | Total PCDDs | 12378-PCDD | Total HCDDs | 123478-HCDD | 123678-HCDD | 123789-HCDD | Total H7CDDs | 1234678-H7CDD | OCDD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 111824 | ng/kg d.w. | 661 | 95.6 | 446 | 49.6 | 1080 | 50.8 | 142 | 76.6 | 4110 | 2220 | 24400 |
| 111825 | ng/kg d.w. | 640 | 100 | 401 | 43.9 | 935 | 42.8 | 125 | 71.2 | 3380 | 1840 | 18900 |
| 111826 | ng/kg d.w. | 700 | 105 | 444 | 49.9 | 1110 | 52.1 | 148 | 81.4 | 4190 | 2250 | 23100 |
| 111827 | ng/kg d.w. | 636 | 101 | 400 | 45.6 | 940 | 44.9 | 126 | 67 | 3800 | 2050 | 21500 |
| 111842 | ng/kg d.w. | 38.1 | 4.05 | 37.4 | 4.22 | 93.8 | 4.21 | 11.9 | 7.4 | 360 | 195 | 2380 |
| 111850 | ng/kg d.w. | 101 | 13.6 | 86 | 10.4 | 204 | 8.95 | 27.1 | 17.2 | 688 | 375 | 4180 |
| 111851 | ng/kg d.w. | 52.8 | 6 | 50.9 | 6.28 | 130 | 5.69 | 16.8 | 10.3 | 456 | 247 | 2780 |
| 111864 | ng/kg d.w. | 77.9 | 9.19 | 63.6 | 8.89 | 158 | 6.88 | 20 | 14.6 | 612 | 336 | 3890 |
| 111866 | ng/kg d.w. | 121 | 10.9 | 111 | 11.8 | 324 | 13.7 | 41.4 | 20.5 | 910 | 480 | 5370 |
| 111868 | ng/kg d.w. | 85.1 | 9.25 | 82.4 | 9.59 | 225 | 8.77 | 30.2 | 17.9 | 810 | 452 | 5280 |
| 111869 | ng/kg d.w. | 48.2 | 4.11 | 51.6 | 6.29 | 171 | 6.04 | 23.7 | 13.1 | 590 | 313 | 4440 |
| 111879 | ng/kg d.w. | 473 | 59.9 | 305 | 29.7 | 769 | 34.3 | 101 | 46.3 | 1850 | 1010 | 11000 |
| 111880 | ng/kg d.w. | 201 | 45.8 | 127 | 17.9 | 354 | 17.1 | 46.7 | 31.3 | 1970 | 1040 | 11200 |
| 111881 | ng/kg d.w. | 250 | 37.3 | 157 | 16.4 | 373 | 13.7 | 54 | 24.9 | 940 | 527 | 4820 |
| 111882 | ng/kg d.w. | 616 | 103 | 345 | 44.3 | 667 | 38 | 85.9 | 48.4 | 2300 | 1260 | 12400 |
| 111883 | ng/kg d.w. | 1240 | 186 | 659 | 73.1 | 1290 | 60.4 | 179 | 94.6 | 4230 | 2360 | 23900 |
| 111884 | ng/kg d.w. | 791 | 132 | 511 | 63.3 | 1040 | 64.7 | 125 | 79.4 | 3840 | 2080 | 20300 |
| 111885 | ng/kg d.w. | 1110 | 155 | 695 | 79.3 | 1480 | 69.7 | 199 | 102 | 4660 | 2520 | 25700 |
| 111886 | ng/kg d.w. | 704 | 107 | 438 | 49 | 1060 | 51.1 | 143 | 78.9 | 4070 | 2200 | 23700 |
| 111887 | ng/kg d.w. | 462 | 52.1 | 376 | 42.2 | 953 | 39.2 | 123 | 67.7 | 2980 | 1590 | 15800 |
| 111912 | ng/kg d.w. | 264 | 37.8 | 181 | 20.9 | 447 | 20.9 | 61 | 33.6 | 1830 | 998 | 10000 |
| 111913 | ng/kg d.w. | 254 | 34.6 | 162 | 19.4 | 443 | 20.8 | 58.6 | 34 | 1750 | 956 | 10400 |
| 112019 | ng/kg d.w. | 938 | 140 | 547 | 55.9 | 1160 | 55.5 | 155 | 84.8 | 4160 | 2260 | 23300 |
| 112022 | ng/kg d.w. | 869 | 134 | 506 | 57.6 | 1140 | 56 | 147 | 83.1 | 4240 | 2280 | 21800 |
| 112023 | ng/kg d.w. | 594 | 82.6 | 395 | 44.2 | 839 | 38.8 | 117 | 64.2 | 2900 | 1580 | 16000 |
| 112024 | ng/kg d.w. | 541 | 73.9 | 338 | 39.7 | 767 | 34.9 | 104 | 58.8 | 2580 | 1420 | 14400 |
| 112025 | ng/kg d.w. | 586 | 77.9 | 357 | 40.3 | 833 | 38.3 | 107 | 63.2 | 2840 | 1540 | 18100 |
| 112026 | ng/kg d.w. | 600 | 88.7 | 344 | 42.9 | 889 | 40.1 | 120 | 65.5 | 2960 | 1610 | 17200 |
| 112027 | ng/kg d.w. | 575 | 84.3 | 377 | 42.9 | 910 | 41 | 121 | 67.6 | 3030 | 1680 | 16300 |
| 112028 | ng/kg d.w. | 561 | 78.9 | 337 | 38 | 762 | 36 | 108 | 56.4 | 3040 | 1630 | 17000 |

**EPA 1613b**
**2378-TCDF Confirmation**

| Sample ID | unit | Total TCDFs | 2378-TCDF | Total PCDFs | 12378-PCDF | 23478-PCDF | Total HCDFs | 123478-HCDF | 123678-HCDF | 234678-HCDF | 123789-HCDF | Total H7CDFs | 1234678-H7CDF | 1234789-H7CDF | OCDF | WHO-TEQ (LoD=0) | WHO-TEQ (LoD=0.5) | WHO-TEQ (LoD) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 111824 | ng/kg d.w. | 1600 | 236 | 1180 | 186 | 195 | 1550 | 250 | 77.9 | 91.2 | 53.4 | 2810 | 1330 | 59.9 | 2210 | 351 | 351 | 351 |
| 111825 | ng/kg d.w. | 1400 | 177 | 912 | 115 | 141 | 1310 | 167 | 59.9 | 75.3 | 37.3 | 2490 | 1200 | 48.6 | 1960 | 302 | 302 | 302 |
| 111826 | ng/kg d.w. | 1500 | 201 | 946 | 129 | 149 | 1380 | 202 | 68.5 | 81.5 | 44.6 | 2740 | 1300 | 61.8 | 2120 | 335 | 335 | 335 |
| 111827 | ng/kg d.w. | 1270 | 181 | 902 | 126 | 143 | 1280 | 184 | 62.3 | 71.5 | 38.5 | 2460 | 1150 | 50 | 2010 | 310 | 310 | 310 |
| 111842 | ng/kg d.w. | 157 | 38.2 | 111 | 24.4 | 22.4 | 119 | 27.1 | 7.72 | 6.94 | 5.35 | 201 | 97.7 | 5.27 | 183 | 30.4 | 30.4 | 30.4 |
| 111850 | ng/kg d.w. | 235 | 28.6 | 135 | 17.6 | 21 | 207 | 26.3 | 10.3 | 12.4 | 5.87 | 479 | 233 | 9.21 | 409 | 52 | 52 | 52 |
| 111851 | ng/kg d.w. | 157 | 26.1 | 99.3 | 15.2 | 17.8 | 133 | 21 | 7.2 | 8.56 | 4.98 | 266 | 122 | 6.61 | 252 | 32.8 | 32.8 | 32.8 |
| 111864 | ng/kg d.w. | 138 | 11.4 | 74.1 | 7.85 | 10.2 | 141 | 14.9 | 6.33 | 8.79 | 3.66 | 367 | 178 | 7.38 | 405 | 36.5 | 36.5 | 36.5 |
| 111866 | ng/kg d.w. | 338 | 68 | 275 | 45 | 49.4 | 446 | 70.2 | 22.5 | 24.9 | 14.4 | 911 | 490 | 17.3 | 640 | 78.1 | 78.1 | 78.1 |
| 111868 | ng/kg d.w. | 338 | 59.1 | 252 | 35 | 44.1 | 352 | 47.9 | 16.2 | 21 | 11 | 688 | 319 | 13.9 | 555 | 63.9 | 63.9 | 63.9 |
| 111869 | ng/kg d.w. | 278 | 71 | 214 | 42.2 | 43.3 | 243 | 52.7 | 15.8 | 16.1 | 10.6 | 369 | 191 | 11.5 | 325 | 52.1 | 52.1 | 52.1 |
| 111879 | ng/kg d.w. | 1750 | 491 | 1380 | 316 | 289 | 1450 | 330 | 88.6 | 81.5 | 63 | 2140 | 1140 | 48.2 | 1280 | 335 | 335 | 335 |
| 111880 | ng/kg d.w. | 431 | 89.3 | 302 | 53.4 | 55.7 | 337 | 60.6 | 18.1 | 20.7 | 11.8 | 625 | 255 | 15.7 | 692 | 128 | 128 | 128 |
| 111881 | ng/kg d.w. | 1850 | 648 | 1780 | 421 | 391 | 1500 | 442 | 103 | 86.8 | 74.7 | 1610 | 886 | 49.4 | 1220 | 345 | 345 | 345 |
| 111882 | ng/kg d.w. | 1760 | 381 | 1190 | 244 | 229 | 1160 | 240 | 70.1 | 71.6 | 41.8 | 1690 | 813 | 39.4 | 1370 | 346 | 346 | 346 |
| 111883 | ng/kg d.w. | 2430 | 263 | 1300 | 157 | 188 | 1740 | 228 | 81.3 | 97.5 | 47.6 | 3650 | 1620 | 78.4 | 3090 | 474 | 474 | 474 |
| 111884 | ng/kg d.w. | 1370 | 144 | 730 | 86.9 | 106 | 1050 | 132 | 47.9 | 60.8 | 30.1 | 2190 | 984 | 45.8 | 2010 | 336 | 336 | 336 |
| 111885 | ng/kg d.w. | 2100 | 263 | 1340 | 169 | 196 | 2120 | 258 | 97.3 | 118 | 54.1 | 4350 | 2220 | 79.4 | 3070 | 471 | 471 | 471 |
| 111886 | ng/kg d.w. | 2260 | 531 | 1650 | 306 | 309 | 1720 | 313 | 95.5 | 102 | 59.3 | 2750 | 1320 | 58.8 | 2140 | 439 | 439 | 439 |
| 111887 | ng/kg d.w. | 2700 | 766 | 2440 | 459 | 467 | 2550 | 646 | 144 | 155 | 92.4 | 2790 | 1530 | 86.3 | 1620 | 489 | 489 | 489 |
| 111912 | ng/kg d.w. | 637 | 138 | 439 | 76.4 | 81.7 | 564 | 96.7 | 29.1 | 33.7 | 19.7 | 1030 | 502 | 22.9 | 857 | 147 | 147 | 147 |
| 111913 | ng/kg d.w. | 623 | 124 | 433 | 74.3 | 76.5 | 565 | 93.1 | 29.8 | 32.2 | 17.7 | 1030 | 512 | 21.9 | 804 | 138 | 138 | 138 |
| 112019 | ng/kg d.w. | 2260 | 470 | 1320 | 215 | 245 | 1510 | 236 | 75 | 84.6 | 50.6 | 2970 | 1310 | 58.6 | 2580 | 441 | 441 | 441 |
| 112022 | ng/kg d.w. | 2230 | 446 | 1400 | 246 | 259 | 1610 | 278 | 84.1 | 96.7 | 54.5 | 2800 | 1320 | 59.9 | 2380 | 445 | 445 | 445 |
| 112023 | ng/kg d.w. | 1340 | 198 | 913 | 113 | 143 | 1210 | 167 | 55.8 | 69.4 | 36.5 | 2210 | 1120 | 45.5 | 1680 | 281 | 281 | 281 |
| 112024 | ng/kg d.w. | 1320 | 212 | 890 | 119 | 147 | 1120 | 162 | 53.8 | 65.1 | 36.8 | 2030 | 1030 | 45.6 | 1460 | 264 | 264 | 264 |
| 112025 | ng/kg d.w. | 1320 | 204 | 865 | 117 | 139 | 1180 | 176 | 58.1 | 69.6 | 34.5 | 2210 | 1090 | 48.1 | 1590 | 271 | 271 | 271 |
| 112026 | ng/kg d.w. | 1260 | 195 | 816 | 113 | 135 | 1170 | 169 | 57.9 | 69.1 | 32.7 | 2320 | 1150 | 46.6 | 1830 | 284 | 284 | 284 |
| 112027 | ng/kg d.w. | 1260 | 204 | 817 | 115 | 131 | 1130 | 157 | 55.4 | 63.7 | 33.4 | 2190 | 1100 | 45.3 | 1710 | 278 | 278 | 278 |
| 112028 | ng/kg d.w. | 1340 | 219 | 795 | 116 | 135 | 1020 | 153 | 49.8 | 59 | 31.9 | 1980 | 950 | 40 | 1540 | 264 | 264 | 264 |

**Attachment 2**
**Phase 2 Analytical Data**

**EPA 1613b**
**EXTENDED confirmation**

| Sample ID | unit | Total TCDDs | 2378-TCDD | Total PCDDs | 12378-PCDD | Total HCDDs | 123478-HCDD | 123678-HCDD | 123789-HCDD | Total H7CDDs | 1234678-H7CDD | OCDD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 111824 | ng/kg d.w. | 661 | 95.6 | 446 | 49.6 | 1080 | 50.8 | 142 | 76.6 | 4110 | 2220 | 24400 |
| 111825 | ng/kg d.w. | 640 | 100 | 401 | 43.9 | 935 | 42.8 | 125 | 71.2 | 3380 | 1840 | 18900 |
| 111826 | ng/kg d.w. | 700 | 105 | 444 | 49.9 | 1110 | 52.1 | 148 | 81.4 | 4190 | 2250 | 23100 |
| 111827 | ng/kg d.w. | 636 | 101 | 400 | 45.6 | 940 | 44.9 | 126 | 67 | 3800 | 2050 | 21500 |
| 111842 | ng/kg d.w. | 38.1 | 4.05 | 37.4 | 4.22 | 93.8 | 4.21 | 11.9 | 7.4 | 360 | 195 | 2380 |
| 111850 | ng/kg d.w. | 101 | 13.6 | 86 | 10.4 | 204 | 8.95 | 27.1 | 17.2 | 688 | 375 | 4180 |
| 111851 | ng/kg d.w. | 52.8 | 6 | 50.9 | 6.28 | 130 | 5.69 | 16.8 | 10.3 | 456 | 247 | 2780 |
| 111864 | ng/kg d.w. | 77.9 | 9.19 | 63.6 | 8.89 | 158 | 6.88 | 20 | 14.6 | 612 | 336 | 3890 |
| 111866 | ng/kg d.w. | 121 | 10.9 | 111 | 11.8 | 324 | 13.7 | 41.4 | 20.5 | 910 | 480 | 5370 |
| 111868 | ng/kg d.w. | 85.1 | 9.25 | 82.4 | 9.59 | 225 | 8.77 | 30.2 | 17.9 | 810 | 452 | 5280 |
| 111869 | ng/kg d.w. | 48.2 | 4.11 | 51.6 | 6.29 | 171 | 6.04 | 23.7 | 13.1 | 590 | 313 | 4440 |
| 111879 | ng/kg d.w. | 473 | 59.9 | 305 | 29.7 | 769 | 34.3 | 101 | 46.3 | 1850 | 1010 | 11000 |
| 111880 | ng/kg d.w. | 201 | 45.8 | 127 | 17.9 | 354 | 17.1 | 46.7 | 31.3 | 1970 | 1040 | 11200 |
| 111881 | ng/kg d.w. | 250 | 37.3 | 157 | 16.4 | 373 | 13.7 | 54 | 24.9 | 940 | 527 | 4820 |
| 111882 | ng/kg d.w. | 616 | 103 | 345 | 44.3 | 667 | 38 | 85.9 | 48.4 | 2300 | 1260 | 12400 |
| 111883 | ng/kg d.w. | 1240 | 186 | 659 | 73.1 | 1290 | 60.4 | 179 | 94.6 | 4230 | 2360 | 23900 |
| 111884 | ng/kg d.w. | 791 | 132 | 511 | 63.3 | 1040 | 64.7 | 125 | 79.4 | 3840 | 2080 | 20300 |
| 111885 | ng/kg d.w. | 1110 | 155 | 695 | 79.3 | 1480 | 69.7 | 199 | 102 | 4660 | 2520 | 25700 |
| 111886 | ng/kg d.w. | 704 | 107 | 438 | 49 | 1060 | 51.1 | 143 | 78.9 | 4070 | 2200 | 23700 |
| 111887 | ng/kg d.w. | 462 | 52.1 | 376 | 42.2 | 953 | 39.2 | 123 | 67.7 | 2980 | 1590 | 15800 |
| 111912 | ng/kg d.w. | 264 | 37.8 | 181 | 20.9 | 447 | 20.9 | 61 | 33.6 | 1830 | 998 | 10000 |
| 111913 | ng/kg d.w. | 254 | 34.6 | 162 | 19.4 | 443 | 20.8 | 58.6 | 34 | 1750 | 956 | 10400 |
| 112019 | ng/kg d.w. | 938 | 140 | 547 | 55.9 | 1160 | 55.5 | 155 | 84.8 | 4160 | 2260 | 23300 |
| 112022 | ng/kg d.w. | 869 | 134 | 506 | 57.6 | 1140 | 56 | 147 | 83.1 | 4240 | 2280 | 21800 |
| 112023 | ng/kg d.w. | 594 | 82.6 | 395 | 44.2 | 839 | 38.8 | 117 | 64.2 | 2900 | 1580 | 16000 |
| 112024 | ng/kg d.w. | 541 | 73.9 | 338 | 39.7 | 767 | 34.9 | 104 | 58.8 | 2580 | 1420 | 14400 |
| 112025 | ng/kg d.w. | 586 | 77.9 | 357 | 40.3 | 833 | 38.3 | 107 | 63.2 | 2840 | 1540 | 18100 |
| 112026 | ng/kg d.w. | 600 | 88.7 | 344 | 42.9 | 889 | 40.1 | 120 | 65.5 | 2960 | 1610 | 17200 |
| 112027 | ng/kg d.w. | 575 | 84.3 | 377 | 42.9 | 910 | 41 | 121 | 67.6 | 3030 | 1680 | 16300 |
| 112028 | ng/kg d.w. | 561 | 78.9 | 337 | 38 | 762 | 36 | 108 | 56.4 | 3040 | 1630 | 17000 |

