Imagine the result

**Cow Palace, LLC**

# Dairy Facility Application Field Management Plan

Administrative Order on Consent

SDWA-10-2013-0080

May 20, 2013

ARCADIS
Infrastructure · Water · Environment · Buildings

Imagine the result

**Dairy Facility Application Field Management Plan**

**Administrative Order on Consent SDWA-10-2013-0080**

**Cow Palace, LLC, Washington**

**Plan Approvals:**

Kevin M. Freeman, PG
Project Coordinator

Steve Hicks, PE
Quality Manager

Thomas F. Mullen, LHG
Site Safety Coordinator/Sampling Team Leader

# Dairy Facility Application Field Management Plan

Prepared for:

Cow Palace, LLC

Prepared by:

ARCADIS U.S., Inc.
695 North Legacy Ridge Drive
Suite 200
Liberty Lake
Washington 99019
Tel 509 928 3369
Fax 509 928 3075

Our Ref.:

SK030334.0001

Date:

May 20, 2013

**1. Project Management (Group A) 1**

1.1 Project/Task Organization (A4) 1

1.2 Problem Definition/Background (A5) 2

1.2.1 Purpose 2

1.2.2 Problem Statement 2

1.3 Project/Task Description and Schedule (A6) 3

1.3.1 Project/Task Description 3

1.3.2 Project Schedule 3

1.4 Quality Objectives and Criteria (A7) 4

1.4.1 Project Quality Objectives 4

1.4.2 Measurement Performance Criteria 4

1.5 Special Training/Certification (A8) 5

1.6 Documents and Records (A9) 6

**2. Data Generation and Acquisition (Group B) 6**

2.1 Sampling Design (Experimental Design) (B1) 6

2.1.1 Sampling Design Rationale 6

2.1.2 Sample Strategy and Numbers 7

2.1.3 Sample Types, Locations, and Frequencies 8

2.2 Sampling Methods (B2) 8

2.2.1 Sample Collection 8

2.2.2 Sampling Equipment Decontamination 9

2.3 Sample Handling and Custody (B3) 9

2.3.1 Sample Labeling Methodology 9

2.3.2 Sample Chain-of-Custody 10

2.3.3 Field Logbooks and Field Sampling Forms 11

2.4 Analytical Methods (B4) 11

2.5 Quality Control (B5) 12

2.5.1 Field Quality Control Samples 12

2.5.2 Laboratory Quality Control Procedures 12

2.6 Instrument/Equipment Testing, Inspection, and Maintenance (B6) 13

2.7 Instrument/Equipment Calibration and Frequency (B7) 13

2.8 Inspection/Acceptance of Supplies and Consumable (B8) 13

2.9 Non-direct Measurements (B9) 13

2.10 Data Management (B10) 13

**3. Assessment and Oversight (Group C) 14**

3.1 Assessments and Response Actions (C1) 14

3.2 Reports to Management (C2) 14

3.2.1 Dairy Facility Application Field Reports 14

3.2.2 Analytical Data Reporting 15

**4. Data Validation and Usability (Group D) 16**

4.1 Data Review, Verification, and Validation (D1) 16

4.2 Verification and Validation Methods (D2) 16

4.2.1 Validation 17

4.3 Reconciliation with User Requirements (D3) 17

**5. References Cited 18**

**6. Certification 19**

## Tables

Table 1 Application Field Summary Table

Table 2 Data Needs

Table 3 Analytes, Methods, Holding TImes, and Preservation

Table 4 Validation Checklist

## Figures

Figure 1 Project Organization Chart

Figure 2 Site Map

Figure 3 Aerial Photograph

## Appendices

A Fertilizer Application Practices

B Data Quality Objectives (DQOs)

C Laboratory Certification

D Field Forms

E Surface and Subsurface Soil Sampling Using Manual Methods

F Compositing or Homogenizing Samples

G Field Equipment Decontamination SOP

H Chain-of-Custody, Handling, Packing and Shipping SOP

I Field Log Book Entries SOP

J EPA Deliverable Guidance Documents

## Acronyms and Abbreviations

| | |
|---|---|
| AFMP | Application Field Management Plan |
| AOC | Administrative Order on Consent |
| DQO | data quality objective |
| EPA | U.S. Environmental Protection Agency |
| HSP | Health and Safety Plan |
| MCL | maximum contaminant level |
| mg/L | milligrams per liter |
| NAPT | North American Proficiency Testing |
| PARCC | precision, accuracy, representativeness, comparability, and completeness |
| PC | Project Coordinator |
| QAM | Quality Assurance Manager |
| QAPP | Quality Assurance Project Plan |
| QC | quality control |
| SOP | standard operating procedure |
| SOW | Statement of Work |
| SSC/STL | Site Safety Coordinator/Sampling Team Leader |
| WCC | Western Coordinating Committee |

## Distribution List (A3)

| | |
|---|---|
| [redacted] | Cow Palace |
| Eric Winiecki | EPA |
| Gina Greppo-Grove | EPA |
| Rene Fuentes | EPA |
| Jennifer MacDonald | EPA |
| Kevin Freeman | ARCADIS |
| Steve Hicks | ARCADIS |
| Tom Mullen | ARCADIS |
| Amy Goldberg Day | ARCADIS |
| Lori Terry Gregory | Foster Pepper PLLC |

# 1. Project Management (Group A)

## 1.1 Project/Task Organization (A4)

This section presents the organization structure and lines of communication that will be followed to implement the application field sampling and analysis activities presented in this Dairy Facility Application Field Management Plan (AFMP).

The Cow Palace, LLC (the "Cow Palace") have retained ARCADIS U.S., Inc. (ARCADIS) to develop and implement the AFMP. This AFMP has been developed in accordance with requirements identified in Section III.F of the Statement of Work (SOW) (Appendix B of Administrative Order on Consent (AOC) SDWA-10-2013-0080). The AFMP was prepared in accordance with "Guidance for Quality Assurance Project Plans (QAPP) (QA/G-5)" (EPA 2002) and "EPA Requirements for Quality Assurance Project Plans (EPA QA/R-5) (EPA 2001, reissued May 2006). To ensure usability, completeness, and compliance with U.S. Environmental Protection Agency (EPA) guidance, plan elements are designated throughout this document by EPA guidance-defined groups, identified by numbers in parentheses next to headings and titles (e.g., A1, A2).

In addition to the above guidance, data quality objectives (DQOs) were developed using the requirements included in the SOW and in accordance with the "Guidance on Systematic Planning Using the Data Quality Objectives Process (QA/G-4)" (EPA 2006). The results of application field sampling will be used to guide nutrient application practices as presented in Appendix A.

The project organization and lines of authority and communication are illustrated schematically on Figure 1.

The Project Coordinator (PC) will be responsible for the implementation of activities identified in the AFMP and will maintain communication with the EPA PC as required to communicate progress and resolve issues that may arise during the implementation of the AFMP, if necessary. The PC has overall authority over the project team and implementation of the AFMP.

The project chemist and Quality Assurance Manager (QAM) will assist in the development and review of project planning documents, evaluation of data, and preparation of deliverables.

Laboratory analysis of project samples will be performed by Soiltest Farm Consultants, Inc. (Soiltest) located at 2925 Driggs Drive, Moses Lake, Washington, 509.765-1622. Soiltest is a state of Washington-certified analytical laboratory and a North American Proficiency Testing (NAPT)-accredited laboratory.

The Site Safety Coordinator/Sampling Team Leader (SSC/STL) will lead the project sampling team. The sampling team will implement the AFMP and Health and Safety Plan (HSP).

The PC, project chemist, and QAM will develop appropriate corrective actions to address any potential quality assurance issues or deficiencies that may occur. Corrective actions will be communicated to the EPA PC and will be implemented and documented by the STL or laboratory, as required.

## 1.2 Problem Definition/Background (A5)

### 1.2.1 Purpose

This document defines the actions and obligations in the management of application fields as required under Section III.F of the AOC SOW. The activities and procedures outlined in this document are presented with the goal of reducing the amount of nitrates within the application fields subsoil; these nitrates may potentially leach to the surficial aquifer beneath the Cow Palace. Table 1 presents a summary of the application fields associated with the Cow Palace that will be sampled as part of this AFMP. Figures 2 and 3 present the locations of application fields. This AFMP was developed to document the type, quantity, and quality of data needed to meet project objectives and support key decisions, and describes the methods for collecting and assessing data.

### 1.2.2 Problem Statement

Pursuant to Section III.E of the AOC SOW, the objectives of the AFMP are to provide information allowing for effective nutrient management at the application fields so as to reduce the potential for migration of nitrates from application field soils to the underlying surficial aquifer through the following:

- The development of a consistent method of sampling and evaluation including defining the field methodologies and procedures that will be utilized in collecting samples (data), transporting samples, allowing for agronomic recommendations related to field application of liquid and solid manure or synthetic fertilizer.

- The production of high yielding crops for increased nutrient removal.
- The application of agronomic rates of nutrients for each specific field and crop.

### 1.3 Project/Task Description and Schedule (A6)

#### 1.3.1 Project/Task Description

The scope of this AFMP includes provision to collect information to supplement and verify existing information on the environmental setting at Cow Palace and development of application field sampling units (SU), soil sampling, and nutrient application. Information collected in accordance with this AFMP will be reported in the Dairy Facility Application Field Report. Specific activities to be performed as part of this AFMP include the following:

- Collect representative subsamples form SUs in each application field in the spring (pre-planting) and in the fall (post-harvest).
- Composite subsamples from distinct intervals into field composite samples.
- Analyze application field samples.
- Prepare Dairy Facility Application Field Reports.

#### 1.3.2 Project Schedule

| Task | Start Date | Completion Date |
|---|---|---|
| Dairy Facility Application Field Management Plan | Upon the Effective Date of the AOC | May 20, 2013 (60 days after the Effective Date of the AOC) |
| Fall (post-harvest) Application Field Sampling | Within 14 days following harvest | 30 days after commencement of sampling |
| Spring (pre-planting) Application Field Sampling | At least 30 days prior to planting | 30 days after commencement of sampling |

| Task | Start Date | Completion Date |
|---|---|---|
| Dairy Facility Application Field Report | | 60 days after collecting last sample of each sampling event |
| Sample manure liquids and solids | | September 19, 2013 and March 19, 2014 and within a month of the anniversaries of these dates for eight years |

## 1.4 Quality Objectives and Criteria (A7)

### 1.4.1 Project Quality Objectives

Project-specific Data Quality Objectives (DQOs) were identified through the DQO process (EPA 2006) to meet the data user's needs for each activity. The specific data needs for application field sampling focus on nitrate concentrations in soil. The DQO decision-making process for the application field sampling is described in Appendix B.

The data needs for the application field sampling are summarized in Table 2. This table lists the specific analytes, regulatory limits or measurement criteria, and data uses. The different criteria that were evaluated to develop the data needs are described in the DQO decision-making process (Appendix B).

### 1.4.2 Measurement Performance Criteria

Measurement performance criteria are often expressed in terms of data quality indicators. The principal indicators of data quality are precision, accuracy, representativeness, comparability, and completeness (PARCC criteria). The following are definitions for the assessment of data quality indicators summarized from "Guidance for Quality Assurance Project Plans (EPA QA/G-5) (EPA 2002):

**Precision** is the measure of agreement among repeated measurements of the same property under identical or substantially similar conditions and is calculated as either the range or standard deviation.

**Accuracy** is a measure of the overall agreement of a measurement to a known value. It includes a combination of random error (precision) and systematic error (bias) components of both sampling and analytical operations.

**Representativeness** is a qualitative term that expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process conditions, or an environmental condition.

**Comparability** is a qualitative term that expresses the measure of confidence that one data set can be compared to another and can be combined for the decision to be made.

**Completeness** is a measure of the amount of valid data needed to be obtained from a measurement system.

Precision, accuracy, and completeness criteria are shown in Table 3.

### 1.5 Special Training/Certification (A8)

All personnel working on the project site will be trained in health and safety in accordance with the Health and Safety Plan (HSP). All personnel will comply with the requirements included in the HSP regarding site-specific hazards and conditions. Training requirements, documentation, and tracking are included in the HSP.

The laboratory performing analysis of application field samples is Soiltest Farm Consultants, Inc. (Soiltest) of Moses Lake, Washington. Section III.A.3.a. of the AOC SOW requires laboratories analyzing application field samples to be accredited by the state of Washington, National Environmental Laboratory Accreditation Program (NELAP) or equivalent as determined by EPA. Additionally, Section III.F.1.b.(5) of the SOW requires the testing laboratory be accredited through the North American Proficiency Testing (NAPT) program. Soiltest will comply with the requirements for analytical laboratories described in Section III.A.3.a. and Section III.F.1.b.(5) of the AOC SOW. Soiltest's certifications are included in Appendix C. Additional verification of Soiltest's NAPT certification and participation in the NAPT Performance Assessment Program (PAP) can be found at http://www.naptprogram.org/pap/labs.

### 1.6 Documents and Records (A9)

All field activities will be documented in field notebooks and the appropriate field forms included in Appendix D. Field documentation may include, but is not limited to:

- Soil Sampling Form
- Chain-of-Custody Form
- Daily Field Activities Record

All field team-generated documentation will be compiled and submitted to the STL and PC for distribution, inclusion in the project records, and use in subsequent reporting.

Laboratory documentation will be provided in accordance with the methods and protocols discussed in Section 4 of this AFMP. Laboratory analytical data will be distributed to the PC. The PC will distribute the data to the EPA, project team members, and others as required.

## 2. Data Generation and Acquisition (Group B)

Considering the primary objective of the project (as detailed in Section 1.2.2), a field activity and sampling strategy has been designed to ensure that all information, sample collection, analytical data and resulting decisions are technically sound, scientifically valid, and properly administered.

### 2.1 Sampling Design (Experimental Design) (B1)

The objectives of the project will be accomplished by sampling soils in application fields. Application fields are those fields located within the Dairy Facility boundaries (Figures 2 and 3) on which the dairy applies solid or liquid animal waste and/or synthetic fertilizer.

#### 2.1.1 Sampling Design Rationale

Representative samples will be collected from a Sampling Unit (SU). A SU may correspond to a particular application field or, at the discretion of Cow Palace in consultation with a certified nutrient management planner, agronomist, or soil scientist, application fields may be subdivided into Management Units. The SUs for Cow Palace were determined from evaluating the following:

- Current Nutrient Management Plan management units
- Field cropping history
- Evaluation of the most recent soil samples
- Soil series and topography
- Irrigation system types and capabilities

The collection and analysis of application field samples will be utilized to monitor mobile and non-mobile nutrients within the upper portion of the soil column. The results will be used to determine agronomic application rates of solid or liquid manure and/or synthetic fertilizer required to grow a healthy crop while limiting the amount of mobile nutrients that may potentially migrate to groundwater. The following methodologies and procedures will guide sampling activities. Table 1 presents a summary of the SUs.

#### 2.1.2 Sample Strategy and Design

This section presents an overview of the sampling strategy and design that will be used to collect application field samples for laboratory analysis. Laboratory analysis will include measurements of ammonium, nitrate, phosphorus, potassium, pH, electrical conductivity, and soil organic matter. Section 2.2 presents a detailed description of the sampling methodology that will be employed to collect samples.

