DELINEATION AND REMEDIATION OF CONTAMINATED SOIL, GROUNDWATER AND DEBRIS AT STRYKER BRIGADE CANTONMENT AND FWA-102 AREAS

QUALITY ASSURANCE PROJECT PLAN FOR THE COMMUNICATIONS SITE, TAKU GARDENS, FORT WAINWRIGHT, ALASKA

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Attachment 3 Approved Variances to the Department of Defense Quality Systems Manual, Version 3

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ACRONYMS

AA	Alternative Actions
ADEC	Alaska Department of Environmental Conservation
ARAR	Applicable or Relevant and Appropriate Requirements
CCV	continuing calibration verification
CDQR	chemical data quality report
CoC	chain-of-custody
CSM	Conceptual Site Model
DoD	Department of Defense
DQI	data quality indicator
DQO	data quality objective
DPW	Directorate of Public Works
DRO	diesel range organic compounds
EDD	electronic data deliverable
EM	Engineering Manual
EPA	U.S. Environmental Protection Agency
FSP	Field Sampling Plan
GC	gas chromatography
GC/MS	gas chromatography/mass spectroscopy
GRO	gasoline range organic compounds
HPLC	high performance liquid chromatography
HTRW	hazardous, toxic, and radioactive waste
ICP/MS	Inductively-Coupled Plasma/Mass Spectrometry
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LIMS	Laboratory Information Management System
LUST	Leaking Underground Storage Tank
MARLAP	Multi-Agency Radiological Laboratory Analytical Protocols
MEC	munitions and explosives of concern
MDA	method of standard additions
MDL	method detection limit
mg/kg	milligrams per kilogram
MQO	measurement quality objective
MS/MSD	matrix spike/ matrix spike duplicate
NELAP	National Environmental Accreditation Program
NWI	North Wind, Inc.

OPO_3	O-Phosphorous
PAH	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyl
PCOC	Potential contaminants of concern
PDS	post digest spike
PE	performance evaluation
PID	photoionization detector
PM	Project Manager
PSE	Preliminary Site Evaluation
PSQ	Principle Study Questions
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
QSM	Quality Systems Manual
RCRA	Resource Conservation and Recovery Act
RF	response factor
RI/FS	Remedial Investigation Feasibility Study
RL	reporting limit
RPD	relative percent difference
RRO	residual range organic compounds
RSD	relative standard deviation
SAP	Sampling and Analysis Plan
SDG	Sample Delivery Group
SGS	SGS Environmental Services, Inc.
SIM	selective ion monitoring
SOP	standard operating procedure
STL	Severn Trent Laboratories
SVOC	semi-volatile organic compound
TCLP	toxic characteristic leaching procedure
TSCA	Toxic Substances Control Act
USACE	U.S. Army Corps of Engineers
USAGAK	U.S. Army Garrison Alaska
UV	ultraviolet
UXO	unexploded ordnance
VOC	volatile organic compound

DELINEATION AND REMEDIATION OF CONTAMINATED SOIL, GROUNDWATER AND DEBRIS AT STRYKER BRIGADE CANTONMENT AND FWA-102 AREAS

QUALITY ASSURANCE PROJECT PLAN

1. INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Alaska District, tasked North Wind, Inc. (NWI) with delineating the extent and nature of contamination at various locations on Fort Wainwright, Alaska under Contract No. W911KB-04-P-0136. NWI has prepared this Quality Assurance Project Plan (QAPP) in accordance with USACE Engineering Manual (EM) 200-1-3, *Requirements for the Preparation of Sampling and Analysis Plans* (USACE 2001) to establish guidelines and practices to ensure that data are scientifically valid, defensible, and of known and acceptable quality. This document also implements the guidance provided in the U.S. Environmental Protection Agency (EPA) *Guidance for Quality Assurance Project Plans* (EPA 2002).

As specified in EM 200-1-3, the QAPP is an integral part of the project Sampling and Analysis Plan (SAP). The QAPP describes the chemical data quality objectives (DQOs), analytical methods and measurements, quality assurance (QA)/quality control (QC) protocols necessary to achieve the DQOs, and data assessment procedures for the evaluation and the identification of any data limitations. In addition to the QAPP, a Field Sampling Plan (FSP) (NWI 2006) is part of the SAP. The FSP provides guidance for fieldwork by defining in detail the sampling and field data-gathering methods to be used on the project. The FSP and QAPP are typically submitted as a single document, although they are often bound separately to facilitate the use of the FSP in the field and the QAPP in the laboratory. For this project, the FSP and QAPP will be bound separately. The SAP and site Health and Safety Plan provide details of the specific data collection activities that are designed to support the objectives of the project.

1.1 Quality Assurance/Quality Control Parameters

The overall QA policies and QC procedures delineated in this QAPP and the Department of Defense (DoD) Quality Systems Manual (QSM) (DoD 2006) shall be followed to ensure data quality.

1.2 Analytical Laboratories

NWI has selected Severn Trent Laboratories (STL) of Sacramento, California, and SGS Environmental Services, Inc. (SGS) of Anchorage, Alaska, to perform chemical analysis of soils and groundwater for the project. In general, SGS will conduct the SW8082A (polychlorinated biphenyl [PCB]) analysis and STL will conduct the remaining analyses, including:

- SW8260B (volatile organic compound [VOC])
- SW8270C (semi-volatile organic compound [SVOC])
- SW8270 selective ion monitoring (SIM) (polynuclear aromatic hydrocarbon [PAH])
- AK102 (diesel range organic [DRO])
- AK103 (residual range organic [RRO])
- SW6020 (total metals with strontium)
- SW8081A (pesticides)
- E300.0 (anions)
- E353.2 (total nitrate/nitrite)
- SW9045/E150.1 (pH)
- SW8330 (nitroaromatics/nitroamines)
- SW6850 (perchlorate)
- SW8290 (dioxins/furans).

On occasion, the requested analyses for each laboratory may be adjusted to accommodate limited sample volume, shipping schedules, or other constraints.

STL of Sacramento has also subcontracted STL of St. Louis, Missouri to conduct the HASL 300/E901.1 (gamma emitting radionuclides) and SW9310/E900.0 (gross alpha/gross beta) analyses. In addition, they subcontracted STL of Seattle, Washington to conduct the AK101 (gasoline range organic [GRO]) and SW8151 (herbicide) analyses. Further, STL of Seattle will provide assistance to STL of Sacramento in the event that sample receipt exceeds analysis capability.

As part of NWI's QA program, the STL and SGS QA programs were reviewed and the laboratories were identified as approved quality vendors. STL and SGS will be under direct contract with NWI and will be responsible to meet the requirements of this QAPP. The laboratories hold current certifications under the National Environmental Laboratory Accreditation Program (NELAP) for all analyses required for this investigation. In addition, the laboratories are certified with the Alaska Department of Environmental Conservation (ADEC).

1.3 Data Categories

There are two general categories of data: (1) screening data and (2) definitive data.

Screening data are generated by rapid methods of analysis with less rigorous sample preparation, calibration, and/or QC requirements than are necessary to produce definitive data. These field methods are used to produce real-time data (i.e., pH, conductivity, and temperature) or qualitative parameters such as those determined using a photoionization detector (PID).

Definitive data are generated using quantitative analytical procedures such as approved EPA or ADEC methods. The off-site laboratory will typically generate this data. These methods define standardized QC and documentation requirements. Definitive data are not restricted in their use unless QC parameters are not met.

2. DATA QUALITY OBJECTIVES

To generate data that will meet the project-specific requirements, it is necessary to define the types of decisions that will be made and to identify the purpose of the data. These functions are addressed by developing project specific DQOs. DQOs are presented here in terms of the most recent EPA systematic planning process (Section 2.1) and data quality indicators (DQIs) and measurement quality objectives (MQOs) (Section 2.2).

2.1 Data Quality Objectives

DQOs are an integrated set of specifications that define data quality requirements based on the intended use of the data. The purpose of the DQOs is to guide decisions and processes for collecting, analyzing, and evaluating data to satisfy overall project objectives. DQOs clarify the project objective, define the most appropriate type of data to collect, determine the most appropriate conditions from which to collect the data, and specify tolerable limits on decision errors that will be used as the basis for establishing the quantity and quality of data needed to support the decision(s). Key features of this approach include:

- Consensus on clearly worded project goals and intended decisions (with expressions of what decision errors are tolerable and which are not) for field work before it begins
- A Conceptual Site Model (CSM) that anticipates site-specific heterogeneities and contaminant distributions
- Strategies to refine the CSM over the course of the project in relation to the intended decisions
- Discussions about the mechanisms to manage sampling and analytical uncertainties in data collection.