**EPA 1613b**
**EXTENDED confirmation**

| Sample ID | unit | Total TCDFs | 2378-TCDF | Total PCDFs | 12378-PCDF | 23478-PCDF | Total HCDFs | 123478-HCDF | 123678-HCDF | 234678-HCDF | 123789-HCDF | Total H7CDFs | 1234678-H7CDF | 1234789-H7CDF | OCDF | WHO-TEQ (LoD=0) | WHO-TEQ (LoD=0.5) | WHO-TEQ (LoD) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 111824 | ng/kg d.w. | 1600 | 236 | 1180 | 186 | 130 | 1550 | 250 | 77.9 | 49.4 | 5.44 | 2810 | 1330 | 59.9 | 2210 | 323 | 323 | 323 |
| 111825 | ng/kg d.w. | 1400 | 177 | 912 | 115 | 94.7 | 1310 | 167 | 59.9 | 42 | 5.27 | 2490 | 1200 | 48.6 | 1960 | 282 | 282 | 282 |
| 111826 | ng/kg d.w. | 1500 | 201 | 946 | 129 | 105 | 1380 | 202 | 68.5 | 44.1 | 5.59 | 2740 | 1300 | 61.8 | 2120 | 314 | 314 | 314 |
| 111827 | ng/kg d.w. | 1270 | 181 | 902 | 126 | 105 | 1280 | 184 | 62.3 | 41.4 | 6.04 | 2460 | 1150 | 50 | 2010 | 293 | 293 | 293 |
| 111842 | ng/kg d.w. | 157 | 38.2 | 111 | 24.4 | 18.5 | 119 | 27.1 | 7.72 | 5.5 | 1.71 | 201 | 97.7 | 5.27 | 183 | 28.7 | 28.7 | 28.7 |
| 111850 | ng/kg d.w. | 235 | 28.6 | 135 | 17.6 | 14.3 | 207 | 26.3 | 10.3 | 7.83 | 1.32 | 479 | 233 | 9.21 | 409 | 49.1 | 49.1 | 49.1 |
| 111851 | ng/kg d.w. | 157 | 26.1 | 99.3 | 15.2 | 13.5 | 133 | 21 | 7.2 | 5.47 | 1.03 | 266 | 122 | 6.61 | 252 | 30.8 | 30.8 | 30.8 |
| 111864 | ng/kg d.w. | 138 | 11.4 | 74.1 | 7.85 | 7.45 | 141 | 14.9 | 6.33 | 5.65 | 0.895 | 367 | 178 | 7.38 | 405 | 35.1 | 35.1 | 35.1 |
| 111866 | ng/kg d.w. | 338 | 68 | 275 | 45 | 36.1 | 446 | 70.2 | 22.5 | 14.5 | 1.52 | 911 | 490 | 17.3 | 640 | 71.8 | 71.8 | 71.8 |
| 111868 | ng/kg d.w. | 338 | 59.1 | 252 | 35 | 30.8 | 352 | 47.9 | 16.2 | 12 | 1.44 | 688 | 319 | 13.9 | 555 | 58.1 | 58.1 | 58.1 |
| 111869 | ng/kg d.w. | 278 | 71 | 214 | 42.2 | 33.2 | 243 | 52.7 | 15.8 | 9.74 | 1.39 | 369 | 191 | 11.5 | 325 | 47.6 | 47.6 | 47.6 |
| 111879 | ng/kg d.w. | 1750 | 491 | 1380 | 316 | 225 | 1450 | 330 | 88.6 | 48.9 | 10.3 | 2140 | 1140 | 48.2 | 1280 | 307 | 307 | 307 |
| 111880 | ng/kg d.w. | 431 | 89.3 | 302 | 53.4 | 41.7 | 337 | 60.6 | 18.1 | 13 | 2.41 | 625 | 255 | 15.7 | 692 | 122 | 122 | 122 |
| 111881 | ng/kg d.w. | 1850 | 648 | 1780 | 421 | 305 | 1500 | 442 | 103 | 50.8 | 9.83 | 1610 | 886 | 49.4 | 1220 | 309 | 309 | 309 |
| 111882 | ng/kg d.w. | 1760 | 381 | 1190 | 244 | 181 | 1160 | 240 | 70.1 | 41.7 | 6.41 | 1690 | 813 | 39.4 | 1370 | 325 | 325 | 325 |
| 111883 | ng/kg d.w. | 2430 | 263 | 1300 | 157 | 143 | 1740 | 228 | 81.3 | 59.8 | 6.43 | 3650 | 1620 | 78.4 | 3090 | 453 | 453 | 453 |
| 111884 | ng/kg d.w. | 1370 | 144 | 730 | 86.9 | 75.6 | 1050 | 132 | 47.9 | 36.9 | 3.85 | 2190 | 984 | 45.8 | 2010 | 322 | 322 | 322 |
| 111885 | ng/kg d.w. | 2100 | 263 | 1340 | 169 | 151 | 2120 | 258 | 97.3 | 71.2 | 9.12 | 4350 | 2220 | 79.4 | 3070 | 448 | 448 | 448 |
| 111886 | ng/kg d.w. | 2260 | 531 | 1650 | 306 | 231 | 1720 | 313 | 95.5 | 59.6 | 8.22 | 2750 | 1320 | 58.8 | 2140 | 406 | 406 | 406 |
| 111887 | ng/kg d.w. | 2700 | 766 | 2440 | 459 | 373 | 2550 | 646 | 144 | 99.1 | 11.6 | 2790 | 1530 | 86.3 | 1620 | 447 | 447 | 447 |
| 111912 | ng/kg d.w. | 637 | 138 | 439 | 76.4 | 61.6 | 564 | 96.7 | 29.1 | 19 | 3.16 | 1030 | 502 | 22.9 | 857 | 138 | 138 | 138 |
| 111913 | ng/kg d.w. | 623 | 124 | 433 | 74.3 | 54.9 | 565 | 93.1 | 29.8 | 19 | 2.38 | 1030 | 512 | 21.9 | 804 | 129 | 129 | 129 |
| 112019 | ng/kg d.w. | 2260 | 470 | 1320 | 215 | 183 | 1510 | 236 | 75 | 48.8 | 10.2 | 2970 | 1310 | 58.6 | 2580 | 415 | 415 | 415 |
| 112022 | ng/kg d.w. | 2230 | 446 | 1400 | 246 | 191 | 1610 | 278 | 84.1 | 54.4 | 8.77 | 2800 | 1320 | 59.9 | 2380 | 416 | 416 | 416 |
| 112023 | ng/kg d.w. | 1340 | 198 | 913 | 113 | 98.4 | 1210 | 167 | 55.8 | 41.9 | 6.63 | 2210 | 1120 | 45.5 | 1680 | 261 | 261 | 261 |
| 112024 | ng/kg d.w. | 1320 | 212 | 890 | 119 | 102 | 1120 | 162 | 53.8 | 39.4 | 4.71 | 2030 | 1030 | 45.6 | 1460 | 244 | 244 | 244 |
| 112025 | ng/kg d.w. | 1320 | 204 | 865 | 117 | 99.9 | 1180 | 176 | 58.1 | 41.6 | 4.53 | 2210 | 1090 | 48.1 | 1590 | 254 | 254 | 254 |
| 112026 | ng/kg d.w. | 1260 | 195 | 816 | 113 | 101 | 1170 | 169 | 57.9 | 39.5 | 5.42 | 2320 | 1150 | 46.6 | 1830 | 268 | 268 | 268 |
| 112027 | ng/kg d.w. | 1260 | 204 | 817 | 115 | 92 | 1130 | 157 | 55.4 | 38.3 | 4.28 | 2190 | 1100 | 45.3 | 1710 | 261 | 261 | 261 |
| 112028 | ng/kg d.w. | 1340 | 219 | 795 | 116 | 102 | 1020 | 153 | 49.8 | 34.5 | 4.13 | 1980 | 950 | 40 | 1540 | 249 | 249 | 249 |