Representative samples or field composites will be collected from specific intervals at each of the SUs (Soil Sampling, U of I Coop Ext Bulletin 704). Subsample intervals will include 12 inches, 24 inches, and 36 inches (36 inch interval for fall post-harvest only). A representative field composite will be taken twice annually representative of spring pre-planting and fall post-harvest conditions. The fall post-harvest field composite samples are designated for the purpose of evaluating the concentration of soil nitrates below the effective crop rooting zone. The number of subsamples in each SU will correspond to the size of the SU as follows:

- SUs smaller than 5 acres will have no fewer than 15 subsamples
- SUs from 5-10 acres will have no fewer than 18 subsamples
- SUs from 10-25 acres will have no fewer than 20 subsamples
- SUs from 25-50 acres will have no fewer than 25 subsamples
- SUs greater than 50 acres will have no fewer than 30 subsamples

#### 2.1.3 Sample Types, Locations, and Frequencies

Subsample locations within the SU will be taken in a random method (zig-zag or meander) to thoroughly represent the SU. Representative field composites will be taken twice annually both as a spring pre-plant and also as a fall post-harvest. Subsample intervals will include 12 inches, 24 inches, and 36 inches (36 inch interval for fall post-harvest only). Where soil depth is limited by an impermeable caliche or rock layer, the maximum sampling depth will be determined by the depth of that layer and recorded in field sampling documents. All sample locations will be recorded with a hand-held GPS so that subsequent samples may be taken in the same general area during later sampling events.

### 2.2 Sampling Methods (B2)

This section presents the sampling methodology for the collection of application field samples. Application field sampling activities will be conducted by field teams comprised of two field staff. Representative sampling procedures are consistent with generally-accepted professional agricultural field sampling presented in Soil Sampling, University of Idaho College of Agriculture Cooperative Extension System Bulletin 704 (revised); Monitoring Soil Nutrients in Dryland Systems using Management Unites, Oregon State University Extension Publication EM 8920-E; and Soil Sampling, U.S. Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS) Fact Sheet MN-NUTR3 (revised July 2002). Soil sampling procedures are presented in the SOPs entitled Surface and Subsurface Soil Using Manual Methods (Appendix E) and Compositing or Homogenizing Samples (Appendix F).

#### 2.2.1 Sample Collection

Application field samples will be collected with a 36- to 54-inch, open-faced soil sampling tube with 12-inch incremental markings or, as needed, a graduated hydraulic sampler or soil auger. Field composite samples for each SU and for each depth (e.g., 12 inches, 24 inches, and 36 inches [36 inch interval for fall post-harvest only]) will be screened to remove organic debris and large rocks and thoroughly mixed in a clean bucket. Subsamples will be of consistent volume and not less than 30 grams (approximately 1 ounce). Samples will be transferred to a labeled can or bag of known volume. Samples will be placed into a cooler packed with ice packs or dry ice so that they are not touching the ice directly and kept at a cool temperature until they can be further processed.

#### 2.2.2 Sampling Equipment Decontamination

Decontamination of sampling equipment will follow the procedures presented in the SOP entitled Field Equipment Decontamination (Appendix G).

### 2.3 Sample Handling and Custody (B3)

This section describes sample management and documentation procedures that will be followed during application field sampling to ensure that samples keep their original condition during sample collection, transportation, storage, and analysis. All sample control and chain-of-custody procedures will follow the SOP entitled Chain-of-Custody, Handling, Packing and Shipping (Appendix H) except where noted.

#### 2.3.1 Sample Labeling Methodology

All samples collected for laboratory analysis will be assigned a unique sample number and will include samples, field duplicates, and field blanks using the nomenclature system described in this section. Sample identification for well samples, duplicates, and field blanks will be as follows:

| | |
|---|---|
| Field composite sample | CP-SU##-‘depth interval’-‘season’ |
| Field duplicate | CP-SU##-‘depth interval’-“D” |
| Field blank | CP-SU##-‘depth interval’ “B” |

where “CP” designates Cow Palace; ‘depth’ is designated by A (12 inches), B (24 inches), or C (36 inches; ‘season’ is designated by S (spring pre-planting) or F (fall post-harvest). One field duplicate sample will be collected for every 20 samples.

For example, sample no. CP-SU03-B-S would refer to a field composite sample collected from Cow Palace, SU no. 3, 24-inch depth interval during the spring (pre-planting).

Each sample collected in the field will be labeled for future identification. Sample labels will be filled out as completely as possible by a member of the sampling team prior to the start of the day’s field sampling activities. The date, time, sampler’s signature, and the last field of the sample identification number should not be completed until the sample is actually collected. All sample labels will be filled out using waterproof ink. At a minimum, each label will contain the following information:

- Sampler's initials
- Sampler's company affiliation
- Site location
- Sample identification number
- Date and time of sample collection
- Analyses required
- Sample matrix
- Sampler's signature.

#### 2.3.2 Sample Chain-of-Custody

Sample designation, sampling time and date, sampling personnel, and analyses will also be recorded on the field records, sample labels, and chains of custody. The purpose of the chain-of-custody is to ensure that the possession of samples is traceable from the time of sample collection until the samples are analyzed. A sample is considered to be in custody when:

- It is in your possession.
- It is in your view, after being in your possession.
- It was in your possession and then you secured it.
- It is in a designated secure area that has restricted access.

To ensure proper control of samples in the field, it is important that as few people as possible handle the samples. The field sampler is the primary person responsible for the care and custody of samples until they are transferred or shipped. The PC and STL will determine if proper custody procedures have been followed during field activities and, if deficiencies are found, will determine if additional sample collection is warranted.

All samples will be accompanied by a chain-of-custody record. When custody of samples is transferred, the individuals relinquishing and receiving the samples will sign and date the chain-of-custody record. The chain-of-custody record documents custody transfer from the sampler, often through another agent (shipping/transport company), to the laboratory sample custodian.

Prior to shipment, samples will be packaged properly and a chain-of-custody record will accompany each shipping container. All shipping containers will be sealed with custody seals for shipment/transport to the laboratory. Custody seals will be placed in a manner that will indicate if the container has been opened during shipment. Courier names and other pertinent information will be documented on the chain-of-custody record. All

shipments will be accompanied by the chain-of-custody record that identifies the contents of the shipment. The original and one copy will be included in the shipment, an additional copy will be retained by the sampler and provided to the PC. All shipping documentation (e.g., freight bills) will be retained as part of the chain-of-custody documentation by the PC.

The samples collected for laboratory analysis will be received by Ms Kay Duvall at Soiltest located at 2925 Driggs Drive, Moses Lake, Washington. Because of the 48-hour holding time for nitrate analysis by Western Coordinating Committee (WCC) S-3.10, samples will be shipped using an overnight delivery service each day (Monday through Thursday). Soiltest will analyze the samples immediately upon receipt to ensure holding time compliance.

Upon arrival at the laboratory, the Soiltest sample custodian will accept custody of the samples from the carrier and enter information about the shipment into a sample receipt log that will include the initials of the person delivering the package and the status of custody seals on the containers. The sample custodian will log in the samples following the laboratory standard operating procedure. Following sample analysis, the unused portions of all samples will be disposed of by Soiltest in accordance with their laboratory SOP.

#### 2.3.3 Field Logbooks and Field Sampling Forms

In addition to the chain-of-custody documentation described above, field log books and field sampling forms will be completed to document daily activities and observations. Field sampling forms will be completed at each SU and will indicate if samples are collected, sample numbers, duplicate samples, and other pertinent information including significant events and observations that occur during sampling activities.

Data entry for sample collection, field measurements, and field equipment will follow the approach provided in the Field Log Book Entries SOP (Appendix I). Sufficient information will be noted in the field log books and on field sampling forms to enable participants to reconstruct events that occurred and to refresh the memory of field personnel if needed. Original copies of all field log books, field forms, and chain-of-custody documents will be retained by the PC in the project files.

### 2.4 Analytical Methods (B4)

Application field samples will be analyzed for the following analytes and methods:

- Ammonium – Western Coordinating Committee (WCC) S-3.50
- Nitrate (as Nitrogen) – WCC S-3.10
- Phosphorus - WCC S-4.10 (Olsen P)
- Potassium – WCC S-4.50
- pH - WCC S-2.20
- Electrical conductivity – WCC S-2.20
- Soil organic matter - WCC S-9.10

Table 3 presents the analytes, method, container, preservation method, and holding times for the application field samples.

### 2.5 Quality Control (B5)

This section presents the field and laboratory quality control (QC) requirements for application field samples.

#### 2.5.1 Field Quality Control Samples

Application field sampling includes the collection of field QC samples including field duplicates and field blanks. The field duplicate samples will be collected immediately following collection of target samples using the same collection procedures. Field duplicate samples will be collected at a frequency of one in every 20 samples. A field blank QC sample will be prepared by the sampling team at the beginning of each sampling day by filling a sample bottle with laboratory supplied deionized water. The field blank will remain in the sample container throughout the day. Field blanks will be prepared for each sample container and will be sent to the laboratory for analysis.

#### 2.5.2 Laboratory Quality Control Procedures

Laboratory QC procedures include the following:

- Laboratory blank measurements at a minimum 5 percent or one per batch frequency
- Accuracy and precision measurements at a minimum of one in 20 or one per set
- Data reduction and reporting according to the specified EPA Methods
- Laboratory documentation according to the specified EPA methods and laboratory SOP requirements.

### 2.6 Instrument/Equipment Testing, Inspection, and Maintenance (B6)

Instrument maintenance logbooks will be maintained in the laboratory at all times and will include a schedule of maintenance as well as a complete history of past maintenance for equipment used for the analysis of application field samples.

### 2.7 Instrument/Equipment Calibration and Frequency (B7)

The analytical laboratory will follow all calibration procedures and frequencies specified in by the methods listed in Section 2.4. The calibration and frequency will following the applicable procedures and method presented in the Quality Assurance Manual, which is maintained by the laboratory.

### 2.8 Inspection/Acceptance of Supplies and Consumable (B8)

Supplies and consumables will be inspected upon receipt. All sample jars used for the collection of laboratory analysis samples will be provided by the laboratory and will be new and certified clean. Field sampling team members will make note of the information on the certificate of analysis that accompanies sample containers to ensure that they meet the specifications and guidance for contaminant-free sample containers. Any discrepancies will be brought immediately to the attention of the STL.

### 2.9 Non-direct Measurements (B9)

No pre-existing data will be used to make decisions in support of the application field sampling. All data used to support decision-making will be collected during the application field sampling.

### 2.10 Data Management (B10)

All field data collected during the application field sampling will be recorded on field forms. Pertinent information will be transferred to an Excel spreadsheet or similar electronic data management tool.

The analytical data obtained from the laboratory will be maintained in an electronic data management tool. All data will undergo review and validation as described in Section 4.

In addition, the data provided to the EPA will be in accordance with the procedures presented in "EPA Region 10 Monitoring and Analytical Data Deliverables Data Submission Process for Water Quality Exchange (WQX) Compatible Deliverables for Yakima Dairies (Docket No. SDWA-10-2013-0080), and "EPA Region 10 Geographic Information System Data Deliverable Guidance for Yakima Dairies (Docket No. SDWA-10-2013-0080). These documents are presented in Appendix J.

Data submitted to the EPA will be provided in the requested format which will be consistent with the examples provided by the EPA to ARCADIS. An example of the required file format was provided to ARCADIS in EPA file R10WQXEDD.zip.

## 3. Assessment and Oversight (Group C)

### 3.1 Assessments and Response Actions (C1)

The PC, QAM, and project chemist will monitor the performance of the QA procedures presented in this AFMP. The PC has the ultimate responsibility for implementation of this AFMP. If problems arise, or if directed by the PC, the QAM will conduct a field audit for the purpose of evaluating compliance with the guidance presented in this AFMP.

Laboratory analysis of samples collected during the Application Field Sampling will be conducted by Soiltest. Soiltest will be responsible for complying with EPA Methods listed in Section 2.4 of this AFMP and internal SOPs for sample analyses; QC; and instrument testing, inspection, maintenance, and calibration. If deficiencies are noted, Soiltest will notify the PC. If such cases occur, the PC will notify the EPA PC and corrective action procedures will be implemented.

### 3.2 Reports to Management (C2)

#### 3.2.1 Dairy Facility Application Field Reports

Reporting is a necessary part of the project in order to assess progress and keep EPA informed of project activities. Dairy Facility Application Field Reports will be prepared for each application field sampling event and will be submitted to EPA within 60 days of collecting the last sample of each sampling event. Dairy Facility Application Field Reports will include a summary of data quality and quality assurance activities, corrective action taken for any significant activity, and project status as related to activity timelines.

### 3.2.2 Analytical Data Reporting

The analytical laboratory, Soiltest, will submit sufficient laboratory documentation such that sample results are traceable to the field samples, and the analytical data can be verified and validated by an independent third-party review. Preliminary and validated data reports will be provided by the laboratory to the PC. The PC, QAM, and project chemist will review the data reports from the laboratory and will evaluate the data validation and usability as described in Section 4. Validated data, the validation report, and associated raw data will be submitted to EPA in accordance with the AOC.

The following information will either be supplied by the laboratory as a hard copy deliverables to support project activities, data validation and the documentation of data quality or maintained at the laboratory and available on request:

| Data Deliverables (or maintained at the laboratory) |
|---|
| Case narrative including a discussion of nonconformance and corrective actions |
| Sample data and QC data summary forms |
| Chain-of-custody (COC) forms, sample receipt forms, logbook pages, shipping manifests |
| Verification of sample temperature on receipt |
| Copies of temperature logs for storage coolers used to store samples |
| Certificate of cleanliness for all laboratory-supplied sample bottles |
| Internal COC |
| Copies of SOPs |
| Sample and Standard preparation logs |
| Instrument Operating Conditions |
| Copies of sample analysis logbooks and analyst's notes |
| Instrument Run Log including copies of autosampler loading and verification of the autosampler loading |
| Raw data for instrument – hardcopy or electronic for field, calibration, and QC samples |
| Data review sheets |

| Data Deliverables (or maintained at the laboratory) |
|---|
| Example calculations |
| Control charts for method blanks, replicates, matrix spikes, matrix spike duplicates, laboratory control samples, and surrogates |
| Pertinent Method Detection Limit (MDL) studies and supporting information |
| Standards, standards reference materials, balance weights, and thermometer certificates |
| Verification of autopipettors and volumetric glassware |
| Balance calibration logs |
| Equipment maintenance records |
| Consumables acceptance and tracking records |
| Analyst's demonstration of precision and accuracy |

The validated data, the data validation repot, and the associated laboratory data will be submitted to the EPA in accordance with the AOC.

## 4. Data Validation and Usability (Group D)

### 4.1 Data Review, Verification, and Validation (D1)

Data verification will be conducted by the laboratory prior to submission to the PC. Data review, validation, and verification performed by the laboratory will comply with EPA requirements and laboratory SOPs for the EPA Methods specified in Section 2.4 of this AFMP.