Planning for the Preliminary Site Evaluation (PSE) was conducted by representatives of the ADEC, EPA Region X, U.S. Army Garrison-Alaska (USAGAK), USACE Alaska District, and NWI in June 2006. Because a significant amount related to the site history had been previously completed by the team, and because initial test pit and debris pile investigations had been completed by NWI in early June 2006, there was sufficient information to support an accelerated planning process.

The following discussion summarizes the systematic planning process used to define the objectives of the PSE. The seven-step DQO process (EPA 2006) provides a convenient approach to document activities and decisions and to communicate the data collection design.

2.1.1 Step 1: State the Problem

Initial Concerns. During the initial construction activities, the construction contractor encountered contaminated subsurface soil. Testing indicated significant PCB contamination in a localized area. Other suspect waste items, including compressed gas cylinders, crushed drums, and apparent munitions constituents, were also unearthed and documented by the construction contractor. A determination of whether hazardous wastes or other contaminated soils exist at this site had not been made. Initial exploratory investigation by NWI in June 2006 identified other areas of potential contamination and Unexploded Ordnance (UXO) items. It is possible that contamination may be associated with different and distinct previous land uses based on historical documentation and preliminary site investigations; therefore, portions of the site may require different investigation and remediation techniques. At this time insufficient supporting documentation exists to classify decision units. Final delineation of decision units will be made by the Army and regulators once sufficient information is available.

Preliminary Conceptual Site Model. The foundation for site-related decisions that are both correct and optimized (from a cost-benefit standpoint) is the CSM. A CSM uses all available historical and current information to estimate where contamination is (or might be) located, how much is (or might be) there, how variable concentrations may be and how much spatial patterning may be present, what is happening to contaminants as far as fate and migration, who might be exposed to contaminants or harmful degradation products, and what might be done to manage risk by mitigating exposure.

An accurate CSM will distinguish and delineate different contaminant populations for which decisions about risk and remediation will differ. Distinguishing between different contaminant populations improves the quality and interpretation of data, as well as the confidence and resource effectiveness of project decisions. The CSM cannot be completed until the project background is thoroughly documented (see Section 2).

Preliminary Exposure Scenarios. During the early phases of investigation activities, it will be necessary to establish which complete exposure pathways exist for each medium and land-use combination. The following factors contribute to the development of preliminary exposure scenarios:

- Potentially contaminated media to which individuals may be exposed include buried waste, soil vapors, subsurface soil, and groundwater.
- Contaminants of potential concern (COPCs) based on historical site use, analytical data, and anecdotal information includes PCBs, metals, explosives, pesticides, and a range of VOCs and SVOCs typically associated with long-term use and maintenance of heavy equipment and military vehicles. Other COPCs may be identified during the course of the PSE.
- Future land use is defined as residential; a military housing development is currently under construction on the site.
- Applicable or Relevant and Appropriate Requirements (ARARs) have not yet been determined for the site; however, preliminary screening levels adopted from the ADEC Petroleum Sites Manual will be utilized for purposes of this PSE. Risk-based cleanup goals will be developed during later stages of the investigation.

Project Constraints. This project is constrained by a number of factors. Perhaps the most significant factor is the fact that a new housing development exists (unoccupied) at this site. Underground utilities, buildings, and other structures limit the areas that excavations, borings, etc. can be performed. Another significant factor is that the potential for munitions and explosives of concern (MEC) requires a slow and careful approach under constant supervision by qualified UXO technicians for all intrusive activities in debris areas. Finally, the severity of the fall/winter season constrains field work to essentially the summer months.

Planning Team Definition. The planning team, often referred to as “Team Taku” is comprised of representatives from the Army, ADEC, and EPA Region X. NWI, a small consulting and remediation contractor, serves to facilitate the planning process.

2.1.2 Step 2: Identify the Decision

The purpose of this step is to define the decision statement which combines the key questions that the study will attempt to resolve with the alternative actions (AAs) that may be taken.

A PSE will be conducted to collect analytical results from soil and water samples to assess the presence of contamination. Physical screening of buried debris as well as analytical data will also be evaluated to determine the presence of UXO. The data will be used to qualitatively evaluate the potential risk to human health from physical hazards such as unexploded ordnance. The following AAs would be considered based on the specific potential hazards present in any given decision unit:

- No further action
- Interim removal/remedial action
- Include in the Operable Unit for Remedial Investigation Feasibility Study (RI/FS)
- Refer to another program such as two-party (Leaking Underground Storage Tank [LUST]), Toxic Substances Control Act (TSCA), or UXO clearance.

2.1.3 Step 3: Identify Inputs to the Decision

Field test methods will be used to establishing the boundaries of the PCB soil contamination prior to a removal action. Field immunoassay methods have been accepted by the agencies and were used successfully during the 2005 investigation to identify areas with elevated PCB contamination.

Confirmation samples will be analyzed by definitive EPA and state approved methods (where applicable) to confirm areas suitable for release (e.g., releasing stockpiles as uncontaminated, or reducing the footprint of the Exclusion Zone).

Field screening methods, photoionization detectors, and plastic scintillators may be used to bias samples for definitive analyses.

Suspect areas previously identified in the Work Plan Addendum, will be evaluated by collecting a minimum number of samples to reliably estimate the mean and variance in any given area, as is practical.

Geophysical surveys (EM-61, magnetic gradiometry, and/or ground-penetrating radar) will be used to identify appropriate areas for test pits to examine the buried waste.

Waste debris (buried or previously excavated) will be evaluated by a combination of visual screening performed by qualified UXO technicians to identify any UXO or MEC-related hazards and judgmental sampling to evaluate presence or absence of potential chemical constituents.

Grab samples (i.e., bailer) from shallow groundwater will be used to evaluate potential presence or absence of chemical constituents associated with large buried waste areas.

A judgmental sampling approach will be used to determine appropriate analyses (e.g., VOC/SVOCs near drums, explosives near ammo boxes, etc.). Definitive methods will be run to evaluate soil and groundwater samples to support the PSE.

2.1.4 Step 4: Define the Boundaries of the Study

For purposes of the PSE and removal action, the overall study boundary will coincide with the Taku Family Housing property fence, although it is acknowledged that contamination, if present, could extend beyond this arbitrary boundary.

The area around Building 52 is considered to have the highest concentrations of PCB contaminants and will be primary area of interest to identify a PCB hot spot.

Geophysical data will be used to delineate and target areas within the Taku Family Housing property fence that may contain buried waste.

Because the original surface soil was removed by the construction contractor, there is no distinction made between the existing ground surface and subsurface soils (technically they are all subsurface soils as they relate to historic contaminant releases).

There is no evidence of confining stratigraphy in the vadoze zone or upper aquifer, other than permafrost which is intermittent. The vadose zone will be considered a single unit.

2.1.5 Step 5: Develop a Decision Rule

The selection of one of the AAs for a specific Decision Unit and potential hazard may be based on the criteria presented below. The final selection will be made jointly by the Army, the EPA, and the ADEC.

No Further Action. This option may be selected when the PSE investigation indicates that a particular Decision Unit presents no apparent risk to human health or to the environment. Results of sampling and analysis of environmental media from the suspected area of highest potential contamination should show that no contamination is present or that existing contaminant concentrations are below threshold values (e.g., risk–based or regulatory thresholds).

Initiate Interim Removal Action. When the results of a limited field investigation confirm that a chemical release has occurred and the environmental contamination exceeds threshold concentrations, initiation of an interim removal action may be recommended. Specific conditions that would support selection of the interim action option include the following:

- The data indicate a need for action to reduce real or potential risk to human health or the environment.
- The data adequately describe the nature of contamination and apparently bound the range of concentrations expected to be encountered.
- The scope of the problem is well-defined and limited, and the remedy is readily apparent so that performance of an RI/FS may not be required.
- The planned discrete action is not inconsistent with or will not preclude implementation of the final expected site remedy.

Inclusion in a RI/FS Operable Unit. If results of a limited field investigation confirm that a chemical release has occurred and that environmental contamination exceeds threshold concentrations, the source area may be recommended for inclusion in a RI/FS. Conditions that would support selection of this option are:

- The data indicate a need for action to reduce real or potential risk to human health or the environment.
- The data do not adequately describe the nature of contamination and do not cover the range of concentrations expected to be encountered.
- The scope of the problem is not well defined, and the remedy is not readily apparent.

Referral to Another Program. If the results of a limited field investigation confirm that a chemical release has occurred and that environmental contamination exceeds threshold concentration, the source area may be referred to another program for resolution (e.g., the underground storage tank program). Conditions that support selection of this option include the following:

- The data indicate contamination from an identifiable source (i.e., a specific PCB transformer release).
- The problem may be effectively remediated under the alternate program.