**Attachment 2**
**Phase 2 Analytical Data**

**MAS 8280**

**Fast Analysis**

| Lab ID | sample description | moisture [%] | 2378-TCDF [ng/kg d.w.] | flag | 2378-TCDD [ng/kg d.w.] | flag | 23478-PeCDF [ng/kg d.w.] | flag | 12378-PeCDD [ng/kg d.w.] | flag | 1234(6)78-HxCDF [ng/kg d.w.] | flag | 1234(6)78-HxCDD [ng/kg d.w.] | flag | 123789-HxCDD [ng/kg d.w.] | flag | 1234678-HpCDF [ng/kg d.w.] | flag | 1234678-HpCDD [ng/kg d.w.] | flag | OCDF [ng/kg d.w.] | flag | OCDD [ng/kg d.w.] | flag | ETEQ (ND=0) | ETEQ (ND=0.5 LoD) | ETEQ (ND=LoD) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11P031 | OPR 10/28/11 | 0.00% | 364 | | 358 | | 918 | | 935 | | 1850 | | 1790 | | 903 | | 907 | | 924 | | 1870 | | 1810 | | 2184 | 2184 | 2184 |
| 11M194 | Method blank 10/28/11 | 0.00% | < 3.47 | J,Y | < 7.00 | J,Y | < 3.77 | J,Y | < 3.50 | J,Y | 1.3 | J,Y | < 6.73 | J,Y | < 2.20 | J,Y | < 3.87 | J,Y | < 3.73 | J,Y | < 13.9 | J,Y | 8.6 | J | 0 | 7 | 14 |
| 111824 | P2CSPB01-05-01 | 14.50% | 260 | | 64.6 | | 209 | | 54.7 | | 321 | | 178 | | 81.6 | | 1390 | | 2460 | | 2170 | | 25700 | | 329 | 329 | 329 |
| 111825 | P2CSPB01-10-01 | 13.90% | 201 | | 76.3 | | 145 | Y | 57.4 | J | 221 | | 155 | | 69.2 | | 1250 | | 1980 | | 1910 | | 19300 | | 294 | 294 | 294 |
| 111826 | P2CSPB01-15-01 | 14.90% | 212 | | 86.2 | | 171 | | 45.1 | Y | 257 | | 188 | | 86.7 | | 1280 | | 2430 | | 2190 | | 23300 | | 317 | 317 | 317 |
| 111827 | P2CSPB01-30-01 | 15.60% | 218 | | 85.9 | | 164 | Y | 60.2 | J | 253 | | 165 | | 76.9 | | 1120 | | 2280 | | 2190 | | 22600 | | 323 | 323 | 323 |
| 111828 | P2CSPB02-05-01 | 12.80% | 905 | | 44 | | 482 | | 41.1 | | 597 | | 119 | | 49.2 | | 1080 | | 1370 | | 1320 | | 14100 | | 447 | 447 | 447 |
| 111829 | P2CSPB02-05-02 | 12.20% | 934 | | 40.2 | | 487 | | 30.2 | Y | 591 | | 97.3 | | 38.6 | | 815 | | 1230 | | 1100 | | 13000 | | 427 | 427 | 427 |
| 111830 | P2CSPB02-05-03 | 12.40% | 930 | | 38.4 | | 479 | | 28.5 | Y | 581 | | 99.5 | | 42.7 | | 948 | | 1260 | | 1200 | | 12800 | | 422 | 422 | 422 |
| 111831 | P2CSPB02-10-01 | 13.70% | 502 | | 76 | | 300 | | 60.3 | | 405 | | 167 | | 68.6 | | 1380 | | 1980 | | 1930 | | 18100 | | 399 | 399 | 399 |
| 111832 | P2CSPB02-10-02 | 13.10% | 389 | | 85.7 | | 241 | | 50.7 | | 331 | | 162 | | 65.7 | | 1290 | | 1880 | | 1850 | | 18500 | | 358 | 358 | 358 |
| 111833 | P2CSPB02-10-03 | 13.60% | 453 | | 64.5 | | 249 | | 50.5 | | 366 | | 133 | | 54.7 | | 2090 | | 1790 | | 2550 | | 15800 | | 352 | 352 | 352 |
| 111834 | P2CSPB02-15-01 | 14.70% | 621 | | 90.4 | | 338 | | 59.5 | J | 444 | | 166 | | 72.1 | | 1140 | | 1990 | | 2030 | | 21700 | | 441 | 441 | 441 |
| 111835 | P2CSPB02-15-02 | 13.90% | 680 | | 79.8 | | 346 | | 61.2 | J,Y | 458 | | 162 | J | 71.8 | | 2400 | | 1900 | | 2520 | | 18300 | | 453 | 453 | 453 |
| 111836 | P2CSPB02-15-03 | 14.50% | 702 | | 82.3 | | 362 | | 65.5 | | 480 | | 167 | | 76.7 | | 1200 | | 2230 | | 2400 | | 22000 | | 462 | 462 | 462 |
| 111837 | P2CSPB02-30-01 | 13.60% | 580 | | 91.8 | | 317 | | 48 | J,Y | 407 | | 158 | J | 70.5 | | 1280 | | 2050 | | 2070 | | 18800 | | 416 | 416 | 416 |
| 111838 | P2CSPB02-30-02 | 13.90% | 564 | | 91.9 | | 306 | | 53 | J | 418 | | 187 | | 79.4 | | 1370 | | 2490 | | 2310 | | 30900 | | 431 | 431 | 431 |
| 111839 | P2CSPB02-30-03 | 13.50% | 647 | | 83.8 | | 341 | | 56.2 | | 448 | | 168 | | 64 | | 1350 | | 2170 | | 2020 | | 20100 | | 438 | 438 | 438 |
| 11P032 | OPR 10/31/11 | 0.00% | 364 | | 354 | | 901 | | 928 | | 1830 | | 1780 | | 900 | | 867 | | 890 | | 1870 | | 1810 | | 2163 | 2163 | 2163 |
| 11M196 | Method blank 10/31/11 | 0.00% | < 2.03 | J,Y | < 5.67 | J,Y | < 3.73 | J,Y | < 3.30 | J,Y | < 7.83 | J,Y | < 7.47 | J,Y | < 2.77 | J,Y | < 3.90 | J,Y | < 3.83 | J,Y | 0.8 | J,Y | 5.27 | J,Y | 0 | 6 | 13 |
| 111842 | P2CSPA02-30-01 | 17.10% | 42 | | 3.35 | J,Y | 23.5 | J | < 14.4 | J,Y | 34.5 | J | 15.8 | J | 6.77 | J,Y | 90.2 | | 201 | | 180 | | 2410 | | 25 | 33 | 40 |
| 111843 | P2CSPB03-05-01 | 14.40% | 384 | | 55.4 | | 214 | | 48.6 | | 644 | | 164 | | 65.9 | | 1300 | | 2110 | | 2060 | | 20000 | | 352 | 352 | 352 |
| 111844 | P2CSPB03-10-01 | 13.60% | 305 | | 91.9 | | 190 | | 61.7 | | 317 | | 213 | | 79 | | 1520 | | 2820 | | 2950 | | 29300 | | 373 | 373 | 373 |
| 111845 | P2CSPB03-15-01 | 14.90% | 475 | | 84 | | 265 | | 56.1 | | 1060 | | 185 | | 75.3 | | 1720 | | 2460 | | 3180 | | 26100 | | 473 | 473 | 473 |
| 111846 | P2CSPB03-30-01 | 13.90% | 345 | | 110 | | 219 | | 75.7 | | 482 | | 230 | | 94 | | 1710 | | 2760 | | 3030 | | 27900 | | 441 | 441 | 441 |
| 111847 | P2CSPC02-30-01 | 15.10% | 177 | | 62.2 | | 123 | | 41.6 | | 203 | | 123 | | 51.6 | | 1080 | | 1480 | | 1280 | | 14300 | | 238 | 238 | 238 |
| 111848 | P2CSPC03-30-01 | 16.20% | 273 | | 112 | | 182 | | 84.3 | | 298 | | 229 | | 95.2 | | 1400 | | 2510 | | 2410 | | 23500 | | 406 | 406 | 406 |
| 111849 | P2CSPC03-30-02 | 15.70% | 270 | | 108 | | 179 | | 77.4 | | 283 | | 203 | | 82.2 | | 1580 | | 2400 | | 2520 | | 22500 | | 389 | 389 | 389 |
| 111850 | P2CSPD02-30-01 | 17.50% | 34.5 | | 14.1 | J | 16.7 | J | 10.1 | J,Y | 35.3 | J | 37.9 | J | 15.4 | J | 216 | | 391 | | 412 | | 4300 | | 51 | 51 | 51 |
| 111851 | P2CSPDDD-30-01 | 17.50% | 30.8 | | 7.81 | J | 20.2 | J | 7.61 | J,Y | 28.8 | J | 24.9 | J | 10.1 | J | 116 | | 254 | | 247 | | 2900 | | 37 | 37 | 37 |
| 111852 | P2CSPDDD-30-02 | 17.00% | 46.7 | | 10.8 | J | 29.6 | J | 12.3 | J | 48.9 | J | 34.5 | J | 20.1 | J | 190 | | 403 | | 369 | | 4570 | | 57 | 57 | 57 |
| 111853 | P2CSPDDD-30-03 | 16.80% | 44.7 | | 9.88 | J,Y | 32.1 | J | 8.44 | J,Y | 43.8 | J | 30.3 | J | 19.6 | J | 177 | | 359 | | 437 | | 4170 | | 51 | 51 | 51 |
| 111854 | P2CSSAAA-30-02 | 16.10% | 493 | | 47.8 | | 274 | | 33.7 | J | 428 | | 102 | | 41.4 | | 1790 | | 1240 | | 1800 | | 12800 | | 320 | 320 | 320 |
| 111855 | P2CSSAAA-60-01 | 16.00% | 175 | | 56.9 | | 103 | | 39.5 | | 163 | | 106 | | 48.2 | | 889 | | 1380 | | 1300 | | 13500 | | 214 | 214 | 214 |
| 111856 | P2CSSAAA-60-02 | 16.40% | 188 | | 66.7 | | 108 | | 44.8 | | 178 | | 126 | | 49.4 | | 792 | | 1420 | | 1360 | | 13700 | | 236 | 236 | 236 |
| 111857 | P2CSSAAA-60-03 | 16.80% | 171 | | 56.5 | | 95.9 | | 35.5 | | 152 | | 110 | | 48.4 | | 742 | | 1360 | | 1210 | | 13500 | | 204 | 204 | 204 |
| 11P033 | OPR 11/01/11 | 0.0% | 351 | | 352 | | 855 | | 893 | | 1780 | | 1730 | | 865 | | 841 | | 866 | | 1820 | | 1730 | | 2090 | 2090 | 2090 |
| 11M197 | Method blank 11/01/11 | 0.0% | < 2.20 | J,Y | 1.43 | J,Y | < 3.70 | J,Y | < 3.27 | J,Y | < 7.27 | J,Y | < 6.60 | J,Y | 0.567 | J | < 3.47 | J,Y | < 3.00 | J,Y | < 8.77 | J,Y | 11 | J | 2 | 5 | 8 |
| 111858 | P2ISPA01-01-01 | 19.5% | 12.2 | J | 4.2 | J,Y | 5.12 | J,Y | < 12.5 | J,Y | 14.3 | J | 13 | J | 8.03 | J | 99.1 | | 199 | | 209 | | 2460 | | 15 | 22 | 28 |
| 111859 | P2ISPA01-01-02 | 18.4% | 13.9 | J | 5.25 | J | 4.75 | J,Y | < 14.5 | J,Y | 19.6 | J | 14.8 | J,Y | 8 | J,Y | 69.7 | | 222 | | 195 | | 2710 | | 17 | 25 | 32 |
| 111860 | P2ISPA01-01-03 | 17.7% | 16.4 | J,Y | 14.5 | J | 3.21 | J,Y | < 15.1 | J,Y | 19.5 | J | 18.2 | J,Y | 8.91 | J | 78 | | 197 | | 168 | | 3200 | | 27 | 35 | 43 |
| 111861 | P2ISPA01-01-04 | 17.0% | 18.5 | J | 7.01 | J | 9.66 | J,Y | < 14.9 | J,Y | 21.6 | J,Y | 17.1 | J | 8.77 | J | 71.4 | | 208 | | 185 | | 3060 | | 21 | 29 | 37 |
| 111862 | P2ISPA01-01-05 | 19.4% | 28 | | 3.79 | J,Y | 10.3 | J,Y | < 15.1 | J,Y | 25 | J | 14.9 | J,Y | 11.7 | J | 80.1 | Y | 295 | | 267 | | 3840 | | 21 | 29 | 37 |
| 111863 | P2ISPA01-01-06 | 16.7% | 21.4 | J | 4.08 | J | 7.81 | J,Y | < 16.3 | J,Y | 21.2 | J | 15.9 | J | 10.6 | J | 72.8 | | 245 | | 222 | | 3590 | | 19 | 27 | 36 |
| 111864 | P2ISPD04-01-01 | 16.6% | 14.6 | J | 10.3 | J,Y | 12.9 | J,Y | 18.4 | J,Y | 33.8 | J | 41.4 | J | 20.2 | J | 170 | | 338 | | 390 | | 4090 | | 53 | 53 | 53 |
| 111865 | P2ISPD04-01-02 | 17.5% | 72.1 | | 17.9 | J,Y | 34.7 | J,Y | 25.5 | J | 91.5 | J | 71.6 | J | 26.4 | J | 568 | | 634 | | 816 | | 6990 | | 99 | 99 | 99 |
| 111866 | P2ISPD04-01-03 | 13.8% | 74.5 | | 10.6 | J,Y | 59 | | 13.7 | J,Y | 91.9 | J | 55.1 | J | 17.9 | J | 483 | | 487 | | 653 | | 5490 | | 81 | 81 | 81 |
| 111867 | P2ISPD04-01-04 | 16.6% | 7.77 | J,Y | 6.33 | J,Y | < 16.1 | J,Y | < 13.9 | J,Y | 15.5 | J | 19.3 | J | 10 | J,Y | 108 | | 256 | | 259 | | 3030 | | 17 | 27 | 37 |
| 111868 | P2ISPD04-01-05 | 15.9% | 69.9 | | 10.1 | J,Y | 30.6 | J,Y | 6.24 | J,Y | 65.9 | J | 36.2 | J | 20.2 | J | 301 | | 477 | | 571 | | 5440 | | 57 | 57 | 57 |
| 111869 | P2ISPD04-01-06 | 16.7% | 75.4 | | 5.32 | J,Y | 31.3 | J | 5.2 | J,Y | 76.9 | J | 24.1 | J,Y | 12.4 | J,Y | 184 | | 327 | | 332 | | 4510 | | 48 | 48 | 48 |
| 111870 | P2ISPD04-01-07 | 14.4% | 24.5 | | 5.06 | J,Y | 14.7 | J | 9.34 | J | 30.7 | J | 28.2 | J | 11.7 | J,Y | 144 | | 328 | | 302 | | 4020 | | 36 | 36 | 36 |
| 111871 | P2ISPD04-01-08 | 16.3% | 19.9 | J | 10.1 | J | 9.09 | J,Y | 14.2 | J | 26.1 | J | 23.8 | J | 15.4 | J | 137 | | 312 | | 311 | | 3770 | | 43 | 43 | 43 |
| 111872 | P2ISPD04-01-09 | 17.5% | 20.3 | J | 10.4 | J,Y | 10.1 | J,Y | 9.68 | J,Y | 26.7 | J | 36.4 | J | 19.5 | J,Y | 144 | | 331 | | 324 | | 3410 | | 41 | 41 | 41 |
| 111873 | P2ISPD04-01-10 | 17.0% | 23.2 | J | 8.68 | J | 13.2 | J,Y | 10.2 | J,Y | 24.8 | J | 26.7 | J | 15.8 | J | 131 | | 266 | | 269 | | 2900 | | 39 | 39 | 39 |