### 4.2 Verification and Validation Methods (D2)

Prior to submitting the analytical samples to the laboratory, the sampling team leader or a designate will review the field notes and chain of custody for accuracy and completeness. The notes will be reviewed for appropriate documentation of the field work pertinent activities, including verifying complete residential information. The chain

of custodies will be reviewed for appropriate sample nomenclature and selected analysis.

The analytical data generated shall be reduced, validated, and reported by the laboratory according to the EPA methods listed in Section 2.4 above. Data verification will be performed by the laboratory for all analyses prior to the release of the data to ARCADIS. The laboratory will archive the analytical data in their own laboratory data management system. In addition, the project chemist will validate laboratory data upon receipt.

#### 4.2.1 Validation

An ARCADIS chemist will validate laboratory data upon receipt. The chemist will perform a Level II validation consistent with the National Functional Guidelines (EPA 2010). The checklist to be used in the validation process is presented in Table 4.

### 4.3 Reconciliation with User Requirements (D3)

Analytical data results obtained during the Application Field Sampling will be reconciled with precision, accuracy, and completeness criteria shown in Table 3.

## 5. References Cited

U.S. Environmental Protection Agency (EPA). 2001. EPA Requirements for Quality Assurance Project Plans (EPA QA/R-5). Office of Environmental Information, Washington, D.C. EPA/240/B-01/1003. March (reissued 2006).

EPA. 2002. Guidance for Quality Assurance Project Plans (EPA QA/G-5). Office of Environmental Information, Washington, D.C. EPA/240/R-02/009. December.

EPA. 2006. Guidance on Systematic Planning Using Data Quality Objectives Processes (EPA QA/G-4). Office of Environmental Information, Washington, D.C. EPA/240/B-06/001. February.

EPA. 2010. National Functional Guidelines for Inorganic Superfund Data Review. EPA/540/R-10/011. Contract Laboratory Program. January.

EPA. 2013. Administrative Order on Consent (AOC) Docket No. SDWA-10-2013-0080, March 19.

Monitoring Soil Nutrients in Dryland Systems Using Management Units, Oregon State University Extension Service, EM 8920-E, November 2006

NRCS Soil Sampling Fact Sheet MN-NUTR3, July 2002

Soil Sampling, University of Idaho Cooperative Extension System Bulletin 704

## 6. Certification

I certify under the penalty of law that this document and all attachments were prepared by me or under my direction or supervision in accordance with a system designed to assure that qualified personnel gathered and evaluated the information submitted. Based on my inquiry of any and all persons directly responsible for gathering and analyzing the information obtained, I certify that the information contained in or accompanying this submittal is to the best of my knowledge and belief, true, accurate and complete. As to those identified portion(s) of this submittal for which I cannot personally verify the accuracy, I certify that this submittal and all attachments were prepared in accordance with procedures designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those directly responsible for gathering the information, or the immediate supervisor of such person(s), the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Cow Palace, LLC

Signature: _____

Name: [redacted] _____

Title: Partner _____

Date: _____

# Tables

**Table 1**
**Application Field Summary Table**
**Cow Palace, Yakima County, Washington**

| Sampling Unit Designation | Related Application Field | Size (Acres) | Irrigation Type | Application Method | Rationale for Sampling Unit (SU) Definition |
|---|---|---|---|---|---|
| | | | | | |
| CP-SU-2 | Application Field 2 | 68.5 | Center pivot | Center pivot | Source of application, irrigation type, consistent soils, consistent topography, no defined sensitive areas, current NMP designation |
| CP-SU-3 | Application Field 3 | 11.8 | Wheel line - Reel gun | Wheel line | Source of application, irrigation type, consistent soils, consistent topography, no defined sensitive areas, current NMP designation |
| CP-SU-4 | Application Field 4 | 7 | Wheel line - Reel gun | Wheel line | Source of application, irrigation type, consistent soils, consistent topography, no defined sensitive areas, current NMP designation |
| CP-SU-5 | Application Field 5 | 143.9 | Center pivot | Center pivot | Source of application, irrigation type, consistent soils, consistent topography, no defined sensitive areas, current NMP designation |
| CP-SU-6 | Application Field 6 | 38.9 | Wheel line - Rill | Tanker | Source of application, irrigation type, consistent soils, consistent topography, no defined sensitive areas, current NMP designation |
| CP-SU-7 | Application Field 7 | 94.6 | Linear | Linear | Source of application, irrigation type, consistent soils, consistent topography, no defined sensitive areas, current NMP designation |
| CP-SU-8N | Application Field 8 | 78.1 | Linear | Linear | Source of application, irrigation type, consistent soils, consistent topography, no defined sensitive areas, farming history |
| CP-SU-8S | Application Field 8 | 79.1 | Linear | Linear | Source of application, irrigation type, consistent soils, consistent topography, no defined sensitive areas, farming history |
| CP-SU-9 | Application Field 9 | 59.4 | Wheel line | Tanker | Source of application, irrigation type, consistent soils, consistent topography, no defined sensitive areas, current NMP designation |
| CP-SU-10 | Application Field 10 | 155 | Center pivot | Tanker | Source of application, irrigation type, consistent soils, consistent topography, no defined sensitive areas, current NMP designation |
| CP-SU-14 | Application Field 14 | 40.3 | Rill | Tanker | Source of application, irrigation type, consistent soils, consistent topography, no defined sensitive areas, current NMP designation |
| CP-SU-16 | Application Field 16 | 16.3 | Wheel line - Reel gun | Tanker | Source of application, irrigation type, consistent soils, consistent topography, no defined sensitive areas, current NMP designation |
| CP-SU-17 | Application Field 17 | 38.4 | Wheel line - Reel gun | Tanker | Source of application, irrigation type, consistent soils, consistent topography, no defined sensitive areas, current NMP designation |

**Notes:**
SU = Sampling Unit
NMP = Nutrient Management Plan

**Table 2**
**Data Needs**
**Application Field Sampling**
**Cow Palace, Yakima County, Washington**

| Matrix | Analyte | Units | Lowest Potential Regulatory Level | Data Use |
|---|---|---|---|---|
| **Soil** | | | | |
| Analytical Laboratory | Ammonium | mg/Kg | NA | Support decision to manage field |
| Analytical Laboratory | Nitrate (as Nitrogen) | mg/Kg | 45 | Support decision to manage field |
| Analytical Laboratory | Phosphorus | mg/Kg | NA | Support decision to manage field |
| Analytical Laboratory | Potassium | mg/Kg | NA | Support decision to manage field |
| Analytical Laboratory | pH | pH units | NA | Support decision to manage field |
| Analytical Laboratory | Electrical Conductivity | mmhos/cm | NA | Support decision to manage field |
| Analytical Laboratory | Soil Organic Matter | mg/Kg | NA | Support decision to manage field |

**Notes:**
mg/Kg = milligrams per kilogram
mmhos/cm = micromhos per centimeter
NA = Not applicable

**Table 3**
**Analytes, Methods, Holding TImes, and Preservation**
**Application Field Sampling**
**Cow Palace, Yakima County, Washington**

| Analyte | Method | Reporting Limit | Container | No. of Containers | Hold Time | Preservation | Accuracy | Precision | Completeness |
|---|---|---|---|---|---|---|---|---|---|
| **Laboratory Measurements** | | | | | | | | | |
| Ammonium | WCC S-3.50 | 0.7 mg/Kg | Ziploc sterile plastic bag (1 gallon) | 1 | 48 hrs at ≤ 4 °C; or indefinitely at -20 °C | Dry, closed container; 4 °C | 80-120% | +/-20% | 90% |
| Nitrate (as Nitrogen) | WCC S-3.30 | 0.8 mg/Kg | Ziploc sterile plastic bag (1 gallon) | 1 | 48 hrs at ≤ 4 °C; or indefinitely at -20 °C | Dry, closed container; 4 °C | 80-120% | +/-20% | 90% |
| Phosphorus | WCC S-4.10 | 0.8 | Ziploc sterile plastic bag (1 gallon) | 1 | 48 hrs at ≤ 4 °C; or indefinitely at -20 °C | Dry, closed container; 4 °C | 80-120% | +/-20% | 90% |
| Potassium | WCC S-4.50 | 6.6 mg/Kg | Ziploc sterile plastic bag (1 gallon) | 1 | 48 hrs at ≤ 4 °C; or indefinitely at -20 °C | Dry, closed container; 4 °C | 80-120% | +/-20% | 90% |
| pH | WCC S-2.20 | NA | Ziploc sterile plastic bag (1 gallon) | 1 | 48 hrs at ≤ 4 °C; or indefinitely at -20 °C | Dry, closed container; 4 °C | 80-120% | +/-20% | 90% |
| Electrical Conductivity | WCC S-2.20 | 0.02 mmhos/cm | Ziploc sterile plastic bag (1 gallon) | 1 | 48 hrs at ≤ 4 °C; or indefinitely at -20 °C | Dry, closed container; 4 °C | 80-120% | +/-20% | 90% |
| Soil Organic Matter | WCC S-9.10 | 0.07 mg/Kg | Ziploc sterile plastic bag (1 gallon) | 1 | 48 hrs at ≤ 4 °C; or indefinitely at -20 °C | Dry, closed container; 4 °C | 80-120% | +/-20% | 90% |

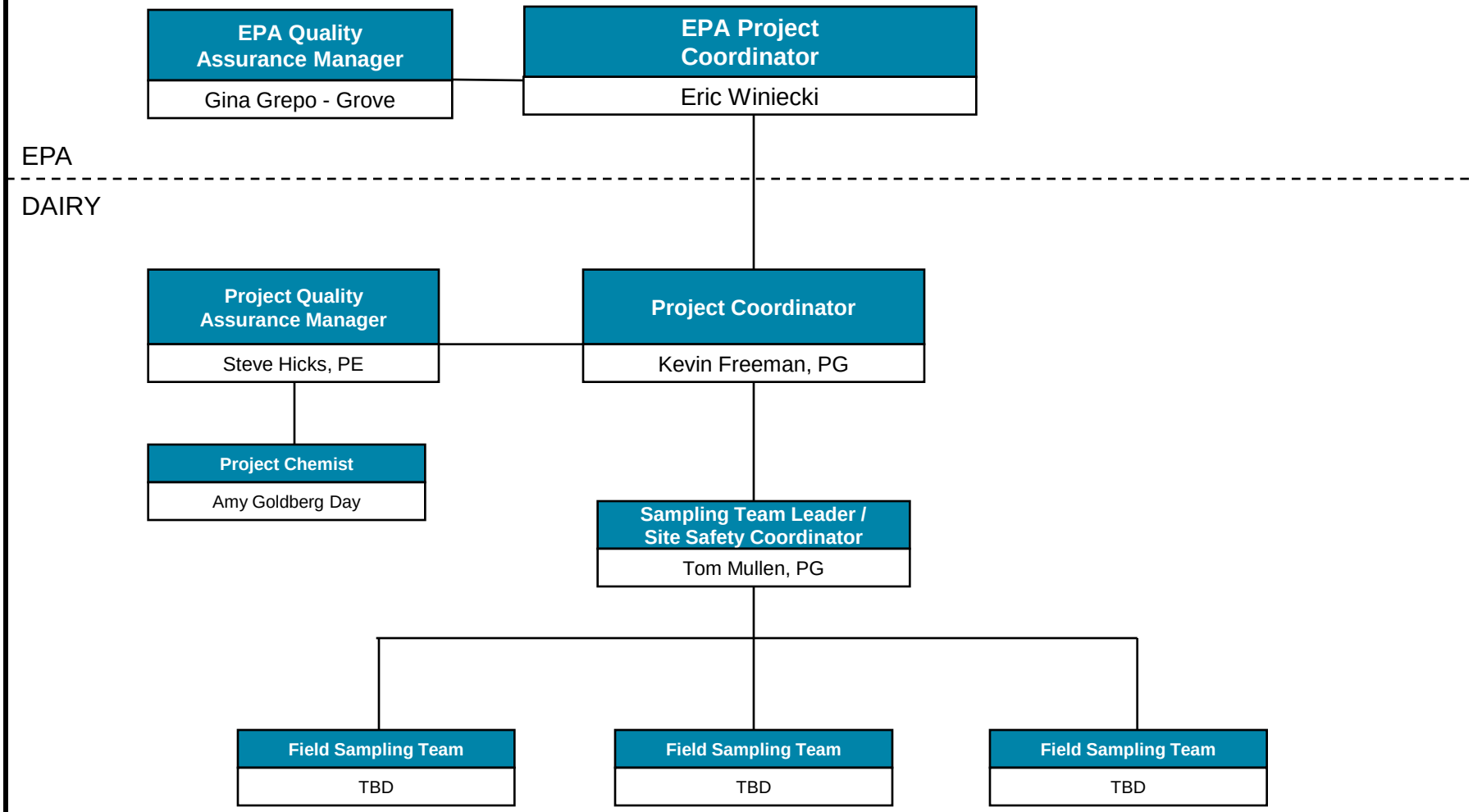
**Notes:**
mg/Kg = milligrams per kilogram
mmhos/cm = micromhos per centimeter
NA = Not applicable
°C = celsius

**Table 4**
**Validation Checklist**
**Application Field Sampling**
**Cow Palace, Yakima County, Washington**

| Tier II Validation Criteria | Reported | | Performance Acceptable | | Not Required |
|---|---|---|---|---|---|
| | No | Yes | No | Yes | |
| Holding times | | | | | |
| Reporting limits (units) | | | | | |
| Blanks | | | | | |
| A. Method blanks | | | | | |
| B. Equipment blanks | | | | | |
| C. Trip blanks | | | | | |
| Laboratory Control Sample (LCS) | | | | | |
| Laboratory Control Sample Duplicate (LCSD) | | | | | |
| LCS/LCSD Precision (RPD) | | | | | |
| Matrix Spike (MS) | | | | | |
| Matrix Spike Duplicate (MSD) | | | | | |
| MS/MSD Precision (RPD) | | | | | |
| Field/Lab Duplicate (RPD) | | | | | |
| Dilution Factor | | | | | |