2.1.6 Step 6: Specify Tolerable Limits on Decision Errors

Tolerable limits will not be applicable as there is no statistically based hypothesis test. The AA decisions will be qualitative assessments made to determine the likelihood of the presence of chemical or physical hazards in sufficient quantities to present a risk to human health. The decisions will be agreed to by the participating agencies.

2.1.7 Step 7: Develop the Plan for Obtaining the Data

Specific field activity plans will be developed as attachments to the FSP and submitted for review by the project team. In general, the field activity plans will be brief and focused on single objectives, such as stockpile sampling, or test pit investigations. The field activity plans will include the rationale behind the required number of field samples; the strategy (statistical, judgmental, and/or random basis) for selecting the particular sampling location; and a summary of the estimated or required number of samples and the type of samples. Where systematic grid patterns are used, a discussion of the grid dimension and layout will be included. Where appropriate, the decision logic that will be used in conjunction with real time measurement strategies to support in-the-field decision making regarding the progress and direction of subsequent site sampling activities will be included. Planning tools such as Visual Sample Plan (Hassig et al. 2005) will be used as appropriate to develop specific sampling strategies.

2.2 Data Quality Indicators/Measurement Quality Objectives

This section describes the QC elements required for the project to ensure data are of known and acceptable quality. As defined in the DoD QSM, DQIs are measurable attributes for the

attainment of necessary quality to support an environmental decision. DQIs include precision, accuracy, completeness, representativeness, comparability, and sensitivity. MQOs are acceptance criteria or ranges that are established to ensure that quality data are continuously produced during analysis to allow the eventual compliance review, and that the analytical method is measuring the quantity of target analytes without unacceptable bias. Acceptance criteria are based on the DoD QSM; Table 4-1 of the *Chemical Quality Assurance for Hazardous, Toxic and Radioactive Waste (HTRW) Projects* (USACE 1997); and this QAPP. In addition, for state of Alaska-specific methods (i.e., AK101, AK102, and AK103), QC criteria are established in the *Underground Storage Tanks Procedures Manual: Guidance for Treatment of Petroleum-Contaminated Soil and Water and Standard Sampling Procedures* (ADEC 2002). The following sections discuss the evaluation of precision, accuracy, completeness, representativeness, comparability, and sensitivity. Table 1 provides the associated equations.

Table 1. Equations for Evaluation of QC Sample Results.

QC Element	Evaluation Method
Precision – Matrix Spike/Matrix Spike Duplicate (MS/MSD)	$RPD = \frac{\lvert X_1 - X_2 \rvert}{(X_1 + X_2/2)} x100\%$
Precision – Field Duplicates	$RPD = \frac{\lvert X_1 - X_2 \rvert}{(X_1 + X_2/2)} x100\%$
Precision – Lab Duplicates	$RPD = \frac{\lvert X_1 - X_2 \rvert}{(X_1 + X_2/2)} x100\%$
Accuracy – Laboratory Control Spike	$\% R = \frac{MSx}{Sp} x100$
Accuracy – MS	$\% R = \frac{MSx - Sx}{Sp} x100$
Accuracy – MSD	$\% R = \frac{MSx - Sx}{Sp} x100$

Table 1. Continued.

QC Element	Evaluation Method
Accuracy – Post Digestion Spike	$\% R = \frac{MSx - Sx}{Sp} x100$
Accuracy – Surrogates	$\% R = \frac{MSx - Sx}{Sp} x100$
Representativeness	Qualitative parameter
Completeness	$C\% = \frac{S}{R}(100\%)$
Comparability	Qualitative parameter
X_1, X_2: value of sample 1 and sample 2 RPD: relative percent difference MS_x: spiked sample result S_p: amount of spike added S_x: unspiked sample results	%R: percent recovery %C: percent complete S: valid data obtained R: total data planned

2.2.1 Precision

Precision is a measure of the reproducibility of an analysis or set of analyses under a given set of conditions. The overall precision of a sampling event has both a sampling and an analytical component. Precision data will be assessed from the analysis of matrix spike duplicates (MSDs), laboratory control sample duplicates (LCSDs), field duplicates, and laboratory duplicates. Precision will be expressed in terms of relative percent difference (RPD) and will be calculated according to the equations in Table 1. For replicate analyses, the relative standard deviation (RSD) is determined.

Field duplicate samples, also known as blind duplicates, are secondary samples collected at the same time from the same source as the primary samples and submitted to one laboratory as separate samples. The purpose of field duplicated samples is to assess the consistency of the overall sampling effort and to measure the precision of the entire measurement system, including sampling and analytical procedures. Field duplicates will be collected at a rate of one for every 10 samples.

NWI will evaluate precision based on the RPD. The RPD values will not be calculated when either one or both duplicate sample results are lower than the reporting limit (RL). There are no established project QC criteria regarding field duplicate result acceptance; however, NWI will employ advisory RPD limits of 50% for this project. If field duplicate sample results exceed advisory limits, MS/MSD precision results will be evaluated to determine the effect of field sampling and sample heterogeneity on precision. If MS/MSD precision values exceed established limits, results of laboratory control samples (LCSs) and post-digest spikes (PDSs) will be evaluated to determine whether matrix effects or laboratory error accounts for the lack of precision.

2.2.2 Accuracy

Accuracy is a quantitative expression of the proximity of a result, or the mean of a set of results, to the known or "true" value. The accuracy of a measurement system generally is affected by errors introduced through one or more of the following sources:

- Sampling processes
- Field contamination
- Preservation
- Handling
- Sample matrix
- Sample preparation
- Analytical procedures.

Accuracy for this project will be assessed through the analyses of MS/MSDs, LCSs, surrogate spike compounds, internal standards, and PDSs. Results will be expressed as a percent recovery (%R) and will be calculated according to the formulas in Table 1. The QC information discussed below will be used to evaluate accuracy.

2.2.2.1 Matrix Spikes and Matrix Spike Duplicates

MS/MSD samples are separate aliquots (portions) taken from a single field sample and spiked with known concentrations of target analytes prior to sample preparation and analysis. MS/MSD

samples may be obtained from the same container as the field sample, depending on the number of analyses requested. Prior to preparation and analysis, MS/MSD samples are spiked with the appropriate analyte at concentrations within the linear calibrated range unless preliminary data indicate significant levels of analytes are present in the sample. The MS and MSD shall be spiked at a level less than or equal to the midpoint of the calibration curve for each analyte. The MS/MSD is used to document the bias attributed to the sample matrix.

MS/MSD samples will be analyzed at a rate of one per 20 primary samples. Only samples from this project will be used for MS/MSD analyses. QC samples such as field blanks will not require an MS/MSD. The sample that requires a MS/MSD shall be designated on the chain-of-custody (CoC) form and does not require a separate sample identification number. The field sampler will note in the comment section of the CoC form when a MS/MSD is required for a specific sample.

The performance of the MS and MSD is evaluated against the QC acceptance limits given in the tables provided for each method. If either the MS or the MSD is outside the QC acceptance limits, the analytes in all related samples shall be qualified. The associated LCS recoveries shall be evaluated to determine if the system is in control or if matrix is a factor impacting recoveries.

2.2.2.2 Laboratory Control Samples

LCSs are defined as an interference-free matrix spiked with a particular set of method-specific target compounds at concentrations near the mid-level. The matrix used to prepare an LCS will be laboratory reagent water. LCSs will be analyzed for each batch of samples up to a maximum of 20 samples for both inorganic and organic parameters. LCS analyses initially not meeting QC accuracy criteria will be reanalyzed once prior to mandatory redigestion/re-extraction and reanalyses of the entire analytical batch. Upon failure, the laboratory initially must reanalyze the LCS in real time (less than 2 hours) with respect to sample analyses; otherwise, reanalysis (at a minimum) of the entire batch will be mandatory.

2.2.2.3 Surrogates

Surrogates are organic compounds that are similar to the target analyte(s) in chemical composition and behavior in the analytical process but that are not normally found in environmental samples. Surrogates are used to evaluate accuracy, method performance, and

extraction efficiency. Surrogates shall be added to environmental samples, controls, and blanks in accordance with the method requirements. The laboratory will provide methanol containing a surrogate for the GROs field-extracted method (AK101).

Sample analyses with surrogate spike recoveries not meeting QC accuracy criteria can be reanalyzed once prior to mandatory re-extraction and reanalyses. Whenever a surrogate recovery is outside the acceptance limits, a corrective action must be performed. After the system problems have been identified and system control has been re-established, the sample will be reprepared and reanalyzed. Successive sample analyses involving a failure of the same surrogate spike to meet QC accuracy criteria will initiate a review of data to determine the extent of matrix effects and interferences for the associated sample.