**Attachment 2**
**Phase 2 Analytical Data**

**MAS 8280**

**Fast Analysis**

| Lab ID | sample description | moisture [%] | 2378-TCDF [ng/kg d.w.] | flag | 2378-TCDD [ng/kg d.w.] | flag | 23478-PeCDF [ng/kg d.w.] | flag | 12378-PeCDD [ng/kg d.w.] | flag | 1234(6)78-HxCDF [ng/kg d.w.] | flag | 1234(6)78-HxCDD [ng/kg d.w.] | flag | 123789-HxCDD [ng/kg d.w.] | flag | 1234678-HpCDF [ng/kg d.w.] | flag | 1234678-HpCDD [ng/kg d.w.] | flag | OCDF [ng/kg d.w.] | flag | OCDD [ng/kg d.w.] | flag | ETEQ (ND=0) | ETEQ (ND=0.5 LoD) | ETEQ (ND=LoD) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11P034 | OPR 11/01/11 | 0.00% | 361 | | 376 | | 866 | | 928 | | 1800 | | 1760 | | 883 | | 848 | | 866 | | 1860 | | 1800 | | 2163 | 2163 | 2163 |
| 11M198 | Method blank 11/01/11 | 0.00% | < 1.57 | J,Y | < 5.73 | J,Y | < 2.87 | J,Y | < 3.17 | J,Y | < 6.83 | J,Y | < 7.47 | J,Y | < 2.83 | J,Y | < 4.03 | J,Y | < 3.70 | J,Y | < 12.5 | J,Y | < 12.5 | J,Y | 0 | 6 | 12 |
| 111874 | P2CSPA03-05-01 | 17.4% | 66.7 | | 9.58 | J,Y | 44.6 | | 6.76 | J,Y | 63.3 | | 31.4 | J | 12.8 | J | 252 | | 330 | | 438 | | 3600 | | 57 | 57 | 57 |
| 111875 | P2CSPA03-10-01 | 19.0% | 34.3 | | 7.37 | J | 19.6 | J,Y | 4.91 | J | 28.9 | J,Y | 21.2 | J,Y | 8.92 | J | 135 | | 303 | | 310 | | 4910 | | 35 | 35 | 35 |
| 111876 | P2CSPA03-15-01 | 17.9% | 44 | | 7.15 | J | 24.9 | Y | 4.33 | J,Y | 35.9 | J | 23.3 | J | 6.21 | J | 163 | | 358 | | 441 | | 4770 | | 39 | 39 | 39 |
| 111877 | P2CSPA03-30-01 | 18.1% | 45.1 | | 7.57 | J | 25.4 | | 4.14 | J,Y | 37.3 | J | 19.6 | J,Y | 9.91 | J | 143 | | 309 | | 367 | | 4910 | | 38 | 38 | 38 |
| 111878 | P2CSPD01-10-01 | 17.0% | 74.2 | | 9.53 | | 34.7 | | 10.8 | J | 45.8 | | 29.2 | J | 17.1 | | 148 | | 429 | | 396 | | 5120 | | 58 | 58 | 58 |
| 111879 | P2ISPB02-01-01 | 14.3% | 584 | | 53.7 | | 320 | | 12.9 | J,Y | 455 | | 127 | | 46.7 | | 1440 | Y | 1110 | | 1380 | | 11700 | | 329 | 329 | 329 |
| 111880 | P2ISPB02-01-02 | 9.7% | 112 | | 40.5 | | 62.3 | | 22.8 | J | 87.2 | | 68.8 | J | 30.2 | | 251 | | 1130 | | 728 | | 12600 | | 137 | 137 | 137 |
| 111881 | P2ISPB02-01-03 | 13.6% | 746 | | 23.9 | | 393 | | 18.5 | J | 546 | | 71.4 | J | 21.5 | J | 861 | | 551 | | 1260 | | 5320 | | 331 | 331 | 331 |
| 111882 | P2ISPB02-01-04 | 14.1% | 445 | | 79.8 | | 242 | | 59.4 | | 329 | | 122 | | 51.3 | | 788 | | 1400 | | 1380 | | 13400 | | 350 | 350 | 350 |
| 111883 | P2ISPB02-01-05 | 17.6% | 317 | | 150 | | 200 | | 88.9 | | 348 | | 223 | | 82.6 | Y | 1660 | | 2530 | | 3480 | | 26200 | | 469 | 469 | 469 |
| 111884 | P2ISPB02-01-06 | 12.8% | 176 | | 124 | | 122 | | 75.7 | | 195 | | 188 | | 75.6 | | 963 | | 2270 | | 2250 | | 21300 | | 356 | 356 | 356 |
| 111885 | P2ISPB02-01-07 | 15.8% | 318 | | 139 | | 202 | | 93.4 | | 387 | | 261 | | 93.6 | | 2600 | | 2790 | | 3140 | | 27100 | | 485 | 485 | 485 |
| 111886 | P2ISPB02-01-08 | 14.2% | 629 | | 90 | | 376 | | 57.6 | J,Y | 453 | | 205 | | 73.2 | | 1320 | | 2440 | | 2250 | | 24500 | | 464 | 464 | 464 |
| 111887 | P2ISPB02-01-09 | 12.7% | 851 | | 41.4 | Y,W | 501 | | 35 | J,Y | 880 | | 156 | J | 67.7 | | 1530 | | 1810 | | 1660 | | 16700 | | 484 | 484 | 484 |
| 111889 | P2CSPAAA-30-01 | 17.6% | 31.2 | | 7.48 | J | 12.7 | J | 4.4 | J,Y | 31.4 | J | 19.3 | J | 8.41 | J | 129 | | 267 | | 278 | | 3070 | | 31 | 31 | 31 |
| 111890 | P2CSPAAA-30-02 | 17.8% | 30.4 | | 4.02 | J,Y | 14 | J,Y | 2.87 | J,Y | 32.9 | J | 16.1 | J,Y | 6.58 | J | 84.5 | | 189 | | 185 | | 2460 | | 24 | 24 | 24 |
| 11P035 | OPR 11/02/11 | 0.00% | 368 | | 356 | | 905 | | 912 | | 1800 | | 1800 | | 859 | | 864 | | 876 | | 1900 | | 1940 | | 2142 | 2142 | 2142 |
| 11M200 | Method blank 11/02/11 | 0.00% | < 2.73 | J,Y | < 8.50 | J,Y | < 5.10 | J,Y | < 5.03 | J,Y | < 10.3 | J,Y | < 9.10 | J,Y | < 3.47 | J,Y | < 4.57 | J,Y | < 4.37 | J,Y | < 10.4 | J,Y | < 11.3 | J,Y | 0 | 9 | 19 |
| 111898 | P2CSPA01-30-01 | 20.10% | 37.9 | | 5.2 | J | 21.5 | | < 5.82 | J,Y | 32.1 | J | 13.5 | J | 8.17 | J | 81 | | 244 | | 211 | | 3250 | | 26 | 29 | 32 |
| 111899 | P2CSPA01-30-02 | 19.50% | 40.8 | | < 8.85 | J,Y | 22.7 | | < 6.56 | J,Y | 32.1 | J | 15.2 | J | < 6.96 | J,Y | 61.3 | Y | 258 | | 233 | | 3680 | | 21 | 29 | 38 |
| 111900 | P2CSPC03-15-03 | 15.90% | 253 | | 121 | | 195 | | 61.4 | | 296 | | 180 | | 79.2 | | 1240 | | 2160 | | 2360 | | 23700 | | 382 | 382 | 382 |
| 111901 | P2CSPC04-15-01 | 15.90% | 229 | | 82 | | 219 | | 55.2 | Y | 238 | | 157 | | 65.7 | | 1530 | Y | 1920 | | 2180 | | 19000 | | 329 | 329 | 329 |
| 111902 | P2CSPC04-30-01 | 16.00% | 442 | | 69.3 | | 267 | | 53 | Y | 308 | | 148 | | 63.5 | | 1480 | | 1860 | | 2020 | | 19800 | | 356 | 356 | 356 |
| 111903 | P2CSPD02-10-01 | 16.90% | 43.7 | | 10 | | 28.1 | | < 6.07 | J,Y | 36.7 | J | 25.7 | J | 9.81 | J,Y | 244 | | 367 | | 406 | | 4380 | | 39 | 43 | 46 |
| 111904 | P2CSPD04-15-03 | 15.90% | 33.7 | | 8.46 | | 25.3 | | < 5.79 | J,Y | 39.8 | | 26.4 | J | 14.2 | J | 144 | | 333 | | 361 | | 4030 | | 35 | 38 | 41 |
| 111905 | P2ISPA01-01-07 | 17.10% | 37.1 | | < 8.64 | J,Y | 19.6 | | 5.67 | J,Y | 24.8 | J | < 13.0 | J,Y | < 6.18 | J,Y | 50.3 | Y | 204 | | 178 | | 3000 | | 22 | 28 | 33 |
| 111906 | P2ISPA01-01-08 | 20.90% | 26.3 | | < 10.1 | J,Y | 16.9 | J | < 6.67 | J,Y | 23.9 | J | 18.4 | J | < 6.90 | J,Y | 83.9 | | 296 | | 264 | | 4340 | | 18 | 27 | 36 |
| 111907 | P2ISPA01-01-09 | 14.80% | 176 | | 8.02 | J | 99.1 | | < 7.72 | J,Y | 114 | | 34.6 | J | 19.2 | J | 307 | Y | 574 | | 528 | | 6720 | | 87 | 91 | 95 |
| 111908 | P2ISPA01-01-10 | 9.50% | 32 | | < 8.16 | J,Y | 17 | J | < 5.96 | J,Y | 17.6 | J | < 9.76 | J,Y | < 6.00 | J,Y | 17.2 | J | 45.2 | | 47 | J | 519 | | 11 | 20 | 28 |
| 111909 | P2CSPAAA-15-01 | 17.50% | 26.1 | | 5.32 | J,Y | 17.7 | J | < 7.49 | J,Y | 25.6 | J | 19 | J | < 6.65 | J,Y | 91.7 | | 420 | | 491 | | 3520 | | 25 | 30 | 34 |
| 111910 | P2CSPAAA-15-02 | 17.90% | 29.1 | | < 10.7 | J,Y | 17.9 | J | < 7.64 | J,Y | 23.6 | J | < 16.6 | J,Y | < 7.76 | J,Y | 89.5 | | 242 | | 233 | | 2960 | | 16 | 27 | 37 |
| 111911 | P2CSPAAA-15-03 | 18.30% | 28.6 | | < 11.3 | J,Y | 17.1 | J | < 7.03 | J,Y | 26.7 | J | 19.2 | J | < 6.77 | J,Y | 85.8 | | 245 | | 231 | | 3090 | | 18 | 28 | 38 |
| 111912 | P2CSSAAA-15-02 | 14.80% | 142 | | 31.4 | | 90.3 | | 26.4 | | 127 | | 77.8 | | 35.5 | | 522 | | 1010 | | 853 | | 10300 | | 149 | 149 | 149 |
| 111913 | P2CSSAAA-15-03 | 14.90% | 132 | | 28.8 | | 88.9 | | < 6.85 | J,Y | 105 | | 74.6 | | 34.1 | | 581 | | 983 | | 840 | | 11100 | | 114 | 119 | 122 |
| 11P036 | OPR 11/03/11 | 0.0% | 326 | | 339 | | 800 | | 826 | | 1620 | | 1600 | | 791 | | 784 | | 790 | | 1680 | | 1600 | | 1943 | 1943 | 1943 |
| 11M201 | Method blank 11/03/11 | 0.0% | < 2.27 | J,Y | < 5.63 | J,Y | < 4.20 | J,Y | < 4.27 | J,Y | < 9.63 | J,Y | < 8.90 | J,Y | < 4.13 | J,Y | < 5.63 | J,Y | < 5.80 | J,Y | < 16.0 | J,Y | < 21.2 | J,Y | 0 | 7 | 14 |
| 111914 | P2CSPC03-05-03 | 15.0% | 197 | | 123 | | 142 | | 68.5 | J | 218 | J | 178 | J | 85.6 | J | 1150 | | 2120 | | 2330 | | 23900 | | 359 | 359 | 359 |
| 111915 | P2CSPC03-10-01 | 16.1% | 326 | | 118 | | 187 | | 70.8 | J | 307 | | 193 | J | 79 | J | 1490 | | 2250 | | 2470 | | 23100 | | 400 | 400 | 400 |
| 111916 | P2CSPC03-10-02 | 15.2% | 254 | | 105 | | 148 | | 81.7 | J | 271 | | 215 | J | 84.4 | J | 1500 | | 2200 | | 2490 | | 20800 | | 375 | 375 | 375 |
| 111917 | P2CSPC03-10-03 | 16.4% | 308 | | 122 | | 196 | | 68.1 | J | 285 | | 209 | J | 89.2 | J | 1600 | | 2290 | | 2540 | | 22700 | | 403 | 403 | 403 |
| 111918 | P2CSPD03-15-01 | 17.4% | 37.9 | | 7.58 | J | 22.4 | J | < 11.8 | J,Y | 35.2 | J | 23 | J | 12.2 | J | 156 | | 333 | | 356 | | 3930 | | 33 | 39 | 45 |
| 111919 | P2CSPD04-05-02 | 16.0% | 38.3 | | 13.2 | J | 41.9 | J | 124 | | 171 | | 195 | | 114 | | 265 | | 559 | | 421 | | 4410 | | 222 | 222 | 222 |
| 111920 | P2ISPC03-01-01 | 20.1% | 312 | | 120 | | 201 | | 90.8 | J | 409 | | 256 | J | 104 | J | 2370 | | 2560 | | 2960 | | 26200 | | 459 | 459 | 459 |
| 111921 | P2ISPC03-01-02 | 18.9% | 401 | | 147 | | 281 | | 118 | J | 512 | | 393 | | 148 | | 3090 | | 3980 | | 4890 | | 37700 | | 608 | 608 | 608 |
| 111922 | P2ISPC03-01-03 | 14.4% | 190 | | 104 | | 115 | | 49.3 | J | 196 | | 147 | | 67.9 | | 1020 | | 1860 | | 1710 | | 18900 | | 297 | 297 | 297 |
| 111923 | P2ISPC03-01-04 | 18.3% | 258 | | 187 | | 183 | | 86.1 | J | 284 | | 273 | J | 117 | J | 2030 | | 2790 | | 3030 | | 26400 | | 503 | 503 | 503 |
| 111924 | P2ISPC03-01-05 | 17.5% | 262 | | 127 | | 146 | W | 77.3 | J | 322 | | 238 | J | 103 | | 1810 | | 2510 | | 3120 | | 25200 | | 412 | 412 | 412 |
| 111925 | P2ISPC03-01-06 | 12.8% | 205 | | 53.4 | | 115 | | 33.9 | J | 203 | | 102 | J | 51.3 | J | 1110 | | 1370 | | 1290 | | 14500 | | 218 | 218 | 218 |
| 111926 | P2ISPC03-01-07 | 15.4% | 161 | | 213 | | 112 | | 71.1 | | 204 | | 198 | | 87.7 | | 1560 | | 2550 | | 2460 | | 25300 | | 454 | 454 | 454 |
| 111927 | P2ISPC03-01-08 | 19.2% | 322 | | 201 | | 166 | W | 110 | J | 338 | | 263 | J | 127 | | 2010 | | 3040 | | 3560 | | 30600 | | 553 | 553 | 553 |
| 111928 | P2ISPC03-01-09 | 15.6% | 216 | | 103 | | 140 | | 58.7 | J | 213 | J | 176 | J | 84.9 | J | 928 | | 2250 | | 2040 | | 24400 | | 329 | 329 | 329 |
| 111929 | P2ISPC03-01-10 | 15.5% | 355 | | 18.9 | | 180 | | < 10.9 | J,Y | 254 | | 54.6 | J | 22.3 | J | 466 | Y | 649 | | 695 | | 6770 | | 163 | 168 | 174 |