**Notes:**
%RSD Relative standard deviation
%R Percent recovery
RPD Relative percent difference
%D Percent difference

# Figures

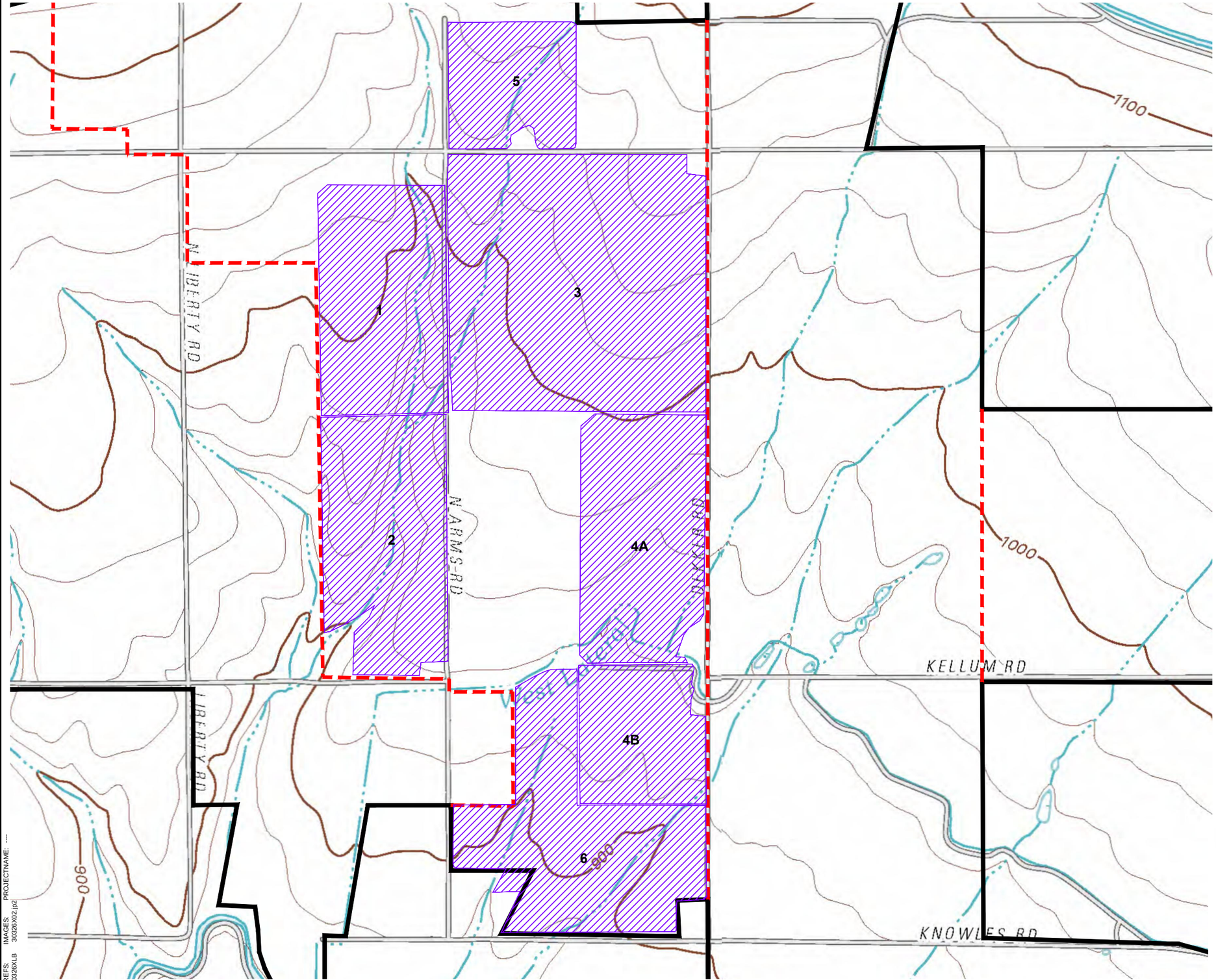



**COW PALACE**

**Project Organization**
**Application Field Sampling**

ARCADIS

FIGURE
**1**




**LEGEND:**

- APPROXIMATE BOUNDARY OF DAIRY FACILITIES
- COW PALACE DAIRY APPLICATION FIELDS
- RESPONDENTS OWNERSHIP BOUNDARIES

0 1000' 2000'

GRAPHIC SCALE

COW PALACE DAIRY
SDWA-10-2013-0080
**APPLICATION FIELD SAMPLING**

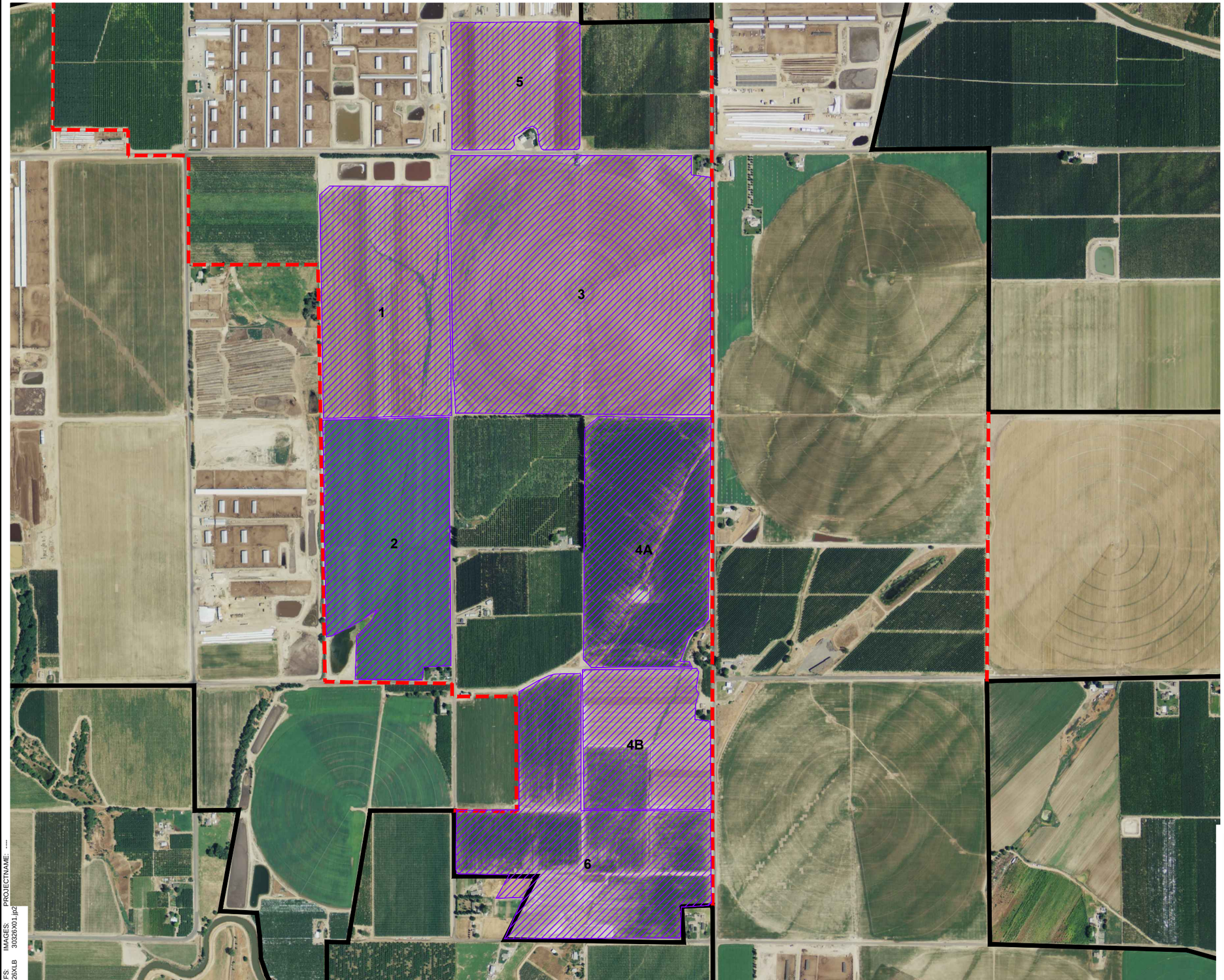
**SITE MAP**

ARCADIS

FIGURE
**2**

**SOURCE: WASHINGTON 2011 NAIP ORTHO-IMAGERY-18 INCH DATA, WASHINGTON STATE ORTHOIMAGE PORTAL [HTTP://GEOGRAPHY.WA.GOV/ORTHO]**

CITY:(Reqd) DIV/GROUP:(Reqd) DB:(Reqd) LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\SK030326\0000\00001\DWG\CP30326B04.dwg LAYOUT: 2 SAVED: 5/15/2013 4:31 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 5/16/2013 8:21 AM BY: SCHILLING, ADAM
XREFS: 30326XLB IMAGES: 30326X02.jp2 PROJECTNAME: ----




**LEGEND:**

- APPROXIMATE BOUNDARY OF DAIRY FACILITIES
- COW PALACE DAIRY APPLICATION FIELDS
- RESPONDENTS OWNERSHIP BOUNDARIES

0 1000' 2000'

GRAPHIC SCALE

COW PALACE DAIRY
SDWA-10-2013-0080
**APPLICATION FIELD SAMPLING**

**AERIAL PHOTOGRAPH**

ARCADIS

FIGURE
**3**

**SOURCE: WASHINGTON 2011 NAIP ORTHO-IMAGERY-18 INCH DATA, WASHINGTON STATE ORTHOIMAGE PORTAL [HTTP://GEOGRAPHY.WA.GOV/ORTHO]**

CITY:(Reqd) DIV/GROUP:(Reqd) DB:(Reqd) LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\SK030326\0000\0001\DWG\CP\30326B03.dwg LAYOUT: 3 SAVED: 5/15/2013 4:30 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 5/15/2013 4:30 PM BY: SCHILLING, ADAM
XREFS: IMAGES: PROJECTNAME: ----
30326XLB 30326X01.jpg

# Appendix A

Fertilizer Application Practices

**APPENDIX A**
**FERTILZER APPLICATION PRACTICES**
**APPLICATION FIELD MANAGEMENT PLAN**
**COW PALACE, YAKIMA COUNTY, WASHINGTON**

## 1. Fertilizer Application

All applications of liquid or solid manure and synthetic fertilizers will be in accordance with the current Natural Resources Conservation Services (NRCS) Practice Standards 590. The same standards are also applicable to Cow Palace's current Nutrient Management Plan.

### 1.1 Purpose

- To budget, supply, and conserve nutrients for plant production
- To minimize agricultural nonpoint source pollution of surface and groundwater resources.
- To properly utilize manure or organic by-products as a plant nutrient source.
- To protect air quality by reducing odors, nitrogen emissions (ammonia, oxides of nitrogen), and the formation of atmospheric particulates.
- To maintain or improve the physical, chemical, and biological condition of the soil.

### 1.2 Criteria /components (of NRCS-590 Nutrient Management Plan)

- Aerial site photographs or maps and a soil map.
- Current and/or planned plant production sequences or crop rotation.
- Soil information –series, texture, pH, drainage class, permeability, available water content (AWC), depth to water table, other, if pertinent.
- Soil test results and recommended nutrient application rates.
- Plant tissue results when used for nutrient management.
- A complete nutrient budget for nitrogen, phosphorus, and potassium for the plant production system.
- Realistic yield goals and a description of how they were determined.
- Quantification of all important nutrient sources (this would include commercial fertilizer, animal manures or other organic by-products, irrigation water, green manures, etc.).
- Planned rates, methods, and timing (month and year) of nutrient applications for each application field sampling unit (SU).
- Location of nearby residences near manure application sites.
- Results of NRCS-approved risk assessment tools for nitrogen (N), phosphorus (P) and erosion.
- Documentation of sites with low P risk if P is applied at excess rates.
- If soil P is increasing, document risks and propose a P draw-down strategy.
- List of all enhanced efficiency fertilizer products used.

### 1.3 Nutrient Application

Determination of application rate must be based on crop/cropping sequence, current soil test results, realistic yield goals, nutrient removal rates, and NRCS-approved nutrient risk assessments. Application rates of liquid or solid manures and synthetic fertilizer will be determined by an up-to-date analysis of the product. Liquid and solid manure samples will be collected twice per year from each dairy facility. Samples should be taken each spring and fall just prior to or at the same time as soil sampling to evaluate nutrient content.

#### 1.3.1 Liquid from lagoons

Samples will be taken from within the pumping zone of the lagoon and sent to Soiltest for analysis. Analyses will include: total nitrogen (TN), ammonium (as nitrogen, NH4-N), P, potassium (K) and percent solids (NRCS-590). Additional tests may be taken for agronomic evaluation. Samples should be kept in a cooler and shipped the same day of collection in an insulated box with ice packs. If same day shipping is not feasible, then the samples should be refrigerated.

#### 1.3.2 Solids from any source used as a fertilizer, including compost.

Samples will be taken from several locations from within the source and mixed, bagged, and kept in a cooler for same day shipping. Samples will be shipped in an insulated box with ice packs. If same day shipping is not feasible, then the samples should be refrigerated.

#### 1.3.3 Determination of Available Nutrient Levels

Available nutrient levels within the liquid and solid manures will be determined utilizing land-grant university guidelines. Application of manure is allowed on crop fields only if the “post-harvest” soil sample nitrate (as nitrogen, NO3-N) levels are at 45 parts per million (ppm) or below in the second foot. However, if the spring soil sample is within the compliance standard, then agronomic rates could be applied following the above criteria of application. If root zone soil NO3-N levels are not adequate to meet crop needs and irrigation water monitoring is being utilized, then topical rates to meet crop demand could be considered, upon documentation of the nitrogen need. In-season soil analysis and tissue analysis could verify or document if such a scenario would arise.

#### 1.3.4 Off-site Application of liquid and solid manures

Avoid transporting solid or liquid manures to locations with known groundwater nitrate levels above 10 milligrams per liter (mg/L). Applications of liquid and solid manures is allowed on crop fields only if the second foot NO3-N levels are at 45 ppm or below in the grower’s most recent soil sample. Growers receiving liquid or solid manures will need to have a spring or fall soil sample each year to verify that they meet the above standard. Records of off-site liquid or solid manure applications will need to be maintained.

#### 1.3.5 Manure Application Methods

*Liquid manure*

If liquid manure is applied through an existing irrigation system, then the total gallons of application will need to be measured. Application rates will need to correspond to the recommendation as outlined by the Agronomist or Soil Scientist. If liquid is applied via a tanker or other spreading implement, then a calibration of the gallons applied per specified unit of area will need to be made.

*Solid manure*

If solid manures are applied via a truck or spreading implement, a specific calibration will need to be made before application to ensure recommended rates are being applied.

#### 1.3.6 Additional Considerations

Irrigation applications must minimize the risk of nutrient loss to surface water and groundwater. Consider any additional measures to help reduce the risk of nitrate leaching including but not limited to: crop changes, reduced application, split applications, the use of nitrogen stabilizers, lagoon water treatment, etc.

Make an assessment of the possible risk of nitrate leaching from any currently utilized surface water retention basins.