If clearly evident and objectively verifiable gross analytical interferences or matrix effects are present, mandatory redigestion and reanalyses will not be required; however, the laboratory must submit analytical data (including instrument printouts presented at an appropriate attenuation) to substantiate such situations and must report all incidents in the associated analytical report narrative. If corrective actions are not performed or are ineffective, the results may require qualification.

2.2.2.4 Post-Digest Spike

A dilution test is performed on each preparatory batch analyzed by inductively-coupled plasma/mass spectrometry (ICP/MS) when positive concentrations greater than 100 times the method detection limit (MDL) are identified to confirm that there is no interference in the original sample analysis. When the dilution test fails or the analyte concentration for all samples is less than 100 times the MDL, contract laboratories will perform a PDS addition to verify absence or presence of matrix effects. To verify the absence of an interference, the spike recovery must be between 75% and 125%. Samples with PDS recoveries outside the QC limits require a method of standard additions (MDA) for all samples within the batch.

2.2.3 Completeness

The completeness criterion is a measure of whether information necessary to meet the DQOs has been collected. As discussed in EM 200-1-3, completeness is the percentage of measurements that are judged to be usable (i.e., which meet project-specific requirements) compared to the total

number of measurements planned. The desired level of completeness is dependent on project-specific DQOs. Completeness goals of 100 percent are typically unattainable. Realistic completeness goals of 80–95% are typically determined based on the size and complexity of the project. As described in Section 2.1, this project is in an investigatory phase, which makes the establishment of a quantitative completeness goal impractical. There is uncertainty related to the matrices, contaminants, and sample types that will be encountered. In fact, the total number of planned samples cannot be determined a priority. In some cases, samples may be collected in an attempt to classify an unknown condition, only to later discover that analysis by conventional methods is impractical or impossible. Furthermore, unexpected field conditions and unusual safety hazards, constrain sampling, handling, shipping, and ultimately analytical activities. For these reasons, the project-specific requirement for the quantitative assessment of completeness will be 80%. In cases where re-sampling is warranted (e.g., a cooler shipment is delayed by a common carrier) the replaced samples will not be counted in the completeness calculation.

Non-definitive field screening methods (i.e., PID samples) are not subject to the completeness criterion, as site-specific conditions will determine the number of samples collected and analyzed.

2.2.4 Representativeness

Objectives for representativeness are defined for each sampling and analysis task and are a function of the investigative objectives. Representativeness shall be achieved through use of the standard field, sampling, and analytical procedures. Representativeness is also determined by appropriate program design, with consideration of elements such as proper sample locations and sampling procedures. To assure that the sample results are as representative as possible, the field sampling procedures in the FSP will be followed.

2.2.5 Comparability

Comparability is the confidence with which one data set can be compared to another data set. The objective for this QA/QC program is to produce data with the greatest possible degree of comparability. The number of matrices that are sampled and the range of field conditions encountered are considered in determining comparability. Comparability is achieved by using standard methods for sampling and analysis, reporting data in standard units, normalizing results

to standard conditions, and using standard and comprehensive reporting formats. Complete field documentation using standardized data collection forms shall support the assessment of comparability. Samples that are not properly preserved or that are analyzed beyond acceptable holding times should not be considered to provide representative data. Historical comparability shall be achieved through consistent use of methods and documentation procedures throughout the project.

2.2.6 Sensitivity

Sensitivity refers to the amount of material necessary to produce a detector response that can be reliably detected or quantified. Sensitivity of analytical measurements is defined by the MDL. MDLs and RLs for all applicable analyses have been identified by SGS and STL, and are provided in Attachment 1.

The analytical laboratories will report sample results down to MDLs, as indicated for the respective method and target analyte. The analytical laboratories will employ appropriate and approved technical guidelines for interpreting and reporting target analytes with concentrations between the MDL and the RL. Data residing between the MDL and the RL will be flagged with a “J” qualifier to indicate any potential quantitative uncertainties. The RL is tied to the lowest calibration standard. RLs will be adjusted based on dry weight measurements of the sample. Occasionally, the concentration of a sample’s target analyte must be diluted and the laboratory must reanalyze the sample. This can result in non-detect values for other analyses detected in the original analysis. In such a case, the analysis results of both the original sample and the diluted sample will be reported. Analytical reports submitted by SGS and STL will include a detailed analysis of any failures to meet minimum requirements of sensitivity.

Method blanks will be prepared to evaluate method sensitivity. A method blank sample consists of laboratory-grade pure water containing all of the reagents used for analysis. The method blank sample is prepared in the same manner as the sample and is processed through all of the analytical steps, including any sample preparation. For example, for samples requiring a preparatory procedure (i.e., digestion prior to analysis), the method blank sample also must be digested. Additionally, contract laboratories will analyze method blank samples every 20 samples or one per batch, whichever is more frequent, for each matrix type to monitor the overall procedure and purity of the reagents.

Method blank results will be reported down to the respective MDL. Method blanks must remain contamination-free for every analyte in the analytical procedure. If the laboratory analyst notices method blank contamination at levels appreciably above the MDL, the source of the contamination must be investigated before further analyses are performed. Observed contamination must be less than half the RL for all target analytes.

3. SAMPLE HANDLING AND RECEIPT

The generation of useable data begins with proper handling of samples at the time of collection. This includes adherence to collection and preservation procedures identified in the FSP, maintaining complete documentation, observing custody protocols, and packing and shipping samples in a manner that maintains sample integrity and allows the laboratory sufficient time to meet holding time requirements.

Sample documentation is initiated in the field as each sample is collected. A sample label is attached to each sample jar before, or shortly after, it is filled to uniquely identify the sample. The sample information is also recorded in the field logbook or on field forms at the time of collection. The information on the sample labels is rechecked and verified against field logbook entries and the CoC forms. Any necessary changes to forms, labels, or the field logbook are made by striking out the error with one straight line and re-entering the correct information. The new entries are initialed and dated by the sampler. Procedures for sample documentation are provided in the FSP.

Sample custody is maintained at all times until the samples are received by the laboratory. The sampling team assumes custody of the samples as soon as they are collected. CoC forms are completed for each sample container (cooler) at the time that samples are packaged for shipment. All samples are accompanied by CoC forms during shipment. Procedures for sample custody are provided in the FSP.

When samples are shipped, the sample containers are securely packed inside the shipping coolers, as specified in the FSP. The person relinquishing cooler custody (or the sampler) will sign and date two cooler custody seals placed across the seam where the lid meets the cooler; on the front and side of the lid. Shipping coolers are secured against damage and tampering, as described in the FSP. Field personnel contact the laboratory Project Manager (PM) immediately prior to each sample shipment. Packaging must conform to applicable U.S. Department of Transportation/International Aviation Transport Association regulations.

The laboratory is responsible for ensuring that laboratory CoC forms and tracking records are completed upon receipt of the samples and maintained through all stages of laboratory analysis in accordance with Sections 4.12 and 5.8 of the DoD QSM. The laboratory uses cooler log-in

sheets to record the essential parameters of sample receipt. These log-in sheets are emailed to the NWI PM or designee within 24 hours of sample receipt. In addition, the laboratory notifies the NWI PM or the NWI Project Chemist as soon as possible if the conditions of any submitted field samples are not acceptable to the extent that resampling would be required (e.g., if sample containers were received broken, in the event of blank contamination, if holding times were exceeded, or if sample temperatures did not meet QAPP requirements). Information recorded in the log-in sheets includes, at a minimum:

- Identification of samples received, including all location and sample identification numbers
- Date and time of sample collection
- Condition of the containers upon receipt, including cooler temperature and temperature of the sample blank
- Types of containers and verification of preservatives (if applicable)
- Analyses requested
- Laboratory project number
- Sample custodian's signature and date.

The laboratory also maintains sample storage information until disposal of the samples. The sample tracking records show the date of sample extraction or preparation and the date of instrument analysis for each analytical procedure. These records are used to determine compliance with holding time requirements. The laboratory maintains daily temperature logs for all refrigerators and freezers that contain samples for this project. These logs are stored at the laboratory and copies are made available to NWI, as requested. The laboratory notifies the NWI Project Chemist if storage temperatures deviate from those specified in the associated method.

4. ANALYTICAL PROCEDURES

4.1 Analytical Methods

Chemical analyses will be performed by SGS of Anchorage, Alaska, and STL of Sacramento, California. These laboratories will use EPA- and ADEC-approved methods and will have established protocols and QA procedures that meet or exceed applicable EPA guidelines.