**Attachment 2**
**Phase 2 Analytical Data**

**MAS 8280**

**Fast Analysis**

| Lab ID | sample description | moisture [%] | 2378-TCDF [ng/kg d.w.] | flag | 2378-TCDD [ng/kg d.w.] | flag | 23478-PeCDF [ng/kg d.w.] | flag | 12378-PeCDD [ng/kg d.w.] | flag | 1234(6)78-HxCDF [ng/kg d.w.] | flag | 1234(6)78-HxCDD [ng/kg d.w.] | flag | 123789-HxCDD [ng/kg d.w.] | flag | 1234678-HpCDF [ng/kg d.w.] | flag | 1234678-HpCDD [ng/kg d.w.] | flag | OCDF [ng/kg d.w.] | flag | OCDD [ng/kg d.w.] | flag | ETEQ (ND=0) | ETEQ (ND=0.5 LoD) | ETEQ (ND=LoD) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11P038 | OPR 11/08/11 | 0.00% | 349 | | 343 | | 845 | | 864 | | 1720 | | 832 | | 802 | | 820 | | 1780 | | 1720 | | 2027 | 2027 | 2027 |
| 11M204 | Method blank 11/08/11 | 0.00% | < 2.43 | J,Y | < 7.10 | J,Y | < 4.00 | J,Y | < 3.57 | J,Y | < 9.13 | J,Y | < 8.83 | J,Y | < 3.27 | J,Y | < 4.37 | J,Y | < 4.07 | J,Y | < 11.2 | J,Y | 6.43 | J,Y | 0 | 8 | 15 |
| 111938 | P2CSPC03-15-01 | 15.80% | 293 | | 113 | | 176 | | 60.9 | J,Y | 306 | | 189 | J | 93.4 | | 1290 | | 2280 | | 2490 | | 24400 | | 376 | 376 | 376 |
| 111939 | P2CSPC03-15-02 | 16.10% | 285 | | 117 | | 148 | Y | 72.2 | J | 314 | | 201 | J | 94.5 | | 1640 | | 2420 | | 2750 | | 30600 | | 393 | 393 | 393 |
| 111940 | P2CSPD01-05-01 | 16.30% | 69.8 | | 9.58 | J | 36.7 | J | < 14.1 | J,Y | 51.1 | J | 28.1 | J | 14.9 | J,Y | 161 | | 349 | | 392 | | 3860 | | 45 | 53 | 60 |
| 111941 | P2CSPD01-15-01 | 16.30% | 99 | | 8.02 | J,Y | 38.8 | J | < 14.1 | J,Y | 45.5 | J | 24.4 | J,Y | 15.1 | J,Y | 151 | | 346 | | 364 | Y | 4290 | | 47 | 54 | 61 |
| 111942 | P2CSPD02-15-01 | 17.20% | 45.9 | | 18.8 | J,Y | 32.7 | J | 16.8 | J | 51.1 | J | 32.3 | J | 20.2 | J | 234 | | 387 | | 408 | | 4670 | | 71 | 71 | 71 |
| 111943 | P2CSPD03-05-01 | 17.40% | 39.3 | | 10.5 | J,Y | 28.8 | J,Y | < 14.6 | J,Y | 50.6 | J | 32.9 | J | 19.2 | J | 204 | Y | 409 | | 440 | | 4860 | | 43 | 51 | 58 |
| 111944 | P2CSPD03-10-01 | 16.90% | 32.6 | | 8.06 | J,Y | 17.8 | J,Y | 13.3 | J | 40.5 | J | 30 | J | 19.1 | J | 184 | | 380 | | 398 | | 4960 | | 49 | 49 | 49 |
| 111945 | P2CSPD03-30-01 | 16.00% | 87 | | 6.22 | J,Y | 45.5 | J | < 15.8 | J,Y | 83.2 | J | 32.8 | J | 24.5 | J | 227 | | 339 | | 365 | | 3750 | | 52 | 60 | 69 |
| 111946 | P2CSPD04-05-01 | 15.90% | 39.3 | | 7.34 | J,Y | 29.9 | J,W | < 14.7 | J,Y | 49.7 | J | 29 | J,Y | 16.7 | J | 206 | | 375 | | 392 | | 4940 | | 39 | 47 | 54 |
| 111947 | P2CSPD04-05-03 | 16.20% | 26.5 | | 7.41 | J | 22 | J | < 14.2 | J,Y | 32.4 | J | 28.1 | J | 16.5 | J | 171 | | 315 | | 329 | | 3830 | | 32 | 39 | 47 |
| 111948 | P2CSPD04-10-01 | 16.10% | 36.2 | | 6.22 | J,Y | 27.6 | J | 12.9 | J,Y | 47.9 | J | 40.5 | J | 21.8 | J,Y | 245 | | 371 | | 390 | | 5170 | | 52 | 52 | 52 |
| 111949 | P2CSPAAA-05-01 | 18.90% | 23.9 | | 8.13 | J | 12.1 | J,Y | < 10.4 | J,Y | 27.4 | J | 17.3 | J | 7.97 | J | 85.8 | | 203 | | 174 | | 2660 | | 24 | 30 | 35 |
| 111950 | P2CSPAAA-05-02 | 17.40% | 22.8 | | 4.99 | J,Y | 13.5 | J,Y | < 9.15 | J,Y | 22.2 | J | 14.5 | J,Y | 7.95 | J | 67.3 | Y | 192 | | 175 | | 2610 | | 20 | 25 | 30 |
| 111951 | P2CSPAAA-05-03 | 17.50% | 29.2 | | 6.69 | J | 16.4 | J,Y | < 14.8 | J,Y | 21.9 | J | 15.3 | J | 8.31 | J | 82 | | 196 | | 173 | | 2370 | | 24 | 32 | 39 |
| 111952 | P2CSPAAA-10-01 | 18.60% | 23.4 | | 6.08 | J | 13.4 | J | < 8.15 | J,Y | 21.7 | J | 14.6 | J | 5.19 | J,Y | 87.5 | | 228 | | 213 | | 3070 | | 22 | 26 | 30 |
| 111953 | P2CSPAAA-10-02 | 17.40% | 25.6 | | 4.81 | J,Y | 13.2 | J,Y | < 14.5 | J,Y | 24 | J | 15.6 | J | 9.4 | J | 83.3 | | 217 | | 203 | | 2790 | | 21 | 29 | 36 |
| 111954 | P2CSPAAA-10-03 | 17.70% | 22 | | 4.07 | J | 11.5 | J,Y | < 8.91 | J,Y | 24.4 | J | 14 | J,Y | 6.36 | J,Y | 88.5 | | 270 | | 326 | | 3840 | | 20 | 25 | 29 |
| 11P039 | OPR 11/08/11 | 0.00% | 346 | | 342 | | 794 | | 875 | | 1730 | | 1670 | | 809 | | 808 | | 831 | | 1790 | | 1740 | | 2030 | 2030 | 2030 |
| 11M205 | Method blank 11/08/11 | 0.00% | < 2.43 | J,Y | < 7.67 | J,Y | < 4.73 | J,Y | < 4.33 | J,Y | < 8.87 | J,Y | < 9.03 | J,Y | < 3.20 | J,Y | < 4.70 | J,Y | 0.967 | J,Y | < 11.2 | J,Y | 10 | J,Y | 0 | 8 | 17 |
| 111955 | P2CSPA01-30-03 | 20.30% | 57.6 | | 5.35 | J | 30.2 | | 4.89 | J,Y | 39.5 | | 15.5 | J | 7.7 | J | 99.6 | | 248 | | 234 | | 3040 | | 38 | 38 | 38 |
| 111956 | P2CSPA02-15-01 | 18.30% | 25.1 | | 4.38 | J,Y | 14 | J | < 6.87 | J,Y | 26.7 | J | 15 | J | 7.52 | J | 70.8 | Y | 216 | | 206 | | 2680 | | 21 | 24 | 28 |
| 111957 | P2CSPC03-30-03 | 16.00% | 252 | | 102 | | 183 | Y | 72.9 | Y | 287 | | 194 | | 86 | | 1490 | | 2310 | | 2550 | | 26900 | | 377 | 377 | 377 |
| 111958 | P2CSPC04-10-01 | 16.50% | 272 | | 92.7 | | 203 | | 63.6 | Y | 286 | | 172 | | 70 | | 1370 | | 1850 | | 2060 | | 18500 | | 353 | 353 | 353 |
| 111959 | P2CSPD02-05-01 | 17.30% | 71 | | 12.2 | Y | 42 | | 12.1 | J,Y | 55.7 | | 36.6 | J | 15 | J,Y | 281 | | 369 | | 471 | | 4240 | | 66 | 66 | 66 |
| 111960 | P2CSPD04-15-01 | 16.20% | 39.3 | | 8.58 | J,Y | 28.3 | | 13.2 | J,Y | 44.1 | | 31 | J | 15 | J | 222 | | 347 | | 403 | | 4090 | | 53 | 53 | 53 |
| 111961 | P2CSPD04-15-02 | 16.00% | 40.2 | | 9.53 | | 29.2 | | 13.8 | J | 63.7 | | 31.8 | J | 17.2 | J | 246 | | 371 | | 445 | | 4400 | | 58 | 58 | 58 |
| 111962 | P2CSPD04-30-03 | 16.20% | 39 | | 12.9 | | 105 | | 15.6 | J | 132 | | 49.2 | | 23.6 | | 329 | | 445 | | 453 | | 5020 | | 99 | 99 | 99 |
| 111963 | P2CSPDDD-05-01 | 18.00% | 36.1 | | 11.9 | | 25.5 | | 11.1 | J,Y | 40.6 | J,Y | 33.7 | J | 14 | J,Y | 207 | | 464 | | 414 | | 9230 | | 55 | 55 | 55 |
| 111964 | P2CSPDDD-05-03 | 17.10% | 39.4 | | 10.4 | | 33.5 | | 32.4 | | 55.9 | | 51.4 | | 29.2 | | 303 | | 400 | | 393 | | 4490 | | 83 | 83 | 83 |
| 111965 | P2CSPDDD-10-01 | 17.70% | 62.1 | | 8.57 | J,Y | 35.7 | | 10.5 | J,Y | 51.2 | | 26.4 | J,Y | 15 | J | 223 | | 425 | | 485 | | 5810 | | 56 | 56 | 56 |
| 111966 | P2CSPDDD-10-02 | 17.00% | 52.8 | | 7.52 | J,Y | 34.6 | | 13.3 | J | 55.9 | | 29.2 | J | 17.5 | J | 211 | | 401 | | 365 | | 4460 | | 57 | 57 | 57 |
| 111967 | P2CSPDDD-10-03 | 16.70% | 59.8 | | 8.93 | J,Y | 39.2 | | 9.84 | J | 54.2 | | 29.9 | J | 15.8 | J | 160 | Y | 396 | | 427 | | 4570 | | 56 | 56 | 56 |
| 111968 | P2CSPDDD-15-01 | 18.00% | 44 | | 8.8 | | 26.7 | | 7.9 | J | 41.7 | J | 21.9 | J,Y | 12.4 | J | 141 | | 323 | | 348 | | 3920 | | 45 | 45 | 45 |
| 111969 | P2CSSAAA-30-01 | 16.50% | 632 | | 46.4 | | 372 | | 36.8 | Y | 519 | | 106 | | 42.8 | | 2390 | | 1160 | | 2010 | | 11900 | | 383 | 383 | 383 |
| 111970 | P2CSSAAA-30-03 | 16.40% | 484 | | 44.6 | | 282 | | 21.5 | Y | 414 | | 98.2 | | 42.7 | | 2000 | | 1300 | | 1920 | | 13300 | | 307 | 307 | 307 |
| 11P040 | OPR 11/10/11 | 0.0% | 341 | | 323 | | 843 | | 874 | | 1670 | | 1640 | | 814 | | 787 | | 792 | | 1780 | | 1670 | | 2010 | 2010 | 2010 |
| 11M207 | Method blank 11/10/11 | 0.0% | < 3.80 | J,Y | < 10.2 | J,Y | < 7.50 | J,Y | < 6.10 | J,Y | < 16.1 | J,Y | < 18.4 | J,Y | < 7.50 | J,Y | < 8.87 | J,Y | < 9.00 | J,Y | < 27.6 | J,Y | < 29.5 | J,Y | 0 | 12 | 25 |
| 111975 | P2CSPA02-05-01 | 22.8% | 23.6 | | 3.08 | J,Y | 12.3 | J,Y | < 6.78 | J,Y | 21.2 | J | 14.5 | J,Y | 6.12 | J | 82.4 | | 217 | | 203 | | 2840 | | 18 | 22 | 25 |
| 111976 | P2CSPA02-10-01 | 18.3% | 18.1 | | 4.63 | J | 9.59 | J,Y | < 7.27 | J,Y | 22.5 | J | 23.1 | J | 8.11 | J,Y | 104 | | 773 | | 530 | | 8910 | | 28 | 31 | 35 |
| 111977 | P2CSPC01-05-01 | 14.0% | 218 | | 53 | Y | 164 | | 47.9 | Y | 220 | | 120 | | 58.7 | | 1030 | | 1620 | | 1550 | | 17800 | | 256 | 256 | 256 |
| 111978 | P2CSPC01-10-01 | 17.3% | 256 | | 75.9 | | 205 | | 52.4 | Y | 285 | | 164 | | 62.1 | | 1390 | | 2090 | | 2300 | | 20900 | | 323 | 323 | 323 |
| 111979 | P2CSPC01-15-01 | 15.7% | 274 | | 63.5 | | 193 | | 53.3 | Y | 295 | | 157 | | 74.1 | | 1370 | | 1710 | | 1900 | | 17900 | | 306 | 306 | 306 |
| 111980 | P2CSPC03-05-01 | 15.8% | 190 | | 116 | | 163 | | 65 | Y | 250 | | 177 | | 82.1 | | 1100 | | 2200 | | 2440 | | 22300 | | 357 | 357 | 357 |
| 111981 | P2CSPC03-05-02 | 14.6% | 180 | | 108 | | 156 | | 74 | | 245 | | 189 | | 82.6 | | 1210 | | 2350 | | 2410 | | 25200 | | 360 | 360 | 360 |
| 111982 | P2CSPC04-05-01 | 17.2% | 241 | | 64.9 | Y | 207 | | 70.6 | | 256 | | 156 | | 69.1 | | 1430 | | 2000 | | 2210 | | 21300 | | 327 | 327 | 327 |
| 111983 | P2CSPD01-30-01 | 16.4% | 80.2 | | 10.1 | | 33.7 | Y | < 6.78 | J,Y | 47.1 | J,Y | 27.8 | J | 13.6 | J,Y | 115 | Y | 333 | | 356 | | 4230 | | 45 | 49 | 52 |
| 111984 | P2CSPD04-10-02 | 16.6% | 31.5 | | 8.9 | J | 26.3 | | 8.31 | J,Y | 47.3 | | 36.5 | J | 18.8 | J,Y | 207 | | 350 | | 418 | | 4470 | | 48 | 48 | 48 |
| 111985 | P2CSPD04-10-03 | 15.7% | 38.6 | | 7.4 | J,Y | 31.1 | | 7.07 | J,Y | 48.8 | | 26.8 | J,Y | 16 | J,Y | 214 | | 391 | | 455 | | 4980 | | 47 | 47 | 47 |
| 111986 | P2CSPAAA-30-03 | 17.5% | 33.1 | | 4.41 | J,Y | 21.4 | J | < 6.51 | J,Y | 27.8 | J | 15.5 | J,Y | 7.35 | J | 65.2 | Y | 260 | | 277 | | 4450 | | 25 | 29 | 32 |
| 111987 | P2CSPDDD-05-02 | 17.2% | 42.5 | | 9.55 | | 26.6 | | 23.5 | Y | 41 | J | 29.1 | J,Y | 14.6 | J,Y | 259 | Y | 367 | | 420 | | 4870 | | 65 | 65 | 65 |
| 111988 | P2CSPDDD-15-02 | 18.1% | 59.8 | | 6.32 | J | 35.7 | | 8.61 | J | 52.3 | | 31.9 | J,Y | 11.9 | J | 198 | | 500 | | 522 | | 6010 | | 53 | 53 | 53 |
| 111989 | P2CSPDDD-15-03 | 17.9% | 43.9 | | 5.87 | J,Y | 27.2 | Y | 7 | J,Y | 41.8 | J | 24.8 | J | 10.1 | J,Y | 159 | | 358 | | 394 | | 4640 | | 42 | 42 | 42 |
| 111990 | P2CSSAAA-15-01 | 15.6% | 122 | | 26.7 | | 82.9 | | 10.3 | J,Y | 123 | | 68.5 | Y | 24.6 | Y | 642 | | 1050 | | 969 | | 12200 | | 123 | 123 | 123 |