## 2. References

NRCS Practice Standard Code 590 – Nutrient Management

# Appendix B

Data Quality Objectives (DQOs)

Appendix B – Data Quality Objectives for Application Field Sampling

| | |
|---|---|
| Step 1: State the Problem | Pursuant to Section III.F of the Administrative Order on Consent (AOC) Statement of Work (SOW), the Dairies shall institute Immediate Source Control Actions as they relate to application fields.<br><br>The goal of the AOC is to achieve soil concentrations of nitrate (as nitrogen) at or less than 45 milligrams per kilogram (mg/kg), or parts per million (ppm), at 2 feet below ground surface (bgs). |
| Step 2: Identify the Decision | Primary Questions:<br>• What are concentrations of nitrate (as nitrogen) in subsurface soils within and below crop root zones in application fields?<br>• Does the application of solid and liquid manure in accordance with current NRCS Practice Standard 590 result in nitrate concentrations less than 45 ppm at 2 feet bgs during fall post-harvest sampling? |
| Step 3: Identify Inputs to the Decision | • Location and size of application fields.<br>• Subsurface soil samples collected both pre-planting and post-harvesting.<br>• Analysis of the collected soil samples for ammonium, nitrate, phosphorus, potassium, pH, electrical conductivity, and soil organic matter. |
| Step 4: Define the Boundaries of the Study | • Spatial Boundary: Representative field composite samples from specific target depth intervals for each Sampling Unit (SU).<br>• Temporal Boundary: Field composite samples collected before spring planting (pre-planting) and after fall harvest (post-harvest) of crops. |
| Step 5: Develop a Decision Rule | Primary Decision Rules:<br>1. If soil nitrate concentrations at 2 feet bgs are equal to or less than 45 ppm in the post-harvest sample, then a certified nutrient management planner, agronomist, or soil scientist will be consulted to develop appropriate irrigation and nutrient management methods to prevent application of nutrients to the SU to meet cropping needs.<br>2. If soil nitrate concentrations at 2 feet bgs are greater than 45 ppm in the post-harvest sample, then a certified nutrient management planner, agronomist, or soil scientist will be consulted to develop appropriate irrigation and nutrient application methods with the goal of reducing nitrate concentrations at 2 feet bgs of 45 ppm or less. |
| Step 6: Specify Tolerable Limits on Decision Errors | The Application Field Management Plan (AFMP) was designed to provide a comprehensive characterization of soil conditions beneath Dairy facility application fields. Nitrate concentrations, as well as related analytes, will be measured in soil samples collected from Dairy application fields of interest.<br><br>Precision, accuracy, and completeness criteria for analytical samples are shown in Table 3 of the AFMP. Data verification will be conducted by the laboratory prior to submission to the Project Coordinator. Data review, validation, and verification performed by the laboratory will comply with EPA requirements and laboratory SOPs for the analytical methods specified in Section 2.5.2 of the AFMP |
| Step 7: Develop the Plan for Obtaining Data | • Representative samples will be collected twice annually as pre-planting (spring) and post-harvest (fall) samples.<br>• Representative samples will be collected from a Sampling Unit (SU). A SU may correspond to a particular application field or application fields may be subdivided into Management Units.<br>• If an application field is divided into Management Units, then the SUs will correspond to the particular Management Units contained by that application field.<br>• Representative samples are defined as composite sample, produced from a defined number of subsamples, collected from the SU at each target depth. |

| | |
|---|---|
| | • The subsamples will be collected from target depths of (1) 12 inches and (2) 24 inches bgs. An additional sample will be collected at 36 inches bgs during post-harvest sampling only<br>• A minimum of 20 subsamples will be collected from discrete locations within a SU of 25 acres or less. For SUs between 25 to 50 acres in size, 25 subsamples will be collected. For SUs greater than 50 acres in size, 30 subsamples will be collected.<br>• The subsample locations within the SU will be determined using a random method. The sampler will meander or zig-zag throughout the SU, making sure to distribute subsample sites throughout the SU.<br>• The target depth subsamples will be collected concurrently from the same subsample location.<br>• (e) The subsamples will be of consistent volume and not less than 30 grams (approximately 1 ounce).<br>• Application field samples will be analyze for ammonium, nitrate as nitrogen, phosphorus, potassium, pH, electrical conductivity, and soil organic matter by Western States methods.<br>• Dairy Facility Application Field Reports will be prepared for each application field sampling event and will be submitted to EPA within 60 days of collecting the last sample of each sampling event. Dairy Facility Application Field Reports will include a summary of data quality and quality assurance activities, corrective action taken for any significant activity, and project status as related to activity timelines. |

# Appendix C

Laboratory Certification

This certifies

# SoilTest Farm Consultants

Participated in the 2012

# Soil & Plant Program

of the
North American Proficiency Testing Program
of the Soil Science Society of America

Scott Fridlund
2012 NAPT Oversight Committee Chair

Soil Science Society of America

# WASHINGTON STATE DEPARTMENT OF ECOLOGY

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

## SCOPE OF ACCREDITATION

## Soiltest Farm Consultants, Inc. Laboratory

### Moses Lake, WA

is accredited for the analytes listed below using the methods indicated. Full accreditation is granted unless stated otherwise in a note. Accreditation for U.S. Environmental Protection Agency (EPA) "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846) is for the latest version of the method. SM refers to EPA approved editions of “Standard Methods for the Examination of Water and Wastewater.” ASTM is the American Society for Testing and Materials. Other references are described in notes.

| Matrix/Analyte | Method | Notes |
|---|---|---|
| **Drinking Water** | | |
| Turbidity | SM 2130 B-01 | |
| Alkalinity | SM 2320 B-97 | |
| Specific Conductance | SM 2510 B-97 | |
| Solids, Total Dissolved | SM 2540 C-97 | |
| Chloride | SM 4500-Cl E-00 | |
| Fluoride | SM 4500-F C-97 | |
| Nitrate | SM 4500-$NO3^{-}$ F-00 | |
| Nitrite | SM 4500-$NO3^{-}$ F-00 | |
| Orthophosphate | SM 4500-P E-99 | |
| Sulfate | SM 4500-$SO4^{-}$ C-97 | 1 |
| Aluminum | EPA 200.5_4.2_2003 | |
| Barium | EPA 200.5_4.2_2003 | |
| Beryllium | EPA 200.5_4.2_2003 | 1 |
| Cadmium | EPA 200.5_4.2_2003 | |
| Chromium | EPA 200.5_4.2_2003 | |
| Copper | EPA 200.5_4.2_2003 | |
| Iron | EPA 200.5_4.2_2003 | |
| Lead | EPA 200.5_4.2_2003 | |
| Manganese | EPA 200.5_4.2_2003 | |
| Nickel | EPA 200.5_4.2_2003 | |
| Silver | EPA 200.5_4.2_2003 | |
| Zinc | EPA 200.5_4.2_2003 | |

| Matrix/Analyte | Method | Notes |
|---|---|---|
| Calcium | EPA 200.7_4.4_1994 | |
| Magnesium | EPA 200.7_4.4_1994 | |
| Sodium | EPA 200.7_4.4_1994 | |
| **Non-Potable Water** | | |
| n-Hexane Extractable Material (O&G) | EPA 1664A_1_1999 | |
| Turbidity | SM 2130 B-01 | |
| Alkalinity | SM 2320 B-97 | |
| Hardness (calc.) | SM 2340 B-97 | |
| Specific Conductance | SM 2510 B-97 | |
| Solids, Total | SM 2540 B-97 | |
| Solids, Total Dissolved | SM 2540 C-97 | |
| Solids, Total Suspended | SM 2540 D-97 | |
| Chloride | SM 4500-Cl E-00 | |
| Fluoride | SM 4500-F C-97 | |
| Ammonia | SM 4500-NH3 G-97 | 1 |
| Nitrate | SM 4500-$NO3^{-}$ F-00 | |
| Nitrite | SM 4500-$NO3^{-}$ F-00 | |
| Nitrogen, Total Kjeldahl | SM 4500-Norg B-97 | |
| Orthophosphate | SM 4500-P E-99 | |
| Phosphorus, Total | SM 4500-P E-99 | 1 |
| Sulfate | SM 4500-$SO4^{-}$ C-97 | |
| Biochemical Oxygen Demand (BOD) | SM 5210 B-01 | |
| Chemical Oxygen Demand (COD) | SM 5220 D-97 | |
| Aluminum | EPA 200.5_4.2_2003 | |
| Antimony | EPA 200.5_4.2_2003 | |
| Arsenic | EPA 200.5_4.2_2003 | |
| Barium | EPA 200.5_4.2_2003 | |
| Beryllium | EPA 200.5_4.2_2003 | |
| Cadmium | EPA 200.5_4.2_2003 | |
| Chromium | EPA 200.5_4.2_2003 | |
| Copper | EPA 200.5_4.2_2003 | |
| Iron | EPA 200.5_4.2_2003 | |
| Lead | EPA 200.5_4.2_2003 | |
| Manganese | EPA 200.5_4.2_2003 | |
| Nickel | EPA 200.5_4.2_2003 | |

| Matrix/Analyte | Method | Notes |
|---|---|---|
| Selenium | EPA 200.5_4.2_2003 | |
| Silver | EPA 200.5_4.2_2003 | |
| Vanadium | EPA 200.5_4.2_2003 | |
| Zinc | EPA 200.5_4.2_2003 | |
| Calcium | EPA 200.7_4.4_1994 | |
| Cobalt | EPA 200.7_4.4_1994 | |
| Magnesium | EPA 200.7_4.4_1994 | |
| Potassium | EPA 200.7_4.4_1994 | |
| Sodium | EPA 200.7_4.4_1994 | |
| Strontium | EPA 200.7_4.4_1994 | |
| Thallium | EPA 200.7_4.4_1994 | 1 |
| **Solid and Chemical Materials** | | |
| Aluminum | EPA 6010C_(2/07) | |
| Antimony | EPA 6010C_(2/07) | |
| Arsenic | EPA 6010C_(2/07) | |
| Barium | EPA 6010C_(2/07) | |
| Beryllium | EPA 6010C_(2/07) | |
| Cadmium | EPA 6010C_(2/07) | |
| Calcium | EPA 6010C_(2/07) | |
| Chromium | EPA 6010C_(2/07) | |
| Cobalt | EPA 6010C_(2/07) | |
| Copper | EPA 6010C_(2/07) | |
| Iron | EPA 6010C_(2/07) | |
| Lead | EPA 6010C_(2/07) | |
| Magnesium | EPA 6010C_(2/07) | |
| Manganese | EPA 6010C_(2/07) | |
| Molybdenum | EPA 6010C_(2/07) | |
| Nickel | EPA 6010C_(2/07) | |
| Phosphorus, total | EPA 6010C_(2/07) | |
| Potassium | EPA 6010C_(2/07) | |
| Selenium | EPA 6010C_(2/07) | |
| Sodium | EPA 6010C_(2/07) | |
| Strontium | EPA 6010C_(2/07) | |
| Vanadium | EPA 6010C_(2/07) | |
| Zinc | EPA 6010C_(2/07) | |

| Matrix/Analyte | Method | Notes |
|---|---|---|
| Mercury | EPA 7473 | 1 |

**Accredited Parameter Note Detail**

(1) Provisional accreditation pending submittal of additional, acceptable Proficiency Testing (PT) results (WAC 173-50-110).

03/15/2013

Authentication Signature
Alan D. Rue, Lab Accreditation Unit Supervisor

Date

# Parameters Not Accredited

## Soiltest Farm Consultants, Inc. Laboratory

Moses Lake, WA

| Analyte | Method | Notes | Matrix |
|---|---|---|---|
| Solids, Total Volatile | EPA 160.4_1971 | 1 | N |
| Tin | EPA 200.5_4.2_2003 | 1 | N |
| Aluminum | EPA 200.7_4.4_1994 | 2 | D |
| Aluminum | EPA 200.7_4.4_1994 | 2 | N |
| Antimony | EPA 200.7_4.4_1994 | 2 | N |
| Arsenic | EPA 200.7_4.4_1994 | 2 | N |
| Barium | EPA 200.7_4.4_1994 | 2 | D |
| Barium | EPA 200.7_4.4_1994 | 2 | N |
| Beryllium | EPA 200.7_4.4_1994 | 2 | D |
| Beryllium | EPA 200.7_4.4_1994 | 2 | N |
| Cadmium | EPA 200.7_4.4_1994 | 2 | D |
| Cadmium | EPA 200.7_4.4_1994 | 2 | N |
| Chromium | EPA 200.7_4.4_1994 | 2 | D |
| Chromium | EPA 200.7_4.4_1994 | 2 | N |
| Copper | EPA 200.7_4.4_1994 | 2 | D |
| Copper | EPA 200.7_4.4_1994 | 2 | N |
| Iron | EPA 200.7_4.4_1994 | 2 | D |
| Iron | EPA 200.7_4.4_1994 | 2 | N |
| Lead | EPA 200.7_4.4_1994 | 2 | D |
| Lead | EPA 200.7_4.4_1994 | 2 | N |
| Manganese | EPA 200.7_4.4_1994 | 2 | D |
| Manganese | EPA 200.7_4.4_1994 | 2 | N |
| Molybdenum | EPA 200.7_4.4_1994 | 2 | N |
| Nickel | EPA 200.7_4.4_1994 | 2 | D |
| Nickel | EPA 200.7_4.4_1994 | 2 | N |
| Selenium | EPA 200.7_4.4_1994 | 2 | N |
| Silver | EPA 200.7_4.4_1994 | 2 | D |
| Silver | EPA 200.7_4.4_1994 | 2 | N |
| Tin | EPA 200.7_4.4_1994 | 2 | N |
| Titanium | EPA 200.7_4.4_1994 | 1 | N |
| Vanadium | EPA 200.7_4.4_1994 | 2 | N |
| Zinc | EPA 200.7_4.4_1994 | 2 | D |
| Zinc | EPA 200.7_4.4_1994 | 2 | N |

| Analyte | Method | Notes | Matrix |
|---|---|---|---|

**Denied Parameter Accreditation Footnotes**

(1) Denied pending receipt of acceptable PT results (WAC 173-50-140). (2) Withdrawn at laboratory's request.

Matrix Definitions - D = Drinking Water; N = Non-potable Water; S = Solid and Chemical Material; A = Air and Emissions.

# Appendix D

Field Forms

AGRIMANAGEMENT® INC.
AGRICULTURAL CONSULTANTS

# Fertility Sampling Worksheet

*Client:* | *Job Number:*
*FieldID:* | *Log Number:* F12-_____
*Acres:* | *Billing Code:* _____

*Sample Date:* ____/____/____ | *Lab Number:* _____
*Sampler:* _____
*IrrType:* _____ *Topography:* _____
*Soil series:* _____
*Leach Hazard:* _____ *FASD:* _____(ft)

*PreviousYear:* 2010 *Crop:* _____ *Sampler Time:* _____hrs
*Last Year:* 2011 *Crop:* _____ *Mileage:* _____miles
*Current Year:* 2012 *Crop:* *Clerical Time:* _____hrs
*Next Year:* _____ *Crop:* _____ *Professional Time:*_____hrs

*# sites to Sample depth 1:* ____ *2:* ____ *3:* ____ *4:* ____ *5:* ____
*Restrictive Layer?* *Y / N* *Restrictive Layer Desc:* _____
*Residue Incorporated?* *Y / N* *Residue Desc:* _____
*Comments:* _____
_____

*Sampler Instructions:* _____
_____
*Sample Depth:* _____ft _____inches
*# of Sites:* _____

## Laboratory Instructions:

| Can # | Depth | Sample Area | %AW | VWt. | NO3 | NH4 | SO4 | O.M. | pH | EC | P | K | Ca | Mg | Na | B | Zn | Mn | Fe | Cu | Calc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |

soiltest
farm consultants, inc.
2925 Driggs Dr., Moses Lake, Wa 98837 - www.soiltestlab.com
Office: (509)765-1622 - Fax:(509)765-0314 - (800)764-1622

# Laboratory Chain of Custody

| **Client: Please fill out:** | **Copy of report sent to:** |
|---|---|
| Company: | Company: |
| Contact: | Contact: |
| Address: | Address: |
| City, ST, Zip.: | City, ST, Zip.: |
| Telephone: | Telephone: |
| Fax: | Fax: |
| e mail: | e mail: |

Date: _____

Page _____ of _____

Job #/ Name:

Payment Method: Credit Card____ Est. Acct.___

Write sample information in horizontal rows. Write test name(s) or code(s) in verticle boxes at left. Mark an "X" at the intersection(s) where appropriate.

| | | | | Analyses Requested | | | | | Lab Use Only | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Identification | Date Sampled | No. of Containers | Sample Matrix | | | | | | **Sample Condition** | **LAB ID** |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

| **Releasing** | Date/Time | **Receiving** | Date | Time |
|---|---|---|---|---|
| Releasing signature 1 | | Receiving Signature 1 | | |
| Releasing signature 2 | | Receiving Signature 2 | | |
| Releasing signature 3 | | Receiving Signature 3 | | |

Submission of samples to Laboratory with a Chain of Custody constitutes a contract for services requested. Provide payment detail with each COC. If no payment information is provided, you will be contacted by the laboratory. We will make every effort to provide an accurate analysis of this sample. For reasonable cause, we will repeat the tests, but because of factors beyond our control, in sampling procedures and inherent sample variability in compost, soils, plants and water our liability is limited to the price of the tests.

soiltest farm consultants, inc.