Analytical procedures are delineated in Table 2. Required parameters and associated analytical methods related to soil sample collection are identified in Table 3. Required parameters and associated analytical methods related to water sample collection are identified in Table 4. Analytes that are required to be reported for each analytical method are identified in Attachment 1. In addition, the laboratory MDL and RL associated with each analyte are provided in Attachment 1. These MDLs and RLs comply with the DoD QSM, Version 3 requirements. Analytical methods that yield MDLs and RLs that are sufficiently low to support the objectives of this investigation were selected.

4.1.1 Method Detection Limits

The MDL is the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. The laboratory shall establish MDLs for each method, matrix, and analyte for each instrument the laboratory plans to use for the project. The laboratory shall revalidate these MDLs at least once per 12-month period. Results less than the MDL shall be reported as “ND.” The sensitivity of the instrument and ability to generate RLs low enough to meet cleanup criteria are critical to the success of this project.

Table 2. Analytical procedures.

Parameter	Analytical Method	Preparatory Methods (Water)	Preparatory Methods (Soil)
VOCs	EPA SW8260B	EPA SW5030B	Field extracted with Methanol or Sodium Bisulfate, EPA SW5035
SVOC	EPA SW8270C	EPA SW3510C	EPA SW3550C
PAH	GC/MS-SIM	EPA SW3510C	EPA SW3550C
GRO	AK101	AK101	Field extracted with Methanol or Sodium Bisulfate, AK101
DRO	AK 102	AK102	AK102
RRO	AK103	AK103	AK103
PCBs	EPA SW8082A	EPA SW3510C	EPA SW3550C
Resource Conservation and Recovery Act (RCRA) Metals by Toxicity Characteristic Leaching Procedure (TCLP)	EPA SW 6010/7470A/7471A	EPA SW1311/3010A	EPA SW1311/3050B
Total RCRA Metals	EPA SW 6010/7470A/7471A	EPA SW3010A	EPA SW3050B
Total Metals by ICP/MS + Strontium	EPA SW6020	EPA SW3010A	EPA SW3050B
Mercury	EPA SW7470A/SW7471A	EPA SW7470A	EPA SW7471A
Pesticides	EPA SW8081A	EPA SW3510C	EPA SW3550C
Herbicides	EPA SW8151	EPA SW3535	EPA SW3550C
Anions by IC	E300.0	E300.0	Modified for soil; E300.0
Nitrate/Nitrite/O-Phosphorous	E353.2	E353.2	E353.2
pH	E150.1/EPA SW9045	E150.1	EPA SW9045
Nitroaromatics and Nitroamines by High Performance Liquid Chromatography (HPLC)/ultraviolet (UV)	EPA SW8330	EPA SW8330	EPA SW8330
Perchlorate	EPA SW6850	EPA SW6850	N/A
Dioxins/Furans	EPA SW8290	EPA SW8290	EPA SW8290
Radionuclides, Gamma Emitting	EPA 901.1/HASL 300	EPA 901.1	HASL 300
Gross Alpha/Gross Beta	EPA 900.0/EPA SW9310	EPA 900.0	EPA SW9310

Table 3. Soil sample collection information.

Analysis	Method Number	Container	Preservative	Maximum Holding Times
VOCs	EPA SW8260B	4 oz. septa, tared amber glass or 40 mL amber glass	Methanol or Sodium Bisulfate	14 days
SVOC	EPA SW8270C	4 oz. amber glass	4°C +/- 2°C	14 days to extraction, 40 days to analysis
PAH	GC/MS-SIM	4 oz. amber glass	4°C +/- 2°C	14 days to extraction, 40 days to analysis
GRO	AK101	4 oz. septa, tared amber glass	Methanol, 4°C +/- 2°C	28 days
DRO	AK 102	4 oz. amber glass	4°C +/- 2°C	14 days to extraction, 40 days to analysis
RRO	AK103	4 oz. amber glass	4°C +/- 2°C	14 days to extraction, 40 days to analysis
PCBs	EPA SW8082A	4 oz. glass	4°C +/- 2°C	14 days to extraction, 40 days to analysis
RCRA Metals by TCLP	EPA SW6010/7471A	8 oz. glass	4°C +/- 2°C	180 days to analysis; Mercury 28 days
Total RCRA Metals	EPA SW6010/7471A	8 oz. glass	4°C +/- 2°C	180 days to analysis; Mercury 28 days
Total Metals by ICP/MS + Strontium	EPA SW6020	8 oz. glass	4°C +/- 2°C	180 days to analysis
Mercury	EPA SW7471A	8 oz. glass	4°C +/- 2°C	28 days
Pesticides	EPA SW8081A	8 oz. amber glass	4°C +/- 2°C	14 days to extraction, 40 days to analysis
Herbicides	EPA SW8151	8 oz. amber glass	4°C +/- 2°C	14 days to extraction, 40 days to analysis
Anions by IC	E300.0	8 oz. amber glass	4°C +/- 2°C	None
Nitrate / Nitrite / OPO_3	E353.2	8 oz. amber glass	4°C +/- 2°C	28 days; 48 hours OPO_3
pH	EPA SW9045	8 oz. amber glass	4°C +/- 2°C	ASAP (laboratory protocol dictates analysis within 14 days)
Nitroaromatics and Nitroamines by HPLC/UV	EPA SW8330	8 oz. amber glass	4°C +/- 2°C	14 days to extraction, 40 days to analysis
Dioxins/Dibenzofurans	EPA SW8290	8 oz. amber glass	4°C +/- 2°C	30 days to extraction, 45 days to analysis
Radionuclides, Gamma Emitting	HASL 300	250 mL HDPE	None	6 months
Gross Alpha/Gross Beta	EPA SW9310	250 mL HDPE	None	6 months

NOTES: All container caps shall be PTFE-lined
OPO_3 - ortho-Phosphate

Table 4. Groundwater sample collection information.

Analysis	Method Number	Container	Preservative	Maximum Holding Times
VOCs	EPA SW8260B	Three 40-ml VOA vials	No headspace, HCl to pH < 2; 4°C +/- 2°C	14 days
SVOC	EPA SW8270C	Two 1-L amber jars	4°C +/- 2°C	7 days to extraction; 40 days to analysis
PAH	GC/MS-SIM	Two 1-L amber jars	4°C +/- 2°C	7 days to extraction; 40 days to analysis
GRO	AK101	Three 40-ml VOA vials	No headspace, HCl to pH < 2; 4°C +/- 2°C	14 days
DRO	AK102	Two 1-L amber jars	HCl to pH < 2; 4°C +/- 2°C	14 days to extraction; 40 days to analysis
RRO	AK103	Two 1-L amber jars	HCl to pH < 2; 4°C +/- 2°C	14 days to extraction; 40 days to analysis
PCBs	EPA SW8082A	Two 1-L amber jars	4°C +/- 2°C	7 days to extraction; 40 days to analysis
Total Metals by ICP/MS + Strontium	EPA SW6020	250 ml HDPE	HNO_3 to pH <2; 4°C +/- 2°C	180 days
Mercury	EPA SW7470A	250 ml HDPE	HNO_3 to pH <2; 4°C +/- 2°C	28 days
Pesticides	EPA SW8081A	Two 1-L amber jars	4°C +/- 2°C	7 days to extraction; 40 days to analysis
Herbicides	EPA SW8151	Two 1-L amber jars	4°C +/- 2°C	7 days to extraction; 40 days to analysis
Anions by Ion Chromatography	E300.0	250 ml HDPE	4°C +/- 2°C	28 days Br, F, Cl, SO_4; 48 Hours NO_3, NO_2, OPO_3
Nitrate/Nitrite	E353.2	250 ml HDPE	4°C +/- 2°C	28 days
pH	E150.1	250 ml HDPE	4°C +/- 2°C	ASAP (laboratory protocol dictates analysis within 14 days)
Nitroaromatics/ Nitroamines	EPA SW8330	Two 1-L amber jars	4°C +/- 2°C	7 days to extraction; 40 days to analysis
Perchlorate	EPA SW6850	500 mL HDPE	4°C +/- 2°C	28 days
Dioxins/Dibenzofurans	EPA SW8290	Two 1-L amber jars	4°C +/- 2°C	30 days to extraction; 45 days to analysis
Radionuclides, Gamma Emitting	EPA 901.1	2 L HDPE	None	6 months
Gross Alpha/Gross Beta	EPA 900.0	2 L HDPE	None	6 months

Notes:

M – Indicates laboratory modified procedure will be used. The NWI PM and USACE Environmental Scientist will review standard operating procedures before samples are tested by this method.