**Attachment 2**
**Phase 2 Analytical Data**

**MAS 8280**

**Fast Analysis**

| Lab ID | sample description | moisture [%] | 2378-TCDF [ng/kg d.w.] | flag | 2378-TCDD [ng/kg d.w.] | flag | 23478-PeCDF [ng/kg d.w.] | flag | 12378-PeCDD [ng/kg d.w.] | flag | 1234(6)78-HxCDF [ng/kg d.w.] | flag | 1234(6)78-HxCDD [ng/kg d.w.] | flag | 123789-HxCDD [ng/kg d.w.] | flag | 1234678-HpCDF [ng/kg d.w.] | flag | 1234678-HpCDD [ng/kg d.w.] | flag | OCDF [ng/kg d.w.] | flag | OCDD [ng/kg d.w.] | flag | ETEQ (ND=0) | ETEQ (ND=0.5 LoD) | ETEQ (ND=LoD) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11P041 | OPR 11/14/11 | 0.0% | 338 | | 332 | | 821 | | 831 | | 1660 | | 1620 | | 816 | | 807 | | 816 | | 1680 | | 1650 | | 1960 | 1960 | 1960 |
| 11M209 | Method blank 11/14/11 | 0.0% | < 3.13 | J,Y | < 9.93 | J,Y | < 6.10 | J,Y | < 5.60 | J,Y | < 13.2 | J,Y | < 12.2 | J,Y | < 4.47 | J,Y | < 6.87 | J,Y | < 6.83 | J,Y | < 20.4 | J,Y | 7 | J,Y | 0 | 11 | 22 |
| 111999 | P2CSPA01-05-01 | 20.4% | 55.3 | | 4.09 | J,Y | 31.9 | | < 6.56 | J,Y | 44.5 | J | 19.8 | J | 9.65 | J | 107 | Y | 346 | | 303 | | 4300 | | 34 | 38 | 41 |
| 112000 | P2CSPA01-05-02 | 20.3% | 63.6 | | 3.43 | J,Y | 34.6 | | < 6.56 | J,Y | 55.4 | | 20.4 | J | 8.02 | J | 145 | Y | 421 | | 315 | | 5010 | | 38 | 41 | 45 |
| 112001 | P2CSPA01-05-03 | 19.5% | 56.6 | | 3.83 | J,Y | 36.7 | | < 5.91 | J,Y | 57.5 | | 17.3 | J | 3.83 | J,Y | 137 | Y | 315 | | 269 | | 3950 | | 36 | 39 | 42 |
| 112002 | P2CSPA01-10-01 | 16.2% | 37.1 | | 5.23 | J | 19.8 | | 4.28 | J,Y | 33.6 | J | 13.7 | J,Y | 6.18 | J,Y | 86 | | 245 | | 218 | | 3130 | | 30 | 30 | 30 |
| 112003 | P2CSPA01-10-02 | 16.4% | 39.4 | | 4.36 | J | 20.5 | Y | 5.75 | J,Y | 34.2 | J | 16.6 | J | 7.49 | J,Y | 88.6 | | 245 | | 205 | | 4110 | | 32 | 32 | 32 |
| 112004 | P2CSPA01-10-03 | 16.3% | 41 | | 4.03 | J,Y | 21.8 | | < 5.89 | J,Y | 33.1 | J | 12.7 | J,Y | 3.95 | J,Y | 50.7 | Y | 244 | | 211 | | 2980 | | 25 | 28 | 31 |
| 112005 | P2CSPA01-15-01 | 19.0% | 35 | | 5.52 | J,Y | 21.4 | J | < 6.34 | J,Y | 31 | J,Y | 21.9 | J | 8.63 | J,Y | 96.8 | | 425 | | 248 | | 4780 | | 30 | 33 | 36 |
| 112006 | P2CSPA01-15-02 | 18.4% | 35.3 | | 5.01 | J | 21.2 | | 6.15 | J,Y | 31.5 | J | 17.5 | J | 8.31 | J | 84.4 | Y | 294 | | 243 | | 3720 | | 33 | 33 | 33 |
| 112007 | P2CSPA01-15-03 | 19.1% | 37.2 | | 5.85 | J | 20.9 | J | < 6.83 | J,Y | 34.2 | J | 15.6 | J | 5.11 | J,Y | 84.5 | Y | 281 | | 231 | | 3770 | | 28 | 31 | 35 |
| 112008 | P2CSPB04-05-01 | 14.9% | 532 | | 98.4 | | 260 | | 61.8 | Y | 321 | | 168 | | 63.8 | | 1220 | | 2030 | | 1850 | | 21500 | | 405 | 405 | 405 |
| 112009 | P2CSPC01-30-01 | 15.1% | 238 | | 77.5 | | 173 | Y | 66.2 | Y | 264 | | 149 | | 56.3 | | 1320 | | 1850 | | 1950 | | 22400 | | 320 | 320 | 320 |
| 112010 | P2CSPC02-05-01 | 14.6% | 175 | | 60 | | 111 | | 34.5 | Y | 175 | | 119 | | 52.9 | | 827 | | 1380 | | 1120 | | 13000 | | 216 | 216 | 216 |
| 112011 | P2CSPC02-10-01 | 14.5% | 201 | | 70.5 | | 138 | | 62.3 | Y | 236 | | 149 | | 59.9 | | 1280 | | 1560 | | 1870 | | 16600 | | 287 | 287 | 287 |
| 112012 | P2CSPC02-15-01 | 15.2% | 198 | | 76.8 | | 144 | | 56.8 | Y | 222 | | 149 | | 63.6 | | 1130 | | 1990 | | 1770 | | 19000 | | 291 | 291 | 291 |
| 112013 | P2CSPD04-30-01 | 16.6% | 46.9 | | 11.4 | | 35.2 | Y | 15.5 | J | 68.8 | | 65.3 | | 28.1 | | 305 | | 530 | | 478 | | 5410 | | 72 | 72 | 72 |
| 112014 | P2CSPD04-30-02 | 16.3% | 36.1 | | 7.82 | J,Y | 28.7 | | 11.5 | J | 47.3 | J | 32.3 | J | 17.9 | J | 262 | | 395 | | 417 | | 5160 | | 52 | 52 | 52 |
| 11P042 | OPR 11/16/11 | 0.0% | 333 | | 326 | | 835 | | 875 | | 1710 | | 1650 | | 893 | | 830 | | 835 | | 1740 | | 1720 | | 2030 | 2030 | 2030 |
| 11M210 | Method blank 11/16/11 | 0.0% | < 2.63 | J,Y | < 7.60 | J,Y | < 5.93 | J,Y | < 5.53 | J,Y | < 12.3 | J,Y | < 12.9 | J,Y | < 4.70 | J,Y | < 7.27 | J,Y | < 6.60 | J,Y | < 17.3 | J,Y | < 21.7 | J,Y | 0 | 10 | 19 |
| 112019 | P2CSPBBB-05-01 | 16.7% | 472 | | 112 | | 250 | | 72.8 | Y | 319 | | 190 | | 73.9 | | 928 | Y | 2370 | | 2560 | | 22900 | | 426 | 426 | 426 |
| 112020 | P2CSPBBB-05-02 | 16.5% | 346 | | 110 | | 219 | | 80.7 | Y | 365 | | 184 | | 73.8 | | 1200 | Y | 2120 | | 2140 | | 22400 | | 414 | 414 | 414 |
| 112021 | P2CSPBBB-05-03 | 15.7% | 333 | | 95.1 | | 211 | | 65.9 | Y | 302 | | 174 | | 68 | | 1350 | | 2070 | | 2140 | | 21100 | | 371 | 371 | 371 |
| 112022 | P2CSPBBB-10-01 | 15.8% | 461 | | 112 | | 266 | | 82.5 | Y | 356 | | 179 | | 74.2 | | 1460 | | 2320 | | 2420 | | 23800 | | 448 | 448 | 448 |
| 112023 | P2CSPCCC-05-01 | 14.8% | 194 | | 65.2 | | 148 | | 68.9 | Y | 230 | | 153 | | 60.7 | | 1010 | | 1540 | | 1630 | | 16700 | | 287 | 287 | 287 |
| 112024 | P2CSPCCC-05-02 | 14.3% | 205 | | 58.9 | | 162 | | 60.9 | Y | 218 | | 130 | | 54.2 | | 920 | | 1440 | | 1540 | | 15500 | | 271 | 271 | 271 |
| 112025 | P2CSPCCC-05-03 | 14.0% | 202 | | 67.7 | | 156 | | 62.5 | Y | 226 | | 136 | | 58.3 | | 1070 | | 1670 | | 1680 | | 18300 | | 287 | 287 | 287 |
| 112026 | P2CSPCCC-10-01 | 13.8% | 209 | | 75.9 | | 143 | Y | 75.2 | Y | 222 | | 145 | | 61.3 | | 1130 | | 1720 | | 1900 | | 18200 | | 307 | 307 | 307 |
| 112027 | P2CSPCCC-10-02 | 14.1% | 201 | | 62.7 | Y | 141 | | 65.2 | Y | 209 | | 154 | | 53.1 | Y | 896 | Y | 1740 | | 1730 | | 17200 | | 277 | 277 | 277 |
| 112028 | P2CSPCCC-10-03 | 14.1% | 223 | | 61.9 | | 151 | | 62.4 | Y | 208 | | 125 | | 45.6 | Y | 922 | | 1690 | | 1570 | | 16900 | | 275 | 275 | 275 |
| 112029 | P2CSPCCC-15-01 | 15.5% | 245 | | 85.5 | | 176 | Y | 85.4 | Y | 300 | | 190 | | 70.5 | | 1460 | | 2110 | | 2300 | | 22100 | | 364 | 364 | 364 |
| 112030 | P2CSPCCC-15-02 | 15.6% | 264 | | 85.9 | | 168 | | 81.5 | Y | 285 | | 178 | | 69.4 | | 1360 | Y | 2210 | | 2300 | | 22100 | | 357 | 357 | 357 |
| 112031 | P2CSPCCC-15-03 | 15.8% | 255 | | 86.1 | | 191 | | 70.3 | Y | 283 | | 182 | | 74.9 | | 1710 | | 2010 | | 2040 | | 20200 | | 354 | 354 | 354 |
| 112032 | P2CSPCCC-30-01 | 15.0% | 216 | | 91.9 | | 164 | | 73.4 | Y | 236 | | 178 | | 73.1 | | 1190 | | 2020 | | 2140 | | 20200 | | 340 | 340 | 340 |
| 112033 | P2CSPCCC-30-02 | 15.0% | 233 | | 85.8 | | 186 | | 68.2 | | 279 | | 160 | | 70.9 | | 1220 | | 2070 | | 2070 | | 21100 | | 340 | 340 | 340 |
| 112034 | P2CSPCCC-30-03 | 15.6% | 211 | | 83.1 | | 189 | | 81.5 | | 258 | | 170 | | 77.5 | | 1190 | | 2220 | | 2130 | | 20900 | | 351 | 351 | 351 |
| 11P043 | OPR 11/16/11 | 0.00% | 330 | | 320 | | 822 | | 812 | | 1670 | | 1620 | | 777 | | 806 | | 809 | | 1690 | | 1630 | | 1930 | 1930 | 1930 |
| 11M212 | Method blank 11/16/11 | 0.00% | < 3.03 | J,Y | < 9.53 | J,Y | < 6.00 | J,Y | < 5.43 | J,Y | < 12.6 | J,Y | < 11.4 | J,Y | < 4.20 | J,Y | 6.93 | J,Y | 17.1 | J | 16.3 | J | 198 | | 0 | 11 | 21 |
| 112048 | P2CSPA04-05-01 | 17.70% | 27.2 | | < 11.3 | J,Y | 17 | J | < 7.11 | J,Y | 27.7 | J | 14.4 | J | < 6.55 | J,Y | 104 | | 222 | | 213 | | 2750 | | 17 | 27 | 37 |
| 112049 | P2CSPA04-10-01 | 18.30% | 20.6 | | < 10.8 | J,Y | 11.9 | J,Y | < 6.76 | J,Y | 22 | J | 15.5 | J | 6.95 | J,Y | 108 | | 203 | | 194 | | 2690 | | 15 | 24 | 33 |
| 112050 | P2CSPA04-15-01 | 17.80% | 26.1 | | < 11.7 | J,Y | 17.6 | J | < 7.43 | J,Y | 29 | J | 18.6 | J | < 6.56 | J,Y | 133 | | 222 | | 212 | | 2540 | | 18 | 28 | 39 |
| 112051 | P2CSPA04-30-01 | 16.50% | 18.4 | | < 11.4 | J,Y | 14 | J | < 7.09 | J,Y | 24.4 | J | 13.8 | J | < 6.34 | J,Y | 109 | | 162 | | 164 | | 1880 | | 14 | 24 | 34 |
| 112052 | P2CSPB04-10-01 | 14.20% | 274 | | 91.8 | | 176 | | 63.3 | Y | 251 | | 163 | | 62.9 | | 1080 | Y | 2210 | | 2150 | | 22000 | | 339 | 339 | 339 |
| 112053 | P2CSPB04-15-01 | 14.20% | 637 | | 98.8 | | 291 | | 77.6 | | 376 | | 196 | | 69.4 | | 1470 | | 2170 | | 2090 | | 28700 | | 459 | 459 | 459 |
| 112054 | P2CSPB04-30-01 | 13.70% | 466 | | 85.6 | | 249 | | 57.6 | | 343 | | 163 | | 69.3 | | 1020 | | 1910 | | 1750 | | 20100 | | 376 | 376 | 376 |
| 112055 | P2ISPB02-01-10 | 13.10% | 248 | | 103 | | 190 | | 70.2 | Y | 271 | | 194 | | 79.9 | | 1430 | | 2170 | | 2170 | | 21800 | | 370 | 370 | 370 |
| 112056 | P2CSPBBB-10-02 | 16.30% | 441 | | 112 | | 248 | | 68.3 | Y | 346 | | 187 | | 80.1 | | 1330 | | 2420 | | 2350 | | 24900 | | 426 | 426 | 426 |
| 112057 | P2CSPBBB-10-03 | 16.20% | 410 | | 103 | | 249 | | 75.7 | Y | 337 | | 188 | | 71.6 | | 1020 | | 2420 | | 2390 | | 22700 | | 416 | 416 | 416 |
| 112058 | P2CSPBBB-15-01 | 15.00% | 346 | | 201 | | 210 | | 66.2 | Y | 332 | | 186 | | 72.2 | | 1420 | | 2140 | | 2090 | | 22600 | | 490 | 490 | 490 |
| 112059 | P2CSPBBB-15-02 | 14.70% | 329 | | 78.4 | | 218 | | 70 | | 344 | | 184 | | 69 | | 1260 | | 2370 | | 2090 | | 22100 | | 368 | 368 | 368 |
| 112060 | P2CSPBBB-15-03 | 15.00% | 321 | | 80.8 | | 197 | | 61.3 | Y | 334 | | 187 | | 74.9 | | 1610 | | 2320 | | 2350 | | 24300 | | 357 | 357 | 357 |
| 112061 | P2CSPBBB-30-01 | 16.10% | 393 | | 89.7 | | 247 | | 65.5 | Y | 393 | | 204 | | 75.1 | | 1610 | | 2480 | | 2410 | | 23800 | | 404 | 404 | 404 |
| 112062 | P2CSPBBB-30-02 | 15.50% | 361 | | 88.1 | | 211 | | 69.8 | Y | 302 | | 170 | | 75.5 | | 1110 | | 2450 | | 2140 | | 22800 | | 373 | 373 | 373 |
| 112063 | P2CSPBBB-30-03 | 15.50% | 344 | | 87.9 | | 208 | | 64.1 | Y | 323 | | 181 | | 74.2 | | 1370 | | 2280 | | 2290 | | 23100 | | 369 | 369 | 369 |

**Attachment 2**
**Phase 2 Analytical Data**

**EPA 1613b**
**EXTENDED confirmation**

| Sample ID | unit | Total TCDDs | 2378-TCDD | Total PCDDs | 12378-PCDD | Total HCDDs | 123478-HCDD | 123678-HCDD | 123789-HCDD | Total H7CDDs | 1234678-H7CDD | OCDD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 111824 | ng/kg d.w. | 661 | 95.6 | 446 | 49.6 | 1080 | 50.8 | 142 | 76.6 | 4110 | 2220 | 24400 |
| 111825 | ng/kg d.w. | 640 | 100 | 401 | 43.9 | 935 | 42.8 | 125 | 71.2 | 3380 | 1840 | 18900 |
| 111826 | ng/kg d.w. | 700 | 105 | 444 | 49.9 | 1110 | 52.1 | 148 | 81.4 | 4190 | 2250 | 23100 |
| 111827 | ng/kg d.w. | 636 | 101 | 400 | 45.6 | 940 | 44.9 | 126 | 67 | 3800 | 2050 | 21500 |
| 111842 | ng/kg d.w. | 38.1 | 4.05 | 37.4 | 4.22 | 93.8 | 4.21 | 11.9 | 7.4 | 360 | 195 | 2380 |
| 111850 | ng/kg d.w. | 101 | 13.6 | 86 | 10.4 | 204 | 8.95 | 27.1 | 17.2 | 688 | 375 | 4180 |
| 111851 | ng/kg d.w. | 52.8 | 6 | 50.9 | 6.28 | 130 | 5.69 | 16.8 | 10.3 | 456 | 247 | 2780 |
| 111864 | ng/kg d.w. | 77.9 | 9.19 | 63.6 | 8.89 | 158 | 6.88 | 20 | 14.6 | 612 | 336 | 3890 |
| 111866 | ng/kg d.w. | 121 | 10.9 | 111 | 11.8 | 324 | 13.7 | 41.4 | 20.5 | 910 | 480 | 5370 |
| 111868 | ng/kg d.w. | 85.1 | 9.25 | 82.4 | 9.59 | 225 | 8.77 | 30.2 | 17.9 | 810 | 452 | 5280 |
| 111869 | ng/kg d.w. | 48.2 | 4.11 | 51.6 | 6.29 | 171 | 6.04 | 23.7 | 13.1 | 590 | 313 | 4440 |
| 111879 | ng/kg d.w. | 473 | 59.9 | 305 | 29.7 | 769 | 34.3 | 101 | 46.3 | 1850 | 1010 | 11000 |
| 111880 | ng/kg d.w. | 201 | 45.8 | 127 | 17.9 | 354 | 17.1 | 46.7 | 31.3 | 1970 | 1040 | 11200 |
| 111881 | ng/kg d.w. | 250 | 37.3 | 157 | 16.4 | 373 | 13.7 | 54 | 24.9 | 940 | 527 | 4820 |
| 111882 | ng/kg d.w. | 616 | 103 | 345 | 44.3 | 667 | 38 | 85.9 | 48.4 | 2300 | 1260 | 12400 |
| 111883 | ng/kg d.w. | 1240 | 186 | 659 | 73.1 | 1290 | 60.4 | 179 | 94.6 | 4230 | 2360 | 23900 |
| 111884 | ng/kg d.w. | 791 | 132 | 511 | 63.3 | 1040 | 64.7 | 125 | 79.4 | 3840 | 2080 | 20300 |
| 111885 | ng/kg d.w. | 1110 | 155 | 695 | 79.3 | 1480 | 69.7 | 199 | 102 | 4660 | 2520 | 25700 |
| 111886 | ng/kg d.w. | 704 | 107 | 438 | 49 | 1060 | 51.1 | 143 | 78.9 | 4070 | 2200 | 23700 |
| 111887 | ng/kg d.w. | 462 | 52.1 | 376 | 42.2 | 953 | 39.2 | 123 | 67.7 | 2980 | 1590 | 15800 |
| 111912 | ng/kg d.w. | 264 | 37.8 | 181 | 20.9 | 447 | 20.9 | 61 | 33.6 | 1830 | 998 | 10000 |
| 111913 | ng/kg d.w. | 254 | 34.6 | 162 | 19.4 | 443 | 20.8 | 58.6 | 34 | 1750 | 956 | 10400 |
| 112019 | ng/kg d.w. | 938 | 140 | 547 | 55.9 | 1160 | 55.5 | 155 | 84.8 | 4160 | 2260 | 23300 |
| 112022 | ng/kg d.w. | 869 | 134 | 506 | 57.6 | 1140 | 56 | 147 | 83.1 | 4240 | 2280 | 21800 |
| 112023 | ng/kg d.w. | 594 | 82.6 | 395 | 44.2 | 839 | 38.8 | 117 | 64.2 | 2900 | 1580 | 16000 |
| 112024 | ng/kg d.w. | 541 | 73.9 | 338 | 39.7 | 767 | 34.9 | 104 | 58.8 | 2580 | 1420 | 14400 |
| 112025 | ng/kg d.w. | 586 | 77.9 | 357 | 40.3 | 833 | 38.3 | 107 | 63.2 | 2840 | 1540 | 18100 |
| 112026 | ng/kg d.w. | 600 | 88.7 | 344 | 42.9 | 889 | 40.1 | 120 | 65.5 | 2960 | 1610 | 17200 |
| 112027 | ng/kg d.w. | 575 | 84.3 | 377 | 42.9 | 910 | 41 | 121 | 67.6 | 3030 | 1680 | 16300 |
| 112028 | ng/kg d.w. | 561 | 78.9 | 337 | 38 | 762 | 36 | 108 | 56.4 | 3040 | 1630 | 17000 |

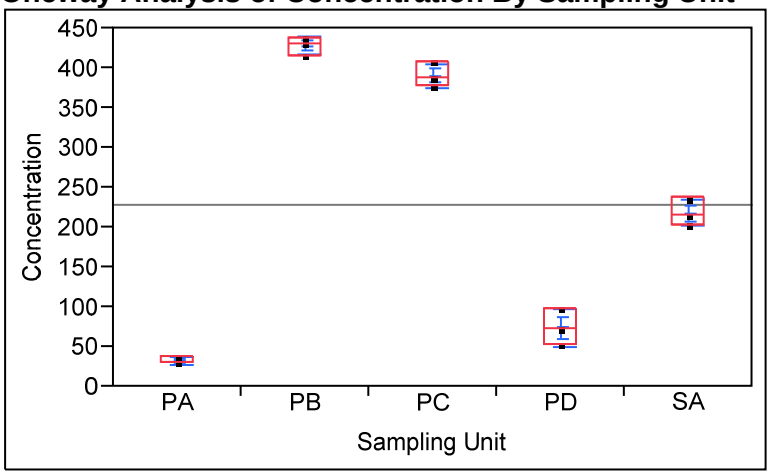
**Attachment 2**
**Phase 2 Analytical Data**