2925 Driggs Dr., Moses Lake, WA 98837
(509)765-1622 or (800)764-1622
FAX (509)765-0314, www.soiltestlab.com

PAP-Accredited NAPT 2012

Soil & Plant Program 2011 NAPT

# MULTIPLE SOIL TEST REQUEST FORM

| | |
|---|---|
| NAME_____ | DATE RECEIVED _____ |
| ADDRESS_____ | GROWER _____ |
| CITY_____ | SAMPLE DATE_____ SAMPLER_____ |
| STATE & ZIP PHONE | FAX EMAIL |

| Report # | LAB # | Field I.D. | PREVIOUS CROP | PROPOSED CROP | YIELD | TEST# | **Nematode** | ADDITIONAL TESTS |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

CHECK TEST GROUP REQUESTED

**TEST GROUP**

- [ ] S - 1: pH, SS, NO3-N, NH4-N, OM, P, K, Ca, Mg, Na, S, B, Zn, Mn, Cu, Fe, Eff., Total Bases
- [ ] S - 2: pH, SS, NO3-N, NH4-N, OM, P, K, Ca, Mg, Na, Eff., Total Bases
- [ ] S - 3: pH, SS, NO3-N, NH4-N, OM, P, K, S, B, Zn, Mn, Cu, Fe
- [ ] S - 4: NO3-N, NH4-N, P, K, S, B, Zn
- [ ] S - 5: **Dryland profile**: NO3-N & Moisture 1-6 ft.; NH4-N, pH, SS, OM, P, K 1st foot; S 1-3 ft.
- [ ] S - 6: **Spring Topdressing**: NO3-N & Moisture 1-6 ft.; NH4-N 1st ft.
- [ ] S - 7: **West of Cascades:** pH, SS, NO3-N, NH4-N, OM, P, K, Ca, Mg, Na, S, B, Zn, Mn, Cu, Fe, CEC, Total Bases, % Base Saturation, Lime Req.
- [ ] S - 8: **Irrigated Profile**: NO3-N 1-3 ft., S 1-2 ft., Ammonium-N, P, K, B, Zn, pH, O.M., Sol Salts, Eff. 1st ft.
- [ ] S - 9: **West of Cascades**:pH, NO3-N, NH4-N, OM, P, K, Ca, Mg, Na, S, B, Zn, Lime Req.
- [ ] S - 10: **West of Cascades**:pH, P, K, Ca, Mg, Na, Lime Req., Total Bases
- [ ] S - 11: **West of Cascades**:pH, P, K, S, B, Zn, Mn, Cu, Fe, Lime Req.
- [ ] S - 12: NO3-N, NH4-N
- [ ] S - 13: **Organic Package:** pH, NO3-N, NH4-N, OM, P, K, CEC, Total Copper
- [ ] S - 14: **Nutrient Management/Garden Package:** NO3-N, NH4-N, P, K, pH, SS, OM
- [ ] **Add Nematode to above package**

**NRCS CSP Program Packages**

- [ ] CSPI S-1 + Cl
- [ ] CSPD CSPI at 1ft; S 1-3 ft NO3 & Moisture 1-6 ft

**Individual lement tests:** pH, SS, NO3-N, NH4-N, OM, P, K, Ca, Mg, Na, S, B, Zn, Mn, Cu, Fe, Eff., moisture, Lime Requirement, CEC

**Individual element(s) can be added to a test group** indicate in "ADDITIONAL TESTS" Box

We will make every effort to provide an accurate analysis of this sample. For reasonable cause, we will repeat the tests but because of factors beyond our control in sampling procedures and the inherent variability of soil, our liability is limited to the price of the tests. Recommendations are to be used as general guides and should be modified for specific field conditions and situations.

# DAILY ACTIVITY REPORT

ARCADIS

DATE:____/____/20___

Page _1_ of_____

| | | |
|---|---|---|
| Project: | Work Period: to | Temp.: |
| | Total Hours: | Wind: |
| Project No.: | Field Activity: | Ground: |
| Client: | | Misc.: |
| Location: | | |
| Personnel: | Equipment: | Visitors: |
| | | |

| Time | Field Notes |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | Report By: // Review By: Date: |

# Appendix E

Surface and Subsurface Soil
Sampling Using Manual Methods

ARCADIS
Infrastructure, environment, facilities

Imagine the result

# Surface and Subsurface Soil Sampling Using Manual Methods

Rev. #: 1

Rev Date: March 6, 2009

**Approval Signatures**

Prepared by: _____ Date: 3/6/09

Reviewed by: _____ Date: 3/6/09
(Technical Expert)

## I. Scope and Application

This document describes procedures for surface and subsurface soil sampling using hand tools.

## II. Personnel Qualifications

ARCADIS personnel directing, supervising, or leading soil sampling activities should have a minimum of 2 years of previous environmental soil sampling experience. ARCADIS personnel providing assistance to soil sample collection and associated activities should have a minimum of 6 months of related experience or an advanced degree in environmental sciences.

## III. Equipment List

The following materials will be available, as required, during soil sampling activities:

- personal protective equipment (PPE), as specified by the site Health and Safety Plan (HASP);
- stainless steel bowls;
- stainless steel spoons;
- stainless steel spades;
- stainless steel hand augers;
- indelible ink pens;
- engineer's ruler or survey rod;
- sealable plastic bags (e.g., Ziploc®);
- equipment decontamination materials
- sample bottles and preservatives appropriate for the parameters to be sampled for laboratory analysis, if any;
- transport container with ice (if sampling for laboratory analysis);
- appropriate sample containers and forms; and

- field notebook and/or personal digital assistant (PDA).

Documentation forms and notebooks to have on hand include: soil sample log forms, chain-of-custody forms, sample labels and seals, field logbook/PDA.

## IV. Cautions / Hazards

Task specific Job Safety Analysis (JSAs) must be developed to identify site hazards associated with the investigation and reviewed by all field crew members prior to the start of work. Safe Performance Self-Assessment (SPSA) to be performed by employees before performing a new task. Underground utilities will be cleared per the ARCADIS Utility Location Policy and Procedure.

## V. Health and Safety Considerations

Soil sample collection will be performed in accordance with a site-specific Health and Safety Plan (HASP) and task specific JSA forms, copies of which will be present on site during such activities.

## VI. Procedure

Soil samples may be collected at intervals from the ground surface to various depths. Sample locations will be identified using stakes, flagging, or other appropriate means, and will be noted in a field logbook, PDA, and/or soil sampling logs. Sample points will be located by surveying, use of a global positioning system (GPS), and/or measurements from other surveyed site features.

1. Equipment that will come in contact with the soil sample should be cleaned in accordance with the appropriate equipment decontamination SOP(s), or else new, disposable equipment should be used. Collect equipment blanks in accordance with the project Quality Assurance Project Plan (QAPP).

2. Clear the ground surface of brush, root mat, grass, leaves, or other debris.

3. Use a spade, spoon, scoop, or hand auger to collect a sample of the required depth interval.

4. Use an engineer's ruler to verify that the sample is collected to the correct depth and record the top and bottom depths from the ground surface.

5. To collect samples below the surface interval, remove the surface interval first; then collect the deeper interval. To prevent the hole from collapsing, it may be

necessary to remove a wider section from the surface or use cut polyvinyl chloride (PVC) tubing or pipe to maintain the opening.

6. Collect samples for volatile organic compounds (VOCs) as discrete samples using Encore® samplers or cut syringes (see Extraction/Preservation of Soil/Sediment Samples for VOCs SOP).

7. Homogenize samples for other analyses across the required interval or mix them with other discrete grab samples to form a composite sample (see Compositing or Homogenizing Samples SOP).

8. Place sample in clean sample container; label with sample identification number, date, and time of collection; and place on ice (if obtained for laboratory analysis). Prepare samples for packaging and shipping to the laboratory in accordance with the Chain-of-Custody Handling, Packing, and Shipping SOP.

9. Backfill sample holes to grade with native material or with clean builder's sand or other suitable material.

## VII. Waste Management

Waste soils will be managed as specified in the FSP or Work Plan, and according to state and /or federal requirements. Personal Protective Equipment (PPE) and decontamination fluids will be contained separately and staged at the project site for appropriate disposal. Waste containers must be a sealed and labeled at the time of generation. Labels will indicate date, sample locations, site name, city, state, and description of the matrix (e.g., soil, PPE).

## VIII. Data Recording and Management

Field documentation such as log book entries and chain-of –custody records will be transmitted to the ARCADIS PM or Task Manager each day unless otherwise directed. The field team leader will retain all site documentation while in the field and add to project files when the field mobilization is complete.

## IX. Quality Assurance

Quality assurance samples (rinse blanks, duplicates, and MS/MSDs) will be collected at the frequency specified in the FSP and/or QAPP and depending on the project quality objectives. Reusable soil sampling equipment will be cleaned prior to use following equipment cleaning SOP. Field rinse blanks will be used to confirm that decontamination procedures are sufficient and samples are representative of site

conditions. Any deviations from the SOP will be discussed with the project manager prior to changing any field procedures.

## Appendix F

Compositing or Homogenizing Samples

ARCADIS
Infrastructure, environment, facilities

Imagine the result

# Compositing or Homogenizing Samples

Rev. #: 01

Rev Date: March 11, 2009

**Approval Signatures**

Prepared by: Andrew Korik Date: 3/11/09

Reviewed by: Michael Gefell (Technical Expert) Date: 3/11/09

## I. Scope and Application

The general procedures to be used in composting/homogenizing solid and semisolid samples are outlined below.

## II. Personnel Qualifications

ARCADIS personnel directing, supervising, or leading compositing and/or homogenizing of samples should have a minimum of 2 years of previous field experience and current health and safety training including 40-hour HAZWOPER training, site supervisor training, site-specific training, first aid, and CPR, as needed. Field personnel will also be compliant with client-specific training requirements. In addition, ARCADIS field sampling personnel will be versed in the relevant SOPs and posses the required skills and experience necessary to successfully complete the desired field work

## III. Equipment List

The following materials will be available, as required, when compositing or homogenizing samples.

- personal protective equipment (PPE), as specified by the site Health and Safety Plan (HASP)
- stainless steel, plastic, glass or ceramic spoon (or disposable equivalent)
- stainless steel, plastic, glass or ceramic bowl (or disposable equivalent)
- stainless steel, plastic, glass or ceramic jar/bottle (or disposable equivalent)
- shovel or trowel
- plastic sheeting
- decontamination supplies
- digital camera (if allowed by facility policy)
- appropriate sample containers and forms
- field notebook and/or personal digital assistant (PDA)

## IV. Cautions

The field crew must be aware of the potential chemicals of concern (COCs), and equipped with a variety of sample homogenizing equipment. The field crew must take care not to use equipment that may react with suspected COCs. For example, stainless steel implements should not be used to homogenize strongly acidic materials.

Soil, sediment, sludge and other solid/semisolid materials that are easily mixed should be thoroughly homogenized. Excessive, vigorous mixing should be avoided as COCs can be mobilized/liberated posing a health and safety risk and diminishing the representativeness of the sample.

Implements used for compositing/homogenizing should be thoroughly decontaminated between samples. Field blanks and rinse blanks should be obtained.

A Shipping Determination must be performed, by DOT-trained personnel, for all environmental and geotechnical samples that are to be shipped, as well as some types of equipment/supplies that are to be shipped.

## V. Health and Safety Considerations

- Sample compositing/homogenizing will be performed using procedures consistent with the project Health and Safety Plan.
- Appropriate personal protective equipment (PPE) must be worn by all field personnel within the designated work area.
- Air monitoring may be required during certain field activities as required in the Site Health and Safety Plan.

ARCADIS field personnel will be familiar and compliant with Client-specific health and safety requirements.

## VI. Procedure

Samples may require homogenization across a given depth interval, or several discrete grabs (usually five) may be combined into a composite sample. Samples for volatile organic compound (VOC) analysis will not be homogenized or composited. The procedure for mixing samples is provided below.

1. Mix the materials in a stainless steel (or appropriate non-reactive material) bowl using a stainless steel spoon (or disposable equivalents). When dealing with large sample quantities, use disposable plastic sheeting and a shovel or trowel. Note: When preparing samples for metals analyses, do not use disposable aluminum (or metal tools or trays other than stainless steel), as it may influence the analytical results.

2. Flatten the pile by pressing the top without further mixing.

3. Divide the circular pile by into equal quarters by dividing out two diameters at right angles.

4. Mix each quarter individually using appropriate non-reactive bowls, spoons and/or sheeting.

5. Mix two quarters (as described above) to form halves, then mix the two halves to form a composite or homogenous sample.

6. Place composite or homogenized sample into specified containers. Remaining material will be disposed of in accordance with project requirements and applicable regulations.

## VII. Waste Management

Investigation-derived waste will be managed as described in the Investigation-Derived Waste Handling and Storage SOP.

## VIII. Data Recording and Management

Sample identification, interval depth (if appropriate), sample date and time will be recorded in the field notebook, the boring log, and/or the PDA. The sample will also be identified on an appropriate chain of custody form, for submittal to an analytical laboratory for analysis. Consider digital photography to record unusual field conditions or to document compliance (i.e. proper labeling and storage of drums/IDW containers).

## IX. Quality Assurance

All materials to be re-used for sample compositing/homogenizing will be decontaminated as appropriate. Field blanks and rinse blanks will be collected to evaluate decontamination procedures and to provide an indication as to whether external contamination has potentially been introduced.

## X. References

Not Applicable.