Br – Bromide, NO_2 – Nitrite, Cl – Chloride, OPO_3 - ortho-Phosphate, F – Fluoride, SO_4 – Sulfate, NO3 - Nitrate

4.1.2 Reporting Limits

The laboratories participating in this work effort shall ensure the MDL study supports the RLs for each method utilized on this project. The MDL may not be more than one-half the corresponding RL. The laboratories shall also verify RLs by including a standard at or below the RL as the lowest point on the calibration curve. This project includes methods that utilize field extraction with methanol. The RL is dependent on the amount of soil collected and volume of methanol added to the sample container in the field. The percent moisture will also impact the RLs. All results at or above the MDL shall be reported; however, those results greater than the MDL and below the RL will be considered estimated and qualified with a "J" flag. The RL should be below the task-specific action limits; however, the RL for some analytes may exceed criteria. Use of a different procedure for sample collection, preparation, or analysis may be considered if technology is available and cost effective.

4.2 Screening Analytical Methods

Field screening methods will be used as appropriate to evaluate soil, groundwater, and waste samples. Specific screening methods and their application are described in the FSP (NWI 2006).

4.3 Instrument/Equipment Testing, Inspection, and Maintenance

Equipment shall be capable of achieving the accuracy, precision, sensitivity, and selectivity required for the intended use of the generated data (DoD 2006). Preventive maintenance of all laboratory equipment and instruments is essential to ensuring the quality and efficiency of analytical data produced. The service arrangements, parts, and preventive maintenance procedures implemented by contract laboratories are discussed below. Expendable items for all major instruments will be kept in inventory to reduce instrument downtime.

To minimize interruption of analytical work, the project laboratory will perform routine preventive maintenance on each analytical instrument. Designated laboratory personnel will be trained in routine maintenance procedures for all major instrumentation. Repairs will be performed either by trained laboratory staff or by trained service engineers employed by the instrument manufacturer. Maintenance contracts will be maintained on all major analytical instruments. All maintenance and repairs conducted will be detailed within bound logbooks unique to each instrument using standardized documentation practices. These logbooks and

records will be made available during audits and will be maintained according to the archive requirements provided.

An attempt will be made to back up all instruments in the laboratory with a functionally equivalent instrument in case of catastrophic instrument failure. It will be the responsibility of the laboratory to have a contingency plan in place such that all sample holding times can be met. This plan will include the use of another state-certified laboratory. Prior to subcontracting, the NWI Project Chemist will be notified for consultation on problem resolution.

4.4 Instrument/Equipment Calibration

Analytical instruments shall be calibrated and operated in accordance with Section 5.5.2.2 of the DoD QSM, QC criteria provided in this QAPP, and referenced analytical methodology. All calibrations will be properly documented in bound logbooks and raw data files.

All analytes reported shall be present in the initial and continuing calibrations. All sample results reported shall be within the calibration range. Records of standard preparation and instrument calibration shall be maintained. Records shall unambiguously trace the preparation of standards and their use in calibration and quantitation of sample results. Calibration standards shall be traceable to the original standard materials.

The initial calibration shall be checked at the frequency specified in the method using materials prepared independently of the calibration standards. Analyte concentrations are determined with either calibration curves or response factors (RFs). When using RFs to determine analyte concentrations for gas chromatography (GC) and gas chromatography/mass spectroscopy (GC/MS) methods, the average RF from the initial five-point calibration shall be used. The continuing calibration shall not be used to update the RFs from the initial five-point calibration.

4.5 Laboratory Quality Control

Each analytical method used in this investigation includes specific instructions for analysis of QC samples and completion of QC procedures during sample analysis. These QC samples and procedures verify that the instrument is calibrated properly and remains in calibration throughout the analytical sequence, and that the sample preparation procedures have been effective and have not introduced contaminants into the samples. Additional QC samples are used to identify and

quantify positive or negative interference caused by the sample matrix. Each method protocol provides control limits that indicate acceptable conditions for analysis of samples as well as unacceptable conditions that would necessitate reanalysis of samples. No special QC procedures will be required for this project. Standard laboratory QC procedures required for chemical and physical analyses are included in the following sections.

4.5.1 Holding Time Compliance

Holding time constraints for each method will be met to ensure the validity of the results reported. All sample preparation and analysis shall be completed within the method-established holding criteria, as presented in Tables 4 and 5.

The first holding time begins at the time of sample collection and ends when sample preparation begins or a sample is analyzed. Some methods have more than one holding time requirement (e.g., methods requiring extraction AK102, SW8082, and SW8270C). The analysis holding time begins at the time sample preparation is completed and ends with completion of analytical testing, including dilutions, second column confirmations, and any required reanalyses.

All results that are reported must be performed within the established holding times. The laboratory shall notify the NWI Project Chemist within 24 hours of missing a holding time. This prompt notification may allow the project team to evaluate recollection of the sample while the team is still in the field.

4.5.2 Instrument Tuning

Instrument tuning will be completed to ensure that mass resolution, identification, and, to some degree, sensitivity of the analyses is acceptable. Instrument tuning will be completed in accordance with the requirements stated in the analytical method during which samples or standards are analyzed. In the event that an instrument tuning does not meet control limits, analysis of project samples will be suspended until the source of the control failure is either eliminated or reduced to within control specifications. Any project samples analyzed while the instrument is out of tune will be reanalyzed.

4.5.3 Performance Evaluation Samples

A performance evaluation (PE) sample is a reference sample provided to a laboratory for the purpose of demonstrating that the laboratory can successfully analyze the sample within limits of performance specified by the USACE. They are used to provide assurance that the laboratory can correctly identify and quantify analytes of interest.

Samples are introduced in a manner whereby the laboratory is unaware of either the nature of the sample (i.e., a PE sample) or of its component concentrations, thus preventing "special" treatment of PE samples. PE sample packaging and labels are identical to the field samples to ensure that they are not identified as PE samples by the laboratory. PE samples mimic routine field samples in both matrix and contaminant concentrations. The true value of the concentration of the reference material, known to project personnel, is unknown to the laboratory at the time of the analysis.

After preparation, PE samples are sent by courier to the field sampling location where they are inserted into the field batch with other samples and sent to the laboratory for analysis. PE samples are then analyzed by the laboratory along with ordinary samples. PE analytical results from the laboratory are evaluated against documented values.

For this project, PE samples may be submitted to one or multiple laboratories to evaluate analytical performance for specific methods. PE testing shall be performed at the discretion of the NWI PM, in consultation with the project chemist for purposes of evaluating overall project quality. It is anticipated that individual PE samples will be submitted occasionally for the most commonly requested analyses; however, any project-specific PE testing shall not affect laboratory accreditation and shall not be used as a basis for acceptance or rejection of data generated by a nationally accredited laboratory.

4.5.4 Method Blank

Method blanks are used to assess possible laboratory contamination of samples during all stages of preparation and analysis. The method blank should be free from analytes of concern and processed simultaneously with and under the same conditions as the associated samples. Blank corrections will not be applied by the laboratory to the original data. A minimum of one method

blank will be analyzed for every sample preparation group, or 1 for every 20 samples, whichever is more frequent.

The presence of analytes in a method blank at concentrations equal to or greater than one-half the RL indicates a need for corrective action. Corrective actions shall be performed to eliminate the source of contamination prior to proceeding with analysis. After the source of contamination has been eliminated, all samples in the associated batch shall be reprepared and reanalyzed.

Analytical results shall not be adjusted based on compounds detected in the associated blank. When an analyte is detected in the method blank and associated samples and corrective actions are not adequate, the results in the impacted samples will be reported with appropriate qualifying codes. If an analyte is detected in the instrument blank and the associated samples, the laboratory shall document concentration of the analyte in the case narrative. If the blank contaminant is greater than the established action level, all samples and QC shall be reprepared and reanalyzed.

4.5.5 Equipment Blank

An equipment blank is defined as a sample of analyte-free media that is collected after equipment decontamination and prior to sample collection. Equipment blanks are not required when disposable sample collection equipment are used. This blank is handled and tested using the same process as the associated samples.

Equipment blanks are used to assess the effectiveness of equipment decontamination procedures and to document potential cross-contamination. If necessary, a minimum of one equipment blank will be analyzed each day for each matrix, or 1 for every 20 samples for each matrix, whichever is more frequent. The blank shall be analyzed for all laboratory analyses requested for the environmental samples collected at the site. When an analyte is detected in the equipment blank, the corresponding results in the associated samples will be qualified.

4.5.6 Trip Blank

Trip blanks are matrix specific, consisting of a 40-mL VOA vial filled in the laboratory with analyte-free water or a 4-oz amber glass jar filled with Ottawa sand and methanol to accompany VOC samples. The trip blanks are shipped from the laboratory with sample glassware, transported to the site in the cooler with associated glassware, handled like an environmental

sample, and returned to the laboratory for analysis. Trip blanks are not opened in the field. Trip blanks are used only when volatile samples (SW8260B and AK101) are collected. A separate trip blank is collected for each method.