**EPA 1613b**
**EXTENDED confirmation**

| Sample ID | unit | Total TCDFs | 2378-TCDF | Total PCDFs | 12378-PCDF | 23478-PCDF | Total HCDFs | 123478-HCDF | 123678-HCDF | 234678-HCDF | 123789-HCDF | Total H7CDFs | 1234678-H7CDF | 1234789-H7CDF | OCDF | WHO-TEQ (LoD=0) | WHO-TEQ (LoD=0.5) | WHO-TEQ (LoD) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 111824 | ng/kg d.w. | 1600 | 236 | 1180 | 186 | 130 | 1550 | 250 | 77.9 | 49.4 | 5.44 | 2810 | 1330 | 59.9 | 2210 | 323 | 323 | 323 |
| 111825 | ng/kg d.w. | 1400 | 177 | 912 | 115 | 94.7 | 1310 | 167 | 59.9 | 42 | 5.27 | 2490 | 1200 | 48.6 | 1960 | 282 | 282 | 282 |
| 111826 | ng/kg d.w. | 1500 | 201 | 946 | 129 | 105 | 1380 | 202 | 68.5 | 44.1 | 5.59 | 2740 | 1300 | 61.8 | 2120 | 314 | 314 | 314 |
| 111827 | ng/kg d.w. | 1270 | 181 | 902 | 126 | 105 | 1280 | 184 | 62.3 | 41.4 | 6.04 | 2460 | 1150 | 50 | 2010 | 293 | 293 | 293 |
| 111842 | ng/kg d.w. | 157 | 38.2 | 111 | 24.4 | 18.5 | 119 | 27.1 | 7.72 | 5.5 | 1.71 | 201 | 97.7 | 5.27 | 183 | 28.7 | 28.7 | 28.7 |
| 111850 | ng/kg d.w. | 235 | 28.6 | 135 | 17.6 | 14.3 | 207 | 26.3 | 10.3 | 7.83 | 1.32 | 479 | 233 | 9.21 | 409 | 49.1 | 49.1 | 49.1 |
| 111851 | ng/kg d.w. | 157 | 26.1 | 99.3 | 15.2 | 13.5 | 133 | 21 | 7.2 | 5.47 | 1.03 | 266 | 122 | 6.61 | 252 | 30.8 | 30.8 | 30.8 |
| 111864 | ng/kg d.w. | 138 | 11.4 | 74.1 | 7.85 | 7.45 | 141 | 14.9 | 6.33 | 5.65 | 0.895 | 367 | 178 | 7.38 | 405 | 35.1 | 35.1 | 35.1 |
| 111866 | ng/kg d.w. | 338 | 68 | 275 | 45 | 36.1 | 446 | 70.2 | 22.5 | 14.5 | 1.52 | 911 | 490 | 17.3 | 640 | 71.8 | 71.8 | 71.8 |
| 111868 | ng/kg d.w. | 338 | 59.1 | 252 | 35 | 30.8 | 352 | 47.9 | 16.2 | 12 | 1.44 | 688 | 319 | 13.9 | 555 | 58.1 | 58.1 | 58.1 |
| 111869 | ng/kg d.w. | 278 | 71 | 214 | 42.2 | 33.2 | 243 | 52.7 | 15.8 | 9.74 | 1.39 | 369 | 191 | 11.5 | 325 | 47.6 | 47.6 | 47.6 |
| 111879 | ng/kg d.w. | 1750 | 491 | 1380 | 316 | 225 | 1450 | 330 | 88.6 | 48.9 | 10.3 | 2140 | 1140 | 48.2 | 1280 | 307 | 307 | 307 |
| 111880 | ng/kg d.w. | 431 | 89.3 | 302 | 53.4 | 41.7 | 337 | 60.6 | 18.1 | 13 | 2.41 | 625 | 255 | 15.7 | 692 | 122 | 122 | 122 |
| 111881 | ng/kg d.w. | 1850 | 648 | 1780 | 421 | 305 | 1500 | 442 | 103 | 50.8 | 9.83 | 1610 | 886 | 49.4 | 1220 | 309 | 309 | 309 |
| 111882 | ng/kg d.w. | 1760 | 381 | 1190 | 244 | 181 | 1160 | 240 | 70.1 | 41.7 | 6.41 | 1690 | 813 | 39.4 | 1370 | 325 | 325 | 325 |
| 111883 | ng/kg d.w. | 2430 | 263 | 1300 | 157 | 143 | 1740 | 228 | 81.3 | 59.8 | 6.43 | 3650 | 1620 | 78.4 | 3090 | 453 | 453 | 453 |
| 111884 | ng/kg d.w. | 1370 | 144 | 730 | 86.9 | 75.6 | 1050 | 132 | 47.9 | 36.9 | 3.85 | 2190 | 984 | 45.8 | 2010 | 322 | 322 | 322 |
| 111885 | ng/kg d.w. | 2100 | 263 | 1340 | 169 | 151 | 2120 | 258 | 97.3 | 71.2 | 9.12 | 4350 | 2220 | 79.4 | 3070 | 448 | 448 | 448 |
| 111886 | ng/kg d.w. | 2260 | 531 | 1650 | 306 | 231 | 1720 | 313 | 95.5 | 59.6 | 8.22 | 2750 | 1320 | 58.8 | 2140 | 406 | 406 | 406 |
| 111887 | ng/kg d.w. | 2700 | 766 | 2440 | 459 | 373 | 2550 | 646 | 144 | 99.1 | 11.6 | 2790 | 1530 | 86.3 | 1620 | 447 | 447 | 447 |
| 111912 | ng/kg d.w. | 637 | 138 | 439 | 76.4 | 61.6 | 564 | 96.7 | 29.1 | 19 | 3.16 | 1030 | 502 | 22.9 | 857 | 138 | 138 | 138 |
| 111913 | ng/kg d.w. | 623 | 124 | 433 | 74.3 | 54.9 | 565 | 93.1 | 29.8 | 19 | 2.38 | 1030 | 512 | 21.9 | 804 | 129 | 129 | 129 |
| 112019 | ng/kg d.w. | 2260 | 470 | 1320 | 215 | 183 | 1510 | 236 | 75 | 48.8 | 10.2 | 2970 | 1310 | 58.6 | 2580 | 415 | 415 | 415 |
| 112022 | ng/kg d.w. | 2230 | 446 | 1400 | 246 | 191 | 1610 | 278 | 84.1 | 54.4 | 8.77 | 2800 | 1320 | 59.9 | 2380 | 416 | 416 | 416 |
| 112023 | ng/kg d.w. | 1340 | 198 | 913 | 113 | 98.4 | 1210 | 167 | 55.8 | 41.9 | 6.63 | 2210 | 1120 | 45.5 | 1680 | 261 | 261 | 261 |
| 112024 | ng/kg d.w. | 1320 | 212 | 890 | 119 | 102 | 1120 | 162 | 53.8 | 39.4 | 4.71 | 2030 | 1030 | 45.6 | 1460 | 244 | 244 | 244 |
| 112025 | ng/kg d.w. | 1320 | 204 | 865 | 117 | 99.9 | 1180 | 176 | 58.1 | 41.6 | 4.53 | 2210 | 1090 | 48.1 | 1590 | 254 | 254 | 254 |
| 112026 | ng/kg d.w. | 1260 | 195 | 816 | 113 | 101 | 1170 | 169 | 57.9 | 39.5 | 5.42 | 2320 | 1150 | 46.6 | 1830 | 268 | 268 | 268 |
| 112027 | ng/kg d.w. | 1260 | 204 | 817 | 115 | 92 | 1130 | 157 | 55.4 | 38.3 | 4.28 | 2190 | 1100 | 45.3 | 1710 | 261 | 261 | 261 |
| 112028 | ng/kg d.w. | 1340 | 219 | 795 | 116 | 102 | 1020 | 153 | 49.8 | 34.5 | 4.13 | 1980 | 950 | 40 | 1540 | 249 | 249 | 249 |

## Attachment C1: Evaluation of Differences between 4-acre and 1-acre Sampling Units

## Oneway Analysis of Concentration By Sampling Unit




## Oneway Anova
## Summary of Fit

| | |
|---|---|
| Rsquare | 0.993869 |
| Adj Rsquare | 0.991416 |
| Root Mean Square Error | 15.42671 |
| Mean of Response | 228.6033 |
| Observations (or Sum Wgts) | 15 |

## Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio | Prob > F |
|---|---|---|---|---|---|
| Sampling Unit | 4 | 385769.43 | 96442.4 | 405.2481 | <.0001* |
| Error | 10 | 2379.84 | 238.0 | | |
| C. Total | 14 | 388149.27 | | | |

## Means for Oneway Anova

| Level | Number | Mean | Std Error | Lower 95% | Upper 95% |
|---|---|---|---|---|---|
| PA | 3 | 32.133 | 8.9066 | 12.29 | 51.98 |
| PB | 3 | 428.050 | 8.9066 | 408.20 | 447.90 |
| PC | 3 | 390.617 | 8.9066 | 370.77 | 410.46 |
| PD | 3 | 74.167 | 8.9066 | 54.32 | 94.01 |
| SA | 3 | 218.050 | 8.9066 | 198.20 | 237.90 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean | Lower 95% | Upper 95% |
|---|---|---|---|---|---|---|
| PA | 3 | 32.133 | 4.7343 | 2.733 | 20.37 | 43.89 |
| PB | 3 | 428.050 | 11.2273 | 6.482 | 400.16 | 455.94 |
| PC | 3 | 390.617 | 14.7890 | 8.538 | 353.88 | 427.35 |
| PD | 3 | 74.167 | 23.3825 | 13.500 | 16.08 | 132.25 |
| SA | 3 | 218.050 | 16.6130 | 9.592 | 176.78 | 259.32 |

## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Expected Score | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|---|
| PA | 3 | 6.000 | 24.000 | 2.0000 | -2.528 |
| PB | 3 | 42.000 | 24.000 | 14.0000 | 2.528 |
| PC | 3 | 33.000 | 24.000 | 11.0000 | 1.228 |
| PD | 3 | 15.000 | 24.000 | 5.0000 | -1.228 |

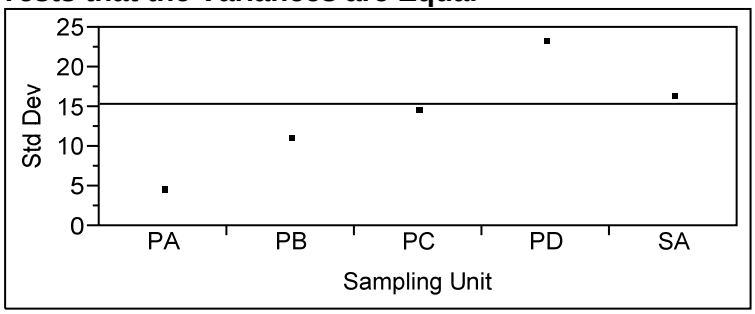
| Level | Count | Score Sum | Expected Score | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|---|
| SA | 3 | 24.000 | 24.000 | 8.0000 | 0.000 |

## 1-way Test, ChiSquare Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 13.5242 | 4 | 0.0090* |

Small sample sizes. Refer to statistical tables for tests, rather than large-sample approximations.

## Tests that the Variances are Equal




| Level | Count | Std Dev | MeanAbsDif to Mean | MeanAbsDif to Median |
|---|---|---|---|---|
| PA | 3 | 4.73427 | 3.64444 | 2.73333 |
| PB | 3 | 11.22731 | 8.16667 | 9.80000 |
| PC | 3 | 14.78904 | 10.48889 | 13.61667 |
| PD | 3 | 23.38254 | 16.28889 | 22.16667 |
| SA | 3 | 16.61302 | 12.13333 | 14.35000 |

| Test | F Ratio | DFNum | DFDen | Prob > F |
|---|---|---|---|---|
| O'Brien[.5] | 0.7898 | 4 | 10 | 0.5576 |
| Brown-Forsythe | 6.6198 | 4 | 10 | 0.0072* |
| Levene | 1.1533 | 4 | 10 | 0.3869 |
| Bartlett | 0.8761 | 4 | . | 0.4772 |

Warning: Small sample sizes. Use Caution.

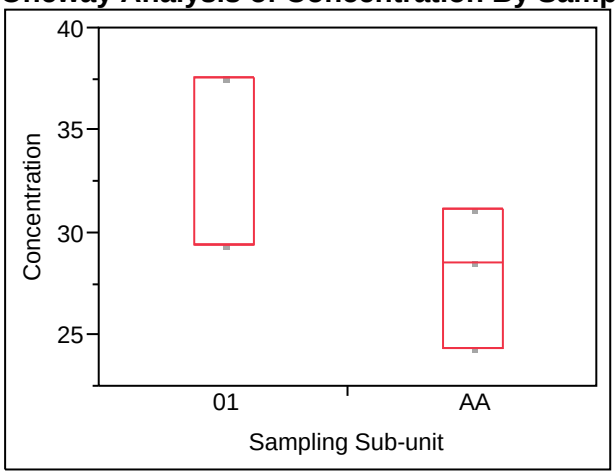
## Welch's Test

Welch Anova testing Means Equal, allowing Std Devs Not Equal

| F Ratio | DFNum | DFDen | Prob > F |
|---|---|---|---|
| 765.0978 | 4 | 4.5274 | <.0001* |

## Attachment C2: Evaluation of Differences between 1-acre and ¼-acre Sampling Units

## Oneway Analysis of Concentration By Sampling Sub-unit




Excluded Rows
36

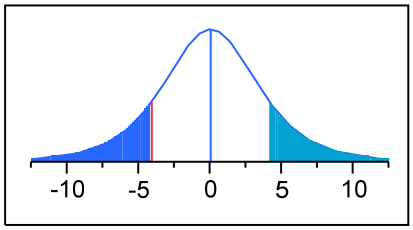
## Oneway Anova
## Summary of Fit

| | |
|---|---|
| Rsquare | 0.270906 |
| Adj Rsquare | 0.088632 |
| Root Mean Square Error | 4.137325 |
| Mean of Response | 30.07417 |
| Observations (or Sum Wgts) | 6 |

## t Test
AA-01

Assuming equal variances

| | | | |
|---|---|---|---|
| Difference | -4.118 | t Ratio | -1.21912 |
| Std Err Dif | 3.378 | DF | 4 |
| Upper CL Dif | 5.261 | Prob > \|t\| | 0.2898 |
| Lower CL Dif | -13.497 | Prob > t | 0.8551 |
| Confidence | 0.95 | Prob < t | 0.1449 |




## Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio | Prob > F |
|---|---|---|---|---|---|
| Sampling Sub-unit | 1 | 25.441004 | 25.4410 | 1.4863 | 0.2898 |
| Error | 4 | 68.469817 | 17.1175 | | |
| C. Total | 5 | 93.910821 | | | |

## Means for Oneway Anova

| Level | Number | Mean | Std Error | Lower 95% | Upper 95% |
|---|---|---|---|---|---|
| 01 | 3 | 32.1333 | 2.3887 | 25.501 | 38.765 |

| Level | Number | Mean | Std Error | Lower 95% | Upper 95% |
|---|---|---|---|---|---|
| AA | 3 | 28.0150 | 2.3887 | 21.383 | 34.647 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

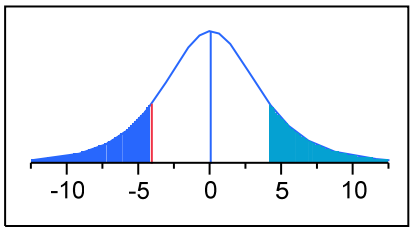
| Level | Number | Mean | Std Dev | Std Err Mean | Lower 95% | Upper 95% |
|---|---|---|---|---|---|---|
| 01 | 3 | 32.1333 | 4.73427 | 2.7333 | 20.373 | 43.894 |
| AA | 3 | 28.0150 | 3.43825 | 1.9851 | 19.474 | 36.556 |

## t Test

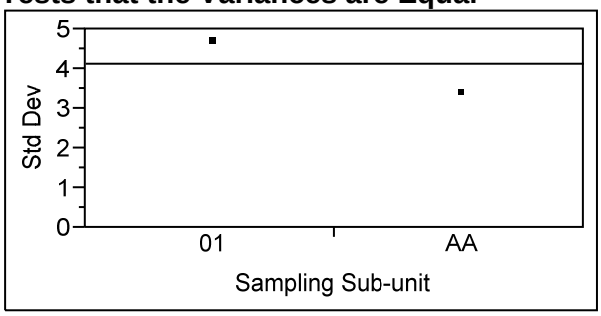
AA-01

Assuming unequal variances

| | | | |
|---|---|---|---|
| Difference | -4.118 | t Ratio | -1.21912 |
| Std Err Dif | 3.378 | DF | 3.650571 |
| Upper CL Dif | 5.626 | Prob > \|t\| | 0.2957 |
| Lower CL Dif | -13.862 | Prob > t | 0.8522 |
| Confidence | 0.95 | Prob < t | 0.1478 |




## Tests that the Variances are Equal




| Level | Count | Std Dev | MeanAbsDif to Mean | MeanAbsDif to Median |
|---|---|---|---|---|
| 01 | 3 | 4.734272 | 3.644444 | 2.733333 |
| AA | 3 | 3.438252 | 2.436667 | 3.170000 |

| Test | F Ratio | DFNum | DFDen | p-Value |
|---|---|---|---|---|
| O'Brien[.5] | 0.3106 | 1 | 4 | 0.6070 |
| Brown-Forsythe | 0.0247 | 1 | 4 | 0.8826 |
| Levene | 0.8095 | 1 | 4 | 0.4191 |
| Bartlett | 0.1610 | 1 | . | 0.6883 |
| F Test 2-sided | 1.8960 | 2 | 2 | 0.6906 |

Warning: Small sample sizes. Use Caution.