## Appendix G

Field Equipment Decontamination SOP

ARCADIS
Infrastructure, environment, facilities

Imagine the result

# Field Equipment Decontamination

Rev. #: 3

Rev Date: April 26, 2010

**Approval Signatures**

Prepared by: _____ Date: 4/26/2010
Keith Shepherd

Reviewed by: _____ Date: 4/26/2010
Richard Murphy (Technical Expert)

## I. Scope and Application

Equipment decontamination is performed to ensure that sampling equipment that contacts a sample, or monitoring equipment that is brought into contact with environmental media to be sampled, is free from analytes of interest and/or constituents that would interfere with laboratory analysis for analytes of interest. Equipment must be cleaned prior to use for sampling or contact with environmental media to be sampled, and prior to shipment or storage. The effectiveness of the decontamination procedure should be verified by collecting and analyzing equipment blank samples.

The equipment cleaning procedures described herein includes pre-field, in the field, and post-field cleaning of sampling tools which will be conducted at an established equipment decontamination area (EDA) on site (as appropriate). Equipment that may require decontamination at a given site includes: soil sampling tools; groundwater, sediment, and surface-water sampling devices; water testing instruments; down-hole instruments; and other activity-specific sampling equipment. Non-disposable equipment will be cleaned before collecting each sample, between sampling events, and prior to leaving the site. Cleaning procedures for sampling equipment will be monitored by collecting equipment blank samples as specified in the applicable work plan or field sampling plan. Dedicated and/or disposable (not to be re-used) sampling equipment will not require decontamination.

## II. Personnel Qualifications

ARCADIS field sampling personnel will have current health and safety training, including 40-hour HAZWOPER training, site supervisor training, and site-specific training, as needed. In addition, ARCADIS field sampling personnel will be versed in the relevant SOPs and possess the skills and experience necessary to successfully complete the desired fieldwork. The project HASP and other documents will identify any other training requirements such as site specific safety training or access control requirements.

## III. Equipment List

- health and safety equipment, as required in the site Health and Safety Plan (HASP)
- distilled water

- Non-phosphate detergent such as Alconox or, if sampling for phosphorus phosphorus-containing compounds, Luminox (or equivalent).
- tap water
- rinsate collection plastic containers
- DOT-approved waste shipping container(s), as specified in the work plan or field sampling plan (if decontamination waste is to be shipped for disposal)
- brushes
- large heavy-duty garbage bags
- spray bottles
- (Optional) – Isoprophyl alcohol (free of ketones) or methanol
- Ziploc-type bags
- plastic sheeting

## IV. Cautions

Rinse equipment thoroughly and allow the equipment to dry before re-use or storage to prevent introducing solvent into sample medium. If manual drying of equipment is required, use clean lint-free material to wipe the equipment dry.

Store decontaminated equipment in a clean, dry environment. Do not store near combustion engine exhausts.

If equipment is damaged to the extent that decontamination is uncertain due to cracks or dents, the equipment should not be used and should be discarded or submitted for repair prior to use for sample collection.

A proper shipping determination will be performed by a DOT-trained individual for cleaning materials shipped by ARCADIS.

## V. Health and Safety Considerations

Review the material safety data sheets (MSDS) for the cleaning materials used in decontamination. If solvent is used during decontamination, work in a well-ventilated area and stand upwind while applying solvent to equipment. Apply solvent in a manner that minimizes potential for exposure to workers. Follow health and safety procedures outlined in the HASP.

## VI. Procedure

A designated area will be established to clean sampling equipment in the field prior to sample collection. Equipment cleaning areas will be set up within or adjacent to the specific work area, but not at a location exposed to combustion engine exhaust. Detergent solutions will be prepared in clean containers for use in equipment decontamination.

### Cleaning Sampling Equipment

1. Wash the equipment/pump with potable water.

2. Wash with detergent solution (Alconox, Liquinox or equivalent) to remove all visible particulate matter and any residual oils or grease.

3. If equipment is very dirty, precleaning with a brush and tap water may be necessary.

4. (Optional) – Flush with isopropyl alcohol (free of ketones) or with methanol. This step is optional but should be considered when sampling in highly impacted media such as non-aqueous phase liquids or if equipment blanks from previous sampling events showed the potential for cross contamination of organics.

5. Rinse with distilled/deionized water.

### Decontaminating Submersible Pumps

Submersible pumps may be used during well development, groundwater sampling, or other investigative activities. The pumps will be cleaned and flushed before and between uses. This cleaning process will consist of an external detergent solution wash and tap water rinse, a flush of detergent solution through the pump, followed

by a flush of potable water through the pump. Flushing will be accomplished by using an appropriate container filled with detergent solution and another contained filled with potable water. The pump will run long enough to effectively flush the pump housing and hose (unless new, disposable hose is used). Caution should be exercised to avoid contact with the pump casing and water in the container while the pump is running (do not use metal drums or garbage cans) to avoid electric shock. Disconnect the pump from the power source before handling. The pump and hose should be placed on or in clean polyethylene sheeting to avoid contact with the ground surface.

## VII. Waste Management

Equipment decontamination rinsate will be managed in conjunction with all other waste produced during the field sampling effort. Waste management procedures are outlined in the work plan or Waste Management Plan (WMP).

## VIII. Data Recording and Management

Equipment cleaning and decontamination will be noted in the field notebook. Information will include the type of equipment cleaned, the decontamination location and any deviations from this SOP. Specific factors that should be noted include solvent used (if any), and source of water.

Any unusual field conditions should be noted if there is potential to impact the efficiency of the decontamination or subsequent sample collection.

An inventory of the solvents brought on site and used and removed from the site will be maintained in the files. Records will be maintained for any solvents used in decontamination, including lot number and expiration date.

Containers with decontamination fluids will be labeled.

## IX. Quality Assurance

Equipment blanks should be collected to verify that the decontamination procedures are effective in minimizing potential for cross contamination. The equipment blank is prepared by pouring deionized water over the clean and dry tools and collecting the deionized water into appropriate sample containers. Equipment blanks should be analyzed for the same set of parameters that are performed on the field samples collected with the equipment that was cleaned. Equipment blanks are collected per equipment set, which represents all of the tools needed to collect a specific sample.

## X. References

USEPA Region 9, Field Sampling Guidance #1230, Sampling Equipment Decontamination.

USEPA Region 1, Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells.

## Appendix H

Chain-of-Custody, Handling, Packing and Shipping SOP

ARCADIS
Infrastructure · Water · Environment · Buildings

Imagine the result

# Chain-of-Custody, Handling, Packing and Shipping

Rev. #: 2

Rev Date: March 6, 2009

**Approval Signatures**

Prepared by: _____ Date: 3/6/09
Caron Koll

Reviewed by: _____ Date: 3/6/09
Jane Kennedy(Technical Expert)

## I. Scope and Application

This Standard Operating Procedure (SOP) describes the chain-of-custody, handling, packing, and shipping procedures for the management of samples to decrease the potential for cross-contamination, tampering, mis-identification, and breakage, and to insure that samples are maintained in a controlled environment from the time of collection until receipt by the analytical laboratory.

## II. Personnel Qualifications

ARCADIS field sampling personnel will have current health and safety training, including 40-hour HAZWOPER training, Department of Transportation (DOT) training, site supervisor training, and site-specific training, as needed. In addition, ARCADIS field sampling personnel will be versed in the relevant SOPs and possess the skills and experience necessary to successfully complete the desired field work.

## III. Equipment List

The following list provides materials that may be required for each project. Project documents and sample collection requirements should be reviewed prior to initiating field operations:

- indelible ink pens (black or blue);
- polyethylene bags (resealable-type);
- clear packing tape, strapping tape, duct tape;
- chain of custody
- DOT shipping forms, as applicable
- custody seals or tape;
- appropriate sample containers and labels,;
- insulated coolers of adequate size for samples and sufficient ice to maintain 4°C during collection and transfer of samples;
- wet ice;
- cushioning and absorbent material (i.e., bubble wrap or bags);

- temperature blank
- sample return shipping papers and addresses; and
- field notebook.

## IV. Cautions

Review project requirements and select appropriate supplies prior to field mobilization.

Insure that appropriate sample containers with applicable preservatives, coolers, and packing material have been supplied by the laboratory.

Understand the offsite transfer requirements for the facility at which samples are collected.

If overnight courier service is required schedule pick-up or know where the drop-off service center is located and the hours of operation. Prior to using air transportation, confirm air shipment is acceptable under DOT and International Air Transport Association (IATA) regulation

Schedule pick-up time for laboratory courier or know location of laboratory/service center and hours of operation.

Understand DOT and IATA shipping requirements and evaluate dangerous goods shipping regulations relative to the samples being collected (i.e. complete an ARCADIS shipping determination). Review the ARCADIS SOPs for shipping, packaging and labeling of dangerous goods. Potential samples requiring compliance with this DOT regulation include:

- Methanol preservation for Volatile Organic Compounds in soil samples
- Non-aqueous phase liquids (NAPL)

## V. Health and Safety Considerations

Follow health and safety procedures outlined in the project/site Health and Safety Plan (HASP).

Use caution and appropriate cut resistant gloves when tightening lids to 40 mL vials. These vials can break while tightening and can lacerate hand. Amber vials (thinner glass) are more prone to breakage.

Some sample containers contain preservatives.

- The preservatives must be retained in the sample container and should in no instance be rinsed out.
- Preservatives may be corrosive and standard care should be exercised to reduce potential contact to personnel skin or clothing. Follow project safety procedures if spillage is observed.
- If sample container caps are broken discard the bottle. Do not use for sample collection.

## VI. Procedure

### Chain-of-Custody Procedures

1. Prior to collecting samples, complete the chain-of-custody record header information by filling in the project number, project name, and the name(s) of the sampling technician(s) and other relevant project information. Attachment 1 provides an example chain-o- custody record

2. Chain-of-custody information MUST be printed legibly using indelible ink (black or blue).

3. After sample collection, enter the individual sample information on the chain-of-custody:

    a. Sample Identification indicates the well number or soil location that the sample was collected from. Appropriate values for this field include well locations, grid points, or soil boring identification numbers (e.g., MW-3, X-20, SB-30). When the depth interval is included, the complete sample ID would be “SB-30 (0.5-1.0) where the depth interval is in feet. Please note it is very important that the use of hyphens in sample names and depth units (i.e., feet or inches) remain consistent for all samples entered on the chain-of-custody form. DO NOT use the apostrophe or quotes in the sample ID. Sample names may also use the abbreviations “FB,” “TB,” and “DUP” as prefixes or suffixes to indicate that the sample is a field blank, trip blank, or field duplicate, respectively. NOTE: The sample

nomenclature may be dictated by the project database and require unique identification for each sample collected for the project. Consult the project data management plan for additional information regarding sample identification.

b. List the date of sample collection. The date format to be followed should be mm/dd/yy (e.g., 03/07/09) or mm/dd/yyyy (e.g. 03/07/2009).

c. List the time that the sample was collected. The time value should be presented using military format. For example, 3:15 P.M. should be entered as 15:15.

d. The composite field should be checked if the sample is a composite over a period of time or from several different locations and mixed prior to placing in sample containers.

e. The “Grab”. field should be marked with an “X” if the sample was collected as an individual grab sample. (e.g. monitoring well sample or soil interval).

f. Any sample preservation should be noted.

g. The analytical parameters that the samples are being analyzed for should be written legibly on the diagonal lines. As much detail as possible should be presented to allow the analytical laboratory to properly analyze the samples. For example, polychlorinated biphenyl (PCB) analyses may be represented by entering “PCBs” or “Method 8082.” Multiple methods and/or analytical parameters may be combined for each column (e.g., PCBs/VOCs/SVOCs or 8082/8260/8270). These columns should also be used to present project-specific parameter lists (e.g., Appendix IX+3 target analyte list. Each sample that requires a particular parameter analysis will be identified by placing the number of containers in the appropriate analytical parameter column. For metals in particular, indicate which metals are required.

h. Number of containers for each method requested. This information may be included under the parameter or as a total for the sample based on the chain of custody form used.

i. Note which samples should be used for site specific matrix spikes.

j. Indicate any special project requirements.

k. Indicate turnaround time required.

l. Provide contact name and phone number in the event that problems are encountered when samples are received at the laboratory.

m. If available attach the Laboratory Task Order or Work Authorization forms

n. The remarks field should be used to communicate special analytical requirements to the laboratory. These requirements may be on a per sample basis such as “extract and hold sample until notified,” or may be used to inform the laboratory of special reporting requirements for the entire sample delivery group (SDG). Reporting requirements that should be specified in the remarks column include: 1) turnaround time; 2) contact and address where data reports should be sent; 3) name of laboratory project manager; and 4) type of sample preservation used.

o. The “Relinquished By” field should contain the signature of the sampling technician who relinquished custody of the samples to the shipping courier or the analytical laboratory.

p. The “Date” field following the signature block indicates the date the samples were relinquished. The date format should be mm/dd/yyyy (e.g., 03/07/2005).

q. The “Time” field following the signature block indicates the time that the samples were relinquished. The time value should be presented using military format. For example, 3:15 P.M. should be entered as 15:15.

r. The “Received By” section is signed by sample courier or laboratory representative who received the samples from the sampling technician or it is signed upon laboratory receipt from the overnight courier service.

3. Complete as many chain-of-custody forms as necessary to properly document the collection and transfer of the samples to the analytical laboratory.

4. Upon completing the chain-of-custody forms, forward two copies to the analytical laboratory and retain one copy for the field records.

5. If electronic chain-of-custody forms are utilized, sign the form and make 1 copy for ARCADIS internal records and forward the original with the samples to the laboratory.

**Handling Procedures**

1. After completing the sample collection procedures, record the following information in the field notebook with indelible ink:

   - project number and site name;
   - sample identification code and other sample identification information, if appropriate;
   - sampling method;
   - date;
   - name of sampler(s);
   - time;
   - location (project reference);
   - location of field duplicates and both sample identifications;
   - locations that field QC samples were collected including equipment blanks, field blanks and additional sample volume for matrix spikes; and
   - any comments.

2. Complete the sample label with the following information in indelible ink:

   - sample type (e.g., surface water);
   - sample identification code and other sample identification information, if applicable;
   - analysis required;
   - date;
   - time sampled; and
   - initials of sampling personnel;

- sample matrix; and
- preservative added, if applicable.

3. Cover the label with clear packing tape to secure the label onto the container and to protect the label from liquid.

4. Confirm that all caps on the sample containers are secure and tightly closed.

5. In some instances it may be necessary to wrap the sample container cap with clear packing tape to prevent it from becoming loose.

6. For some projects individual custody seals may be required. Custody seal evidence tape may be placed on the shipping container or they may be placed on each sample container such that the cooler or cap cannot be opened without breaking the custody seal. The custody seal should be initialed and dated prior to relinquishing the samples.

**Packing Procedures**

Following collection, samples must be placed on wet ice to initiate cooling to 4°C immediately. Retain samples on ice until ready to pack for shipment to the laboratory.

1. Secure the outside and inside of the drain plug at the bottom of the cooler being used for sample transport with “Duct” tape.