Trip blanks are used to assess potential cross-contamination during transportation, handling, and storage. When an analyte is detected in the trip blank, the associated sample results may be qualified. Samples with high levels of contamination shall not be shipped with water samples but shall be shipped in a separate container. Trip blanks are not required for waste samples.

The trip blanks shall receive a unique sample ID (**do not ship samples identified as TRIP BLANK**) similar to that used for a field sample, as specified in the FSP.

4.5.7 Laboratory Control Samples

LCSs (i.e., reference material or spiked blanks) will be used as a check on overall method performance. An LCS, and possibly a LCSD, will be analyzed for every Sample Delivery Group (SDG) or for every 20 samples, whichever is more frequent.

4.5.8 Matrix Spike and Matrix Spike Duplicates

MSs and MSDs are aliquots of sample spiked with known concentrations of all target analytes. The spiking occurs during sample preparation and analysis. The MS and MSD shall be spiked at a level less than or equal to the midpoint of the calibration curve for each analyte. Only samples generated for this project shall be used for spiking. The MS/MSD shall be designated on the CoC. The MS/MSD is used to document the bias attributed to the sample matrix.

A minimum of one MS and one MSD sample shall be analyzed for every 20 samples analyzed, per matrix per analytical method. The performance of the MS and MSD is evaluated against the QC acceptance limits given in the tables provided for each method. If either the MS or the MSD is outside the QC acceptance limits, the analytes in all related samples shall be qualified. The associated LCS recoveries shall be evaluated to determine if the system is in control or if matrix is a factor impacting recoveries.

QC samples such as field blanks will not require a MS/MSD. The sample that requires a MS/MSD shall be designated on the CoC form and does not require a separate sample

identification number. The field sampler will note in the comment section of the CoC when a MS/MSD is required for a specific sample.

4.5.9 Laboratory Duplicates

Replicate laboratory analyses are indicators of laboratory precision. Laboratory duplicates shall be analyzed at a minimum of 1 in 20 samples or for every sample batch, whichever is more frequent. The laboratory shall document their procedure to select the use of appropriate types of duplicates. The selected samples(s) shall be rotated among client samples so that various sample matrix problems may be noted and/or addressed. Poor performance in the duplicates may indicate a problem with the sample composition and shall be reported to the client.

4.5.10 Internal Standards

Internal standards are measured amounts of specific compounds added to the sample extracts. They are used as a reference to control and evaluate the precision and bias introduced during analysis of the sample. These standards shall be added to all environmental samples, controls, and blanks in accordance with the method requirements. Corrective actions shall be performed when acceptance limits are not met. After the system problems have been identified and system control has been re-established, all effected samples shall be reanalyzed. If corrective actions are not performed or are ineffective, the associated results will be qualified.

4.5.11 Retention Time Windows

Retention time windows are used in identification of analytes. They are calculated from replicate analyses of a standard on multiple days. The significant shift in retention time of a compound in a daily standard may indicate the system is no longer stable or has changed since the retention time windows were initially established. Corrective action shall be implemented and all associated samples shall be reanalyzed.

4.6 Inspection/Audits

4.6.1 Supplies and Consumables

Supplies and consumables are required for sample collection and laboratory activities. Supplies of appropriate, documented purity will be used for sample collection and decontamination. Acceptance for all supplies will require an intact seal upon receipt, maintenance at appropriate

temperature, and use only prior to the expiration date. This method of documentation allows any contamination problem to be traced to its source and will enable identification of related samples that may have been affected. Acceptance requirements will include a basic inspection of all containers received and rejection of unacceptable supplies.

Reagents of appropriate purity and suitably cleaned equipment must be used for all stages of laboratory analyses. In addition, the laboratory must ensure that the concentrations of calibration and spiking standard are accurate and that instrumentation is functioning properly. The lot numbers of all standards are routinely tracked by the laboratory, from purchase of stock standards to preparation of secondary and working calibration standards. All calibration and spiking standards are checked against standards from another source. LCS results provide an additional check for accuracy. Details for acceptance requirements for supplies and consumables at the laboratory are provided in the laboratory QA manuals.

4.6.2 Audits

No formal performance or system audits of the laboratory are planned under this project. The laboratory will maintain ADEC certifications/approval throughout the duration of the project.

4.7 Nonconformance/Corrective Actions

In accordance with Section 4.10 of the DoD QSM, the laboratory shall have a policy and procedures in place that shall be implemented when any aspect of its environmental testing work, or the results of this work, do not conform to its own procedures or the agreed requirements of the client. Corrective actions will then be initiated when potential or existing field or laboratory conditions are identified that may adversely affect data quantity or quality, as defined in previous tables for each method. Events that may lead to corrective actions include the following:

- Violation of established analytical controls
- Performance, system, or QA audits
- Laboratory/field comparison studies
- Violation of shipping requirements
- Violation of holding times.

Corrective actions may take several forms, but the following steps generally are included:

- Designate appropriate authorities for implementing corrective action
- Check the calculations
- Check the instrument for proper setup
- Re-extract and/or reanalyze, as appropriate
- Resample.

The NWI PM, NWI Project Chemist, sampling personnel, and laboratory quality manager may be involved in the corrective action. The corrective action may be immediate or long term. An immediate corrective action may include recalculating, reanalyzing, or repeating sample collection. Long-term corrective actions may be identified through PE samples, standards, control charts, or other devices.

Corrective actions, if necessary, are to be completed once. If acceptance criteria were not met and a corrective action was not successful or the corrective action was not performed, the appropriate flagging criteria will be applied in accordance with Appendix B of the DoD QSM. Requirements and procedures for documenting the need for corrective actions are provided in detail in the DoD QSM, Appendix I.

Problems requiring corrective action in the field must be reported in accordance with QAP-10-151, *Control of Nonconforming Items* (see Attachment 4). Problems requiring corrective action in the laboratory are documented by the use of a laboratory corrective action report, as discussed below.

4.7.1 Corrective Action Report

Problems requiring corrective action in the laboratory are documented by the use of a corrective action report. Corrective actions that warrant data as unusable shall be provided to the NWI Project Chemist within 24 hours so recollection can be evaluated immediately. The QA coordinator or any other laboratory member can initiate the corrective action request in the event QC results exceed acceptability limits, or upon identification of some other laboratory problem.

Corrective actions can include reanalysis of the sample or samples affected, resampling and analysis, or a change in procedures, depending upon the severity of the problem.

5. LABORATORY DATA REDUCTION

Data reduction involves the mathematical or statistical calculations used by the laboratory to convert raw data to the reported data. Analytical data will be reduced by the laboratory, as specified in each of the referenced analytical methods. For each method, all raw data results will be recorded using method-specific forms or a standardized output from each of the various laboratory instruments. The laboratory QA officer is responsible for reviewing the laboratory data packages and checking data reduction prior to submittal to NWI. Any transcription or computation errors identified during this review will be corrected by the laboratory.

5.1 Record Keeping

The laboratory shall maintain electronic and hardcopy records sufficient to recreate each analytical event conducted for a minimum of 5 years. The minimum records the laboratory shall keep contain the following elements:

- CoC forms
- Initial and continuing calibration records, including standards preparation traceable to the original material and lot number
- Instrument tuning records (as applicable)
- Method blank results
- Internal standard results
- Surrogate spiking records and results (as applicable)
- Spike and spike duplicate records and results
- Laboratory records (bench sheets, preparation logs, etc.)
- Raw data, including instrument printouts, chromatograms with compound identification, and quantitation reports
- Corrective action reports
- Other method and project-required QC samples and results

- Laboratory-specific written standard operating procedures (SOPs) for each analytical method and QA/QC function in place at the time of analysis of project samples.

All data and reports will be held client confidential. If the laboratory is unable to store data for 5 years, then it is the responsibility of the laboratory to contact the NWI or USACE representative to make alternative arrangements.

6. LABORATORY OPERATIONS DOCUMENTATION

This section discusses the data reporting procedures for the project. Sample receipt reports, delivery schedule for laboratory reports, definitive data package, and electronic data files are identified.

6.1 Sample Receipt Reports

The laboratory will issue sample receipt documentation, including the cooler receipt forms, within 24 hours of receipt of each batch of samples to the NWI PM and NWI Project Chemist via e-mail. The laboratory shall also post this information at receipt.cooler@poa02.usace.army.mil to allow the USACE Project Chemist immediate access to the analytical results. The laboratory shall also post and email a copy of the CoC, custody seals, and shipping documentation within 24 hours of sample receipt at the laboratory. Initial inspection will be documented by the laboratory using CoC forms and cooler log-in sheets. If samples pass this initial inspection, they will be logged into the Laboratory Information Management System (LIMS). The laboratory will use LIMS to track project samples from time of receipt to the time results are officially reported. If problems are discovered, the laboratory sample log-in clerk will immediately notify the laboratory PM, who in turn will immediately notify the NWI Project Chemist or NWI PM.