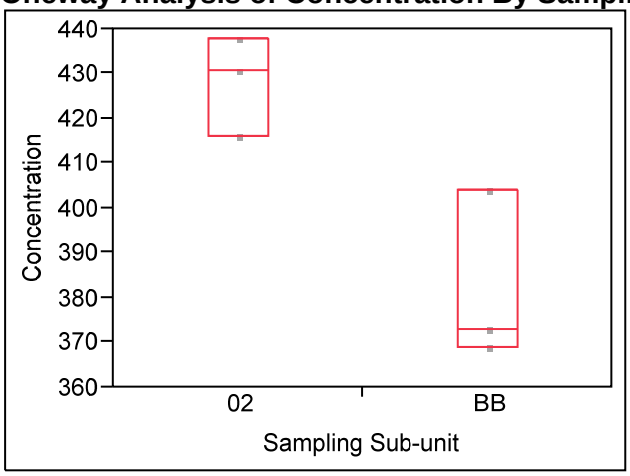
## Welch's Test

Welch Anova testing Means Equal, allowing Std Devs Not Equal

| F Ratio | DFNum | DFDen | Prob > F |
|---|---|---|---|
| 1.4863 | 1 | 3.6506 | 0.2957 |

**t Test**
1.2191

## Oneway Analysis of Concentration By Sampling Sub-unit




Excluded Rows
36

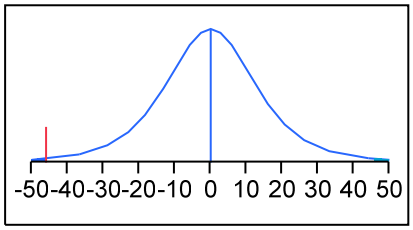
## Oneway Anova
## Summary of Fit

| | |
|---|---|
| Rsquare | 0.763354 |
| Adj Rsquare | 0.704193 |
| Root Mean Square Error | 15.70115 |
| Mean of Response | 405.025 |
| Observations (or Sum Wgts) | 6 |

## t Test
BB-02

Assuming equal variances

| | | | |
|---|---|---|---|
| Difference | -46.050 | t Ratio | -3.59206 |
| Std Err Dif | 12.820 | DF | 4 |
| Upper CL Dif | -10.456 | Prob > \|t\| | 0.0229* |
| Lower CL Dif | -81.644 | Prob > t | 0.9885 |
| Confidence | 0.95 | Prob < t | 0.0115* |




## Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio | Prob > F |
|---|---|---|---|---|---|
| Sampling Sub-unit | 1 | 3180.9038 | 3180.90 | 12.9029 | 0.0229* |
| Error | 4 | 986.1050 | 246.53 | | |

| Source | DF | Sum of Squares | Mean Square | F Ratio | Prob > F |
|---|---|---|---|---|---|
| C. Total | 5 | 4167.0088 | | | |

## Means for Oneway Anova

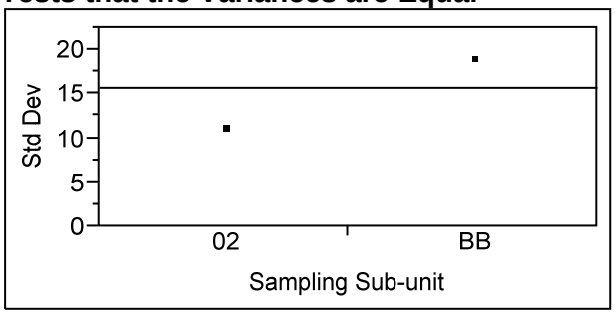
| Level | Number | Mean | Std Error | Lower 95% | Upper 95% |
|---|---|---|---|---|---|
| 02 | 3 | 428.050 | 9.0651 | 402.88 | 453.22 |
| BB | 3 | 382.000 | 9.0651 | 356.83 | 407.17 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean | Lower 95% | Upper 95% |
|---|---|---|---|---|---|---|
| 02 | 3 | 428.050 | 11.2273 | 6.482 | 400.16 | 455.94 |
| BB | 3 | 382.000 | 19.1572 | 11.060 | 334.41 | 429.59 |

## Tests that the Variances are Equal




| Level | Count | Std Dev | MeanAbsDif to Mean | MeanAbsDif to Median |
|---|---|---|---|---|
| 02 | 3 | 11.22731 | 8.16667 | 9.80000 |
| BB | 3 | 19.15724 | 14.66667 | 13.00000 |

| Test | F Ratio | DFNum | DFDen | p-Value |
|---|---|---|---|---|
| O'Brien[.5] | 0.6854 | 1 | 4 | 0.4543 |
| Brown-Forsythe | 0.1177 | 1 | 4 | 0.7488 |
| Levene | 1.8019 | 1 | 4 | 0.2506 |
| Bartlett | 0.4366 | 1 | . | 0.5088 |
| F Test 2-sided | 2.9115 | 2 | 2 | 0.5113 |

Warning: Small sample sizes. Use Caution.

## Welch's Test

Welch Anova testing Means Equal, allowing Std Devs Not Equal

| F Ratio | DFNum | DFDen | Prob > F |
|---|---|---|---|
| 12.9029 | 1 | 3.2289 | 0.0328* |

| t Test |
|---|
| 3.5921 |

## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Expected Score | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|---|
| 02 | 3 | 15.000 | 10.500 | 5.00000 | 1.746 |
| BB | 3 | 6.000 | 10.500 | 2.00000 | -1.746 |

## 2-Sample Test, Normal Approximation

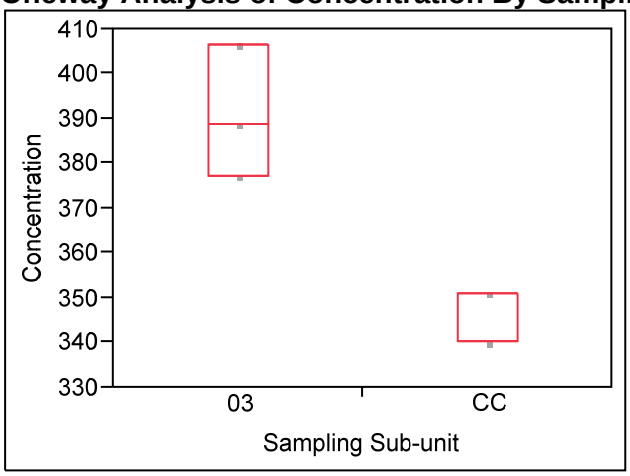
| S | Z | Prob>\|Z\| |
|---|---|---|
| 6 | -1.74574 | 0.0809 |

## 1-way Test, ChiSquare Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 3.8571 | 1 | 0.0495* |

Small sample sizes. Refer to statistical tables for tests, rather than large-sample approximations.

## Oneway Analysis of Concentration By Sampling Sub-unit




Excluded Rows
36

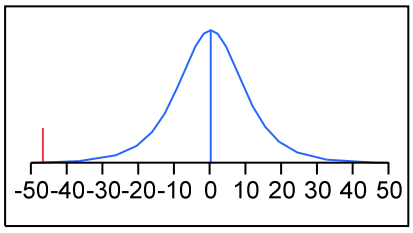
## Oneway Anova
## Summary of Fit

| | |
|---|---|
| Rsquare | 0.864534 |
| Adj Rsquare | 0.830667 |
| Root Mean Square Error | 11.38089 |
| Mean of Response | 367.1417 |
| Observations (or Sum Wgts) | 6 |

## t Test
CC-03

Assuming equal variances

| | | | |
|---|---|---|---|
| Difference | -46.950 | t Ratio | -5.05249 |
| Std Err Dif | 9.292 | DF | 4 |
| Upper CL Dif | -21.150 | Prob > \|t\| | 0.0072* |
| Lower CL Dif | -72.750 | Prob > t | 0.9964 |
| Confidence | 0.95 | Prob < t | 0.0036* |




## Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio | Prob > F |
|---|---|---|---|---|---|
| Sampling Sub-unit | 1 | 3306.4537 | 3306.45 | 25.5276 | 0.0072* |
| Error | 4 | 518.0983 | 129.52 | | |

| Source | DF | Sum of Squares | Mean Square | F Ratio | Prob > F |
|---|---|---|---|---|---|
| C. Total | 5 | 3824.5521 | | | |

## Means for Oneway Anova

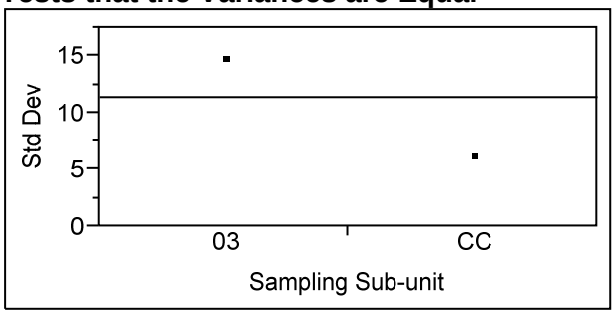
| Level | Number | Mean | Std Error | Lower 95% | Upper 95% |
|---|---|---|---|---|---|
| 03 | 3 | 390.617 | 6.5708 | 372.37 | 408.86 |
| CC | 3 | 343.667 | 6.5708 | 325.42 | 361.91 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean | Lower 95% | Upper 95% |
|---|---|---|---|---|---|---|
| 03 | 3 | 390.617 | 14.7890 | 8.5385 | 353.88 | 427.35 |
| CC | 3 | 343.667 | 6.3509 | 3.6667 | 327.89 | 359.44 |

## Tests that the Variances are Equal




| Level | Count | Std Dev | MeanAbsDif to Mean | MeanAbsDif to Median |
|---|---|---|---|---|
| 03 | 3 | 14.78904 | 10.48889 | 13.61667 |
| CC | 3 | 6.35085 | 4.88889 | 3.66667 |

| Test | F Ratio | DFNum | DFDen | p-Value |
|---|---|---|---|---|
| O'Brien[.5] | 1.1437 | 1 | 4 | 0.3451 |
| Brown-Forsythe | 5.5232 | 1 | 4 | 0.0785 |
| Levene | 1.6173 | 1 | 4 | 0.2724 |
| Bartlett | 1.0285 | 1 | . | 0.3105 |
| F Test 2-sided | 5.4227 | 2 | 2 | 0.3114 |

Warning: Small sample sizes. Use Caution.

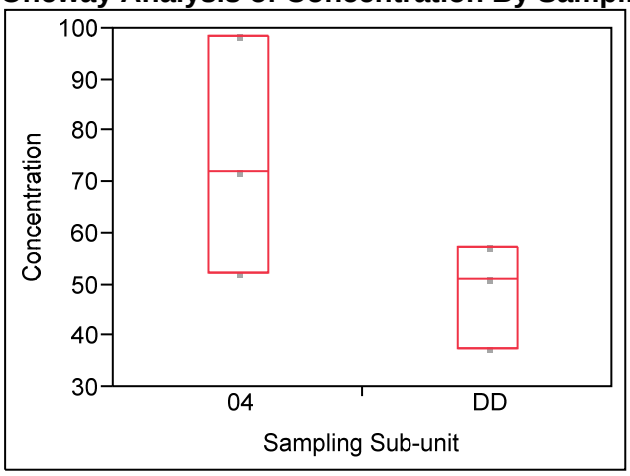
## Welch's Test

Welch Anova testing Means Equal, allowing Std Devs Not Equal

| F Ratio | DFNum | DFDen | Prob > F |
|---|---|---|---|
| 25.5276 | 1 | 2.7134 | 0.0190* |

| t Test |
|---|
| 5.0525 |

## Oneway Analysis of Concentration By Sampling Sub-unit




Excluded Rows
36

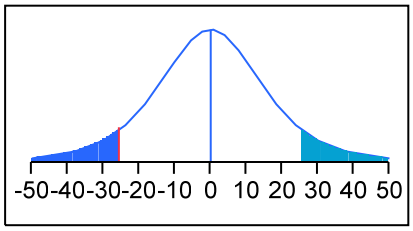
## Oneway Anova
### Summary of Fit

| | |
|---|---|
| Rsquare | 0.432843 |
| Adj Rsquare | 0.291054 |
| Root Mean Square Error | 18.00919 |
| Mean of Response | 61.32083 |
| Observations (or Sum Wgts) | 6 |

### t Test
DD-04

Assuming equal variances

| | | | |
|---|---|---|---|
| Difference | -25.692 | t Ratio | -1.7472 |
| Std Err Dif | 14.704 | DF | 4 |
| Upper CL Dif | 15.134 | Prob > \|t\| | 0.1555 |
| Lower CL Dif | -66.518 | Prob > t | 0.9222 |
| Confidence | 0.95 | Prob < t | 0.0778 |




### Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Ratio | Prob > F |
|---|---|---|---|---|---|
| Sampling Sub-unit | 1 | 990.0926 | 990.093 | 3.0527 | 0.1555 |
| Error | 4 | 1297.3242 | 324.331 | | |
| C. Total | 5 | 2287.4168 | | | |

### Means for Oneway Anova

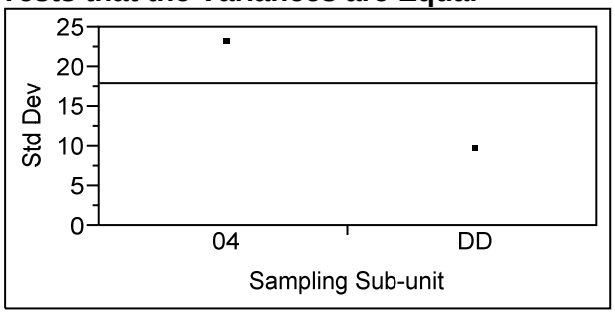
| Level | Number | Mean | Std Error | Lower 95% | Upper 95% |
|---|---|---|---|---|---|
| 04 | 3 | 74.1667 | 10.398 | 45.298 | 103.04 |
| DD | 3 | 48.4750 | 10.398 | 19.607 | 77.34 |

Std Error uses a pooled estimate of error variance

## Means and Std Deviations

| Level | Number | Mean | Std Dev | Std Err Mean | Lower 95% | Upper 95% |
|---|---|---|---|---|---|---|
| 04 | 3 | 74.1667 | 23.3825 | 13.500 | 16.081 | 132.25 |
| DD | 3 | 48.4750 | 10.0955 | 5.829 | 23.396 | 73.55 |

## Tests that the Variances are Equal




| Level | Count | Std Dev | MeanAbsDif to Mean | MeanAbsDif to Median |
|---|---|---|---|---|
| 04 | 3 | 23.38254 | 16.28889 | 22.16667 |
| DD | 3 | 10.09548 | 7.39667 | 8.64500 |

| Test | F Ratio | DFNum | DFDen | p-Value |
|---|---|---|---|---|
| O'Brien[.5] | 1.1372 | 1 | 4 | 0.3463 |
| Brown-Forsythe | 16.4121 | 1 | 4 | 0.0155* |
| Levene | 1.4069 | 1 | 4 | 0.3012 |
| Bartlett | 1.0166 | 1 | . | 0.3133 |
| F Test 2-sided | 5.3645 | 2 | 2 | 0.3142 |

Warning: Small sample sizes. Use Caution.

## Welch's Test

Welch Anova testing Means Equal, allowing Std Devs Not Equal

| F Ratio | DFNum | DFDen | Prob > F |
|---|---|---|---|
| 3.0527 | 1 | 2.7206 | 0.1883 |

| t Test |
|---|
| 1.7472 |

## Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

| Level | Count | Score Sum | Expected Score | Score Mean | (Mean-Mean0)/Std0 |
|---|---|---|---|---|---|
| 04 | 3 | 14.000 | 10.500 | 4.66667 | 1.309 |
| DD | 3 | 7.000 | 10.500 | 2.33333 | -1.309 |

## 2-Sample Test, Normal Approximation

| S | Z | Prob>\|Z\| |
|---|---|---|
| 7 | -1.30931 | 0.1904 |

## 1-way Test, ChiSquare Approximation

| ChiSquare | DF | Prob>ChiSq |
|---|---|---|
| 2.3333 | 1 | 0.1266 |

Small sample sizes. Refer to statistical tables for tests, rather than large-sample approximations.