2. Place a new large heavy duty plastic garbage bag inside each cooler

3. Place each sample bottle wrapped in bubble wrap inside the garbage bag. VOC vials may be grouped by sample in individual resealable plastic bags). If a cooler temperature blank is supplied by the laboratory, it should be packaged following the same procedures as the samples. If the laboratory did not include a temperature blank, do not add one. Place 1 to 2 inches of cushioning material (i.e., vermiculite) at the bottom of the cooler.

4. Place the sealed sample containers upright in the cooler.

5. Package ice in large resealable plastic bags and place inside the large garbage bag in the cooler. Samples placed on ice will be cooled to and maintained at a temperature of approximately 4°C.

6. Fill the remaining space in the cooler with cushioning material such as bubble wrap. The cooler must be securely packed and cushioned in an upright position and be surrounded (Note: to comply with 49 CFR 173.4, filled cooler must not exceed 64 pounds).

7. Place the completed chain-of-custody record(s) in a large resealable bag and tape the bag to the inside of the cooler lid.

8. Close the lid of the cooler and fasten with packing tape.

9. Wrap strapping tape around both ends of the cooler.

10. Mark the cooler on the outside with the following information: shipping address, return address, “Fragile, Handle with Care” labels on the top and on one side, and arrows indicating “This Side Up” on two adjacent sides.

11. Place custody seal evidence tape over front right and back left of the cooler lid, initial and date, then cover with clear plastic tape.

**Note**: Procedure numbers 2, 3, 5, and 6 may be modified in cases where laboratories provide customized shipping coolers. These cooler types are designed so the sample bottles and ice packs fit snugly within preformed styrofoam cushioning and insulating packing material.

**Shipping Procedures**

1. All samples will be delivered by an express carrier within 48 hours of sample collection. Alternatively, samples may be delivered directly to the laboratory or laboratory service center or a laboratory courier may be used for sample pickup.

2. If parameters with short holding times are required (e.g., VOCs [EnCore™ Sampler], nitrate, nitrite, ortho-phosphate and BOD), sampling personnel will take precautions to ship or deliver samples to the laboratory so that the holding times will not be exceeded.

3. Samples must be maintained at 4°C±2°C until shipment and through receipt at the laboratory

4. All shipments must be in accordance with DOT regulations and ARCADIS dangerous goods shipping SOPs.

5. When the samples are received by the laboratory, laboratory personnel will complete the chain-of-custody by recording the date and time of receipt of samples, measuring and recording the internal temperature of the shipping container, and checking the sample identification numbers on the containers to ensure they correspond with the chain-of-custody forms.

Any deviations between the chain-of-custody and the sample containers, broken containers, or temperature excursions will be communicated to ARCADIS immediately by the laboratory.

## VII. Waste Management

Not applicable

## VIII. Data Recording and Management

Chain-of-custody records will be transmitted to the ARCADIS PM or designee at the end of each day unless otherwise directed by the ARCADIS PM. The sampling team leader retains copies of the chain-of-custody forms for filing in . the project file. Record retention shall be in accordance with project requirements.

## IX. Quality Assurance

Chain-of-custody forms will be legibly completed in accordance with the applicable project documents such as Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP), Work Plan, or other project guidance documents. A copy of the completed chain-of-custody form will be sent to the ARCADIS Project Manager or designee for review.

## X. References

Not Applicable

**Attachment 1**

ARCADIS
*Infrastructure, environment, facilities*

ID#:

# CHAIN OF CUSTODY & LABORATORY ANALYSIS REQUEST FORM

Page ___ of ___

Lab Work Order #

**Send Results to:**

Contact & Company Name: | Telephone:

Address: | Fax:

City | State | Zip | E-mail Address:

Project Name/Location (City, State): | Project #:

Sampler's Printed Name: | Sampler's Signature:

| Preservative | | | | | | | |
|---|---|---|---|---|---|---|---|
| Filtered (✓) | | | | | | | |
| # of Containers | | | | | | | |
| Container Information | | | | | | | |

**PARAMETER ANALYSIS & METHOD**

**Keys**

**Preservation Key:**
A. $H_2SO_4$
B. HCL
C. $HNO_3$
D. NaOH
E. None
F. Other: _____
G. Other: _____
H. Other: _____

**Container Information Key:**
1. 40 ml Vial
2. 1 L Amber
3. 250 ml Plastic
4. 500 ml Plastic
5. Encore
6. 2 oz. Glass
7. 4 oz. Glass
8. 8 oz. Glass
9. Other: _____
10. Other: _____

**Matrix Key:**
SO - Soil | SE - Sediment | NL - NAPL/Oil
W - Water | SL - Sludge | SW - Sample Wipe
T - Tissue | A - Air | Other: _____

| Sample ID | Collection Date | Collection Time | Type (✓) Comp | Type (✓) Grab | Matrix | | | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

**Special Instructions/Comments:**

☐ **Special QA/QC Instructions(✓):**

| Laboratory Information and Receipt | | Relinquished By | Received By | Relinquished By | Laboratory Received By |
|---|---|---|---|---|---|
| Lab Name: | Cooler Custody Seal (✓) | Printed Name: | Printed Name: | Printed Name: | Printed Name: |
| ☐ Cooler packed with ice (✓) | ☐ Intact ☐ Not Intact | Signature: | Signature: | Signature: | Signature: |
| Specify Turnaround Requirements: | Sample Receipt: | Firm: | Firm/Courier: | Firm/Courier: | Firm: |
| Shipping Tracking #: | Condition/Cooler Temp: _____ | Date/Time: | Date/Time: | Date/Time: | Date/Time: |

20030826 CofC AR Form 01.12.2007

**Distribution:** **WHITE – Laboratory returns with results** **YELLOW – Lab copy** **PINK – Retained by BBL**

## Appendix I

Field Log Book Entries SOP

## IX. Quality Assurance

Be mindful that the field log book may be produced in court. All entries should be legible (as discussed above). Entries should also be in English, unless working in a country where English is not the predominant language or you are directed otherwise by the project manager.

## X. References

Not Applicable

## Appendix J

EPA Deliverable Guidance Documents

# EPA Region 10
# Monitoring and Analytical Data Deliverables
# Data Submission Process for WQX Compatible Deliverables
# For Yakima Dairies
# (Docket No. SDWA-10-2013-0080)

Water Quality Exchange (WQX) is EPA's national database for long term storage of environmental monitoring data. Data that are placed in WQX are available to the public via both table-downloading functionality and map viewing applications deployed by EPA Headquarters. EPA Region 10 maintains a local version of WQX (called AWQMS) from which project-specific data mapping applications are served. Together these databases and mapping applications provide critical data-sharing and archiving functionality to project teams, external partners and stakeholders, and the public.

Data deliverables must contain the information specified in the Region 10 WQX Electronic Data Deliverable Specifications document (R10WQXEDD), contained in the attached zip file.

**Data Submission Process for WQX Compatible Data**

Monitoring and analytical data shall be submitted in tab-delimited text files prepared in accordance with specifications in the Region 10 WQX Electronic Data Deliverable (R10WQXEDD) which accompanies this document in zip file format (R10WQXEDD.zip).

Completed data files must be sent to EPA Region 10 via email. Each submittal must be accompanied by a cover letter that includes the following information:

- Submitting entity's name, affiliation, physical address, phone number, and email address
- Point of contact name, phone number, and email address
- Date of submittal
- Data file type, data file name, number of records
- Yakima Dairies (Docket No. SDWA-10-2013-0080)
- Comments or other information relating to the data submittal

**Format of WQX Compatible Electronic Data Deliverables**

All electronic data deliverables shall be reviewed for completeness as well as compliance with the R10WQXEDD specifications prior to submittal to EPA Region 10. The submitting entity is responsible for the content and quality of the data provided. If the deliverable is incomplete or erroneous, corrected data shall be re-submitted.

There are three general categories of data that are addressed in the attached R10WQXEDD: projects; stations; and physical and chemical results data. The R10WQXEDD provides detailed specifications on how each category of data should be formatted, identifies allowable values for the data fields (also known as data codes or valid values), and provides example data submittals.

Data shall be prepared as tab-delimited text files with column headers. Many software products allow for export of tab delimited text files (including Excel, Access, Notepad, and Open Office products). No other delimiters, such as quotation marks, commas, colons, or semi-colons shall be included in the files. No tabs shall be included in the actual data values themselves, and additional limitations on the use of special characters are identified in the R10WQXEDD. A set of allowable values are identified in the R10WQXEDD; however, because these may have been updated since release of the R10WQXEDD, referencing the most current list is recommended. It is available at: http://www.epa.gov/storet/wqx/wqx_getdomainvalueswebservice.html.

The attached R10WQXEDD.zip file contains the R10 WQX Electronic Data Deliverable (R10WQXEDD). It includes the following three templates which specify the format of data deliverables:

- R10WQXEDDPart1-ProjectandMonitorLocationTemplate.xlsx
- R10WQXEDDPart2-ActivitiesAndResultsTemplate.xlsx
- R10WQXEDDTemplateExamples.xlsx

# EPA Region 10
# Geographic Information Systems Data Deliverable Guidance
# For Yakima Dairies
# (Docket No. SDWA-10-2013-0080)

## Introduction and Scope

This document is intended to provide specific requirements and file delivery formats for Geographic Information System (GIS) products which are generated by external entities for submission to EPA. These products include GIS and imagery files.

## GIS Data Files

GIS data files must be in a format specified in this document. All electronic geospatial data, whether vector or raster, must include a correct definition of the map projection and coordinate system, either embedded in, or associated with, the data file. In the case of CAD data, the projection must NOT be in page space or a custom site-specific projection. All CAD data shall be in known real world coordinate space, ideally in geographic/decimal degrees/NAD83. Should tabular data containing attribute information be appropriate to connect to location information then documentation must be provided that describes the nature of the relationship between the location data and tabular data, including cardinality, primary and foreign keys, and field definitions. Should coordinate information be provided in tabular format it should contain at minimum the following fields:

ID – a unique identifier given to each feature

Latitude – the Y coordinate in decimal degrees

Longitude – the X coordinate in decimal degrees

Horizontal Datum – the datum of the coordinates

Collection Method – if known provide a brief description (e.g. GPS, address geocoding, map interpolation)

Additionally, all static maps must be in an electronic Adobe PDF format with fonts embedded and at a resolution of 300 dots per inch (dpi) or greater. Finally, all ArcMap documents (.mxd) or equivalent map document files used in final map production are also required for delivery to EPA with accompanying data in a stand-alone directory structure. Map document (.mxd) formats also need to be configured to use relative paths and not be set to use a printer-specific paper setting.

## Metadata and Projection Requirements

Federal Geographic Data Committee (FGDC) compliant metadata on all GIS data files must be developed for deliverables. It is important to understand that deliverables are not considered complete without metadata. Region 10 also requires that all dynamic maps (ArcMap documents) have metadata completed. The Content Standard for Digital Geospatial Metadata can be found at

http://www.fgdc.gov/. Metadata, including information about the data's projection, can be developed using one of several built-in or add on tools within a GIS, and typically is associated with the geometry file as an XML file. EPA has created the EPA Metadata Editor (EME) which is available for free download from: https://edg.epa.gov/EME/ and this tool can be used to help create FGDC compliant metadata.

All GIS files submitted to EPA must have spatial reference information that describes the projection, datum, and where applicable the collection methods. All vector data must be submitted in geographic coordinate system, decimal degree units, and either NAD83 or WGS84 datum. Raster data, such as aerial photographs may be submitted in their native projection, and maps should be in the appropriate projection/coordinate system for the area depicted.

**Delivery Requirements and Standard Organizational Structures**

EPA will accept data delivered on CD-ROM, DVD, or external hard drive, as well as direct electronic submission via email or FTP site.

A directory structure and readme text file in the upper level directory that describes the structure are required. A recommended directory structure is as follows:

**<Project_Name>**

|_ **Docs** (reports, SOPs, correspondence, and other such documents)

|_ **Images** (aerial photos, satellite imagery, logos, DEMs, and other raster type data)

|_ **Maps** (MXDs and PDFs. Map names should use the project name as a prefix)

|_ **Shapes** (geodatabases, shape files, and other approved vector data formats)

|_ **Source** (original unmodified data that may have been acquired from external/internal sources)

|_ **Tables** (MS-Access databases, spreadsheets, delimited text files, or other such tabular data not stored in a geodatabase)

File naming conventions shall be descriptive, dated, consistent, and contain no spaces or special characters. An underscore may be used in lieu of a space.

## EPA Acceptable Data Formats

The following file formats are considered acceptable and all maps and data must include an associated metadata document:

| DATA |
|---|
| **Vector - projected to geographic, decimal degrees, NAD83/WGS84 (preferred)** – other defined projections allowed |
| Shape File (.shp, .shx, .dbf, .prj, .sbx, .sbn)<br>File Geodatabase (.gdb)<br>Personal Geodatabase (.mdb)<br>XML Workspace Document with dependencies clearly documented (.xml) |
| **Raster - native projection acceptable** |
| TIFF image with world reference file or as a GeoTIFF (.tif, .tfw)<br>JPEG image with world reference file (.jpg, .jpw)<br>ERDAS Imagine image with pyramid file (.img, .rrd)<br>MrSid image (.sid)<br>ESRI Grid<br>DEM |
| **Terrain Dataset - appropriate real world projection/coordinate system for the area depicted** |
| File Geodatabase (.gdb) for mass point collections (e.g. lidar, sonar, photogrammetric data) |
| **TINs - appropriate real world projection/coordinate system for the area depicted** |
| ESRI TIN |
| **CAD - appropriate real world projection/coordinate system for the area depicted** |
| DXF layer separates (.dxf) |
| **Tabular - primary and foreign keys should be clearly identified/documented** |
| MS-Access database (.mdb)<br>MS-Excel spreadsheet (.xls)<br>Delimited text file (.txt, .csv) |
| **MAPS** |
| **Static** |
| Adobe PDF at 300 dpi or better with embedded fonts (.pdf) |
| **Dynamic** |
| ArcMap document with associated data files in a stand-alone directory structure using relative paths (.mxd) |
| **FGDC Compliant METADATA** |
| XML (.xml)<br>FGDC CSDGM XML (.xml)<br>ArcMap (.mxd) "Description" metadata within the document |

## CHECKLIST

The following checklist may be used to assist in complying with these standards:

| | DATA |
|---|---|
| | Is each vector file, CAD included, in geographic, decimal degrees, NAD83 or WGS84? |
| | Is each raster file in its native projection? |
| | Is each data file one of the EPA acceptable formats? |
| | Does each data file have FGDC compliant metadata in an associated file? |
| | Are the primary and foreign keys documented for tabular data? |
| | Is a README text file included with a directory structure explaining how the structure is organized? |
| | **MAPS** |
| | Is each static map provided in an electronic format at a resolution of 300 dpi or higher? |
| | Does each static map have fonts embedded? |
| | Has the page and print setup for map documents been configured to NOT use printer-specific paper settings? |
| | Are map documents set to use relative paths? |
| | Are map names prefixed with the project name? |
| | Are map documents accompanied with their relevant data in a stand-alone directory structure? |
| | Does each map have FGDC compliant metadata in an associated file? |