6.2 Delivery Schedule

Initial sample results for primary and QC samples, including both a signed PDF document and associated Microsoft Excel spreadsheets, will be submitted by facsimile or e-mail to the NWI Project Chemist. The time-frame in which these results are due to NWI will be specified on the sample CoC form. The initial reports shall include, at a minimum, the following information:

- Initial analytical results (field and QC samples)
- Associated QC results (MS/MSD, LCS, surrogate [if applicable], and analytical blanks)
- Supporting documentation (cooler receipt and CoC forms).

Comprehensive definitive data packages shall be delivered by the laboratory to NWI within 28 calendar days of sample receipt. Reports delivered outside of the 28 calendar day requirement may be subject to contractual penalties.

6.3 Definitive Data Package

The laboratory will provide a comprehensive definitive data package, as specified in EM 200-1-3. A comprehensive data package contains sufficient information to completely reconstruct the chemical analyses that were performed. The data package will include all batch QC results, instrument QC results (e.g., initial calibration verification, continuing calibration verification [CCV], and instrument performance checks), MDL studies, and raw data (e.g., run logs, sample preparation logs, standard preparation logs, and printed instrumental output chromatograms), and will adhere to the requirements of the DoD QSM. In addition, the package will include the following:

- Cover page (including the laboratory's name, address, telephone number, fax number, and the name of the person authorizing release of laboratory data)
- Report date
- The site or project name
- Original CoC for each group of samples
- Cooler receipt form documenting the condition of the samples and the ambient temperature of the interior of the shipping container (or temperature blank) when received by the laboratory
- Case narrative explaining all deficiencies or variances to the laboratory SOP (see Attachment 2) or analytical method that occurred during sample processing and analysis, including all control limit exceedances
- The type field sample number, laboratory sample number, type of matrix, date sampled, date received, date extracted and digested, and date analyzed
- Type of analysis
- The analytical and extraction method used and method number
- The concentrations of analytes (reported in micrograms per liter [µg/L] for liquids or milligrams per kilogram [mg/kg], dry weight basis, for solids)
- The dilution factor

- The analyst's name, signature or initials, and date signed
- Surrogate recoveries, summarized in table format
- LCS/LCSD recoveries, summarized in table format
- MS/MSD recoveries, summarized in table format
- Blank data, including method blanks and any instrument blanks with positive results
- Chromatograms for fuel methods (AK101, AK102, and AK103)
- Total Ion Chromatograms (20) for methods SW8260B and SW8270C
- Summary forms and raw data for ICAL standards, second source verification standards, and internal standard recoveries to include retention times and quantitation ions
- Summary forms and raw data for CCV standards
- Other requirements:
  - Summary reports shall include RLs and control limits for all analytes
  - Report shall include definitions of any characters used to qualify data
  - Report shall be paginated
  - Electronic data deliverable (EDD) in COELT 1.2a, Adobe PDF, and Microsoft Excel formats (data in all formats must match)
  - Hard copy of all data in Adobe PDF formats
  - Two copies of all deliverables.

6.3.1 Electronic Data Deliverables

Upon completion of sample analysis, the laboratories will prepare and submit the EDD in COELT 1.2a, Adobe PDF, and Microsoft Excel formats.

7. DATA ASSESSMENT PROCEDURES

This section discusses the process that will be used to assure the validity of the data. The following sections describe the procedures to be used for data review, verification and validation, and reconciliation of DQOs.

7.1 Data Quality Control Review

7.1.1 Data Package Verification

The NWI PM will evaluate each laboratory data package for completeness, correctness, consistency, and compliance with this QAPP. In this context, "completeness" means that all required hard copy and electronic deliverables are provided.

7.1.2 Sample Collection Evaluation

The conformance of the field activities to specifications in the FSP will be evaluated on an ongoing basis while field activities are in progress. Additional verification will be provided through oversight of the field activities by the FM and by contacts with the NWI PM. If a sample cannot be collected as planned, the NWI PM will be notified and an alternate location or sampling method may be selected, if possible. The review process will include immediate evaluation of any change to the sampling plan so that an alternate field procedure may be established quickly, if necessary. Additional verification procedures may be completed for information generated in the field. Station location information will be verified when station coordinates are used to generate project maps. A final verification review of field activities will be made when the field effort is complete. The verification results will be included in the data quality and usability report.

7.1.3 Sample Handling Evaluation

Standard procedures for sample collection and shipping will be followed to ensure that samples are preserved and stored as specified in the FSP. Any sample handling difficulties that are encountered in the field will be described in the field log. The field log will be reviewed and sample integrity verified as part of the data validation procedures. Samples will be checked by laboratory personnel upon receipt and the cooler temperature will be determined. The temperature and condition of the samples will be recorded at the laboratory and any problems

will be described in the case narrative for the data report. The field log and case narrative will be reviewed during the QA review, and data will be flagged if the sample integrity was compromised. Data may be rejected as unusable if severe handling problems are encountered.

7.1.4 Laboratory Data Review

The laboratory analyst who generates the analytical data will be primarily responsible for the correctness and completeness of that data. Each step of this review process will involve the evaluation of data quality based on the results of the QC data and on the professional judgment of those conducting the review. This application of technical knowledge and experience to the evaluation of data is essential to ensure that quality data are generated consistently. All data generated and reduced will follow well-documented in-house protocols.

7.1.4.1 Level 1 Technical Data Review

Analysts will review the quality of their work (100% review) based on an established set of guidelines, consistent with Sections 4.2 and 5.4 of the DoD QSM, including the QC criteria established in each method, in this QAPP, and in the laboratory QA manual. This review will, at a minimum, ensure that:

- Sample preparation and analysis information is correct and complete
- Appropriate SOPs have been followed
- Analytical results are correct and complete
- QC samples are within established control limits
- Blanks and LCSs are within appropriate QC limits
- Special sample preparation and analytical requirements have been met
- Documentation is complete (e.g., any anomalies and holding times have been documented and forms have been completed).

7.1.4.2 Level 2 Technical Data Review

This laboratory review will be performed by a supervisor or data review specialist whose function is to provide an independent review of data packages. This review also will be

conducted according to an established set of guidelines consistent with Sections 4.2 and 5.4 of the DoD QSM and will be structured to ensure that:

- All appropriate laboratory SOPs have been followed
- Calibration data are scientifically sound, appropriate to the method, and completely documented
- QC samples are within established guidelines
- Qualitative identification of sample components is correct
- Quantitative results are correct
- Documentation is complete (e.g., any anomalies and holding times have been documented and any forms have been completed)
- Data are ready for incorporation into the final report
- The data package is complete and ready for data archive.

The Level 2 review will be structured so that the laboratory reviews all calibration data and QC sample results, and so that all of the analytical results from at least 10% of project samples are checked back to the sample preparation and analytical bench sheets. If no problems are found with the data package, the review will be considered complete.

If any problems are found with the data package, an additional 10% of the project results will be checked back to the sample preparatory and analytical bench sheets. The laboratory then will repeat this cycle either until no errors are found in the data set checked or until all data are checked. The laboratory will note all errors and corrections.

7.1.4.3 Level 3 Administrative Data Review

The laboratory QC officer or PM will perform this review. It should be similar to the Level 2 review except that it will provide a total overview of the data package to ensure its consistency and compliance with QC requirements. The laboratory will note all errors and corrections.

7.2 Data Verification and Validation

7.2.1 Data Verification

Data verification is the process of determining whether data have been collected or generated as required by the project documents. Data verification consists of the following categories: (1) verifying that field sampling operations were performed in compliance with the FSP, (2) verifying that the data collection plans and protocols were followed, (3) verifying completeness to establish that sufficient data necessary to meet project objectives have been collected, and (4) checking that QC procedure results meet control limits defined in the methods.

7.2.2 Data Validation

Data validation is the process of evaluating the technical usability of the verified data with respect to the planned objectives of the project. Data validation consists of the following objectives: (1) verifying that measurements (field and laboratory) meet the user's needs, (2) providing information to the data user regarding data quality by assignment of individual data qualifiers based on the associated degree of variability, and (3) determining whether DQOs were met. The NWI Project Chemist or a third party data validator, under subcontract to NWI, will perform validation of the data according to requirements of *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA 2004a) and *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (EPA 1999). In addition, radiological data validation will be completed in accordance with the requirements set forth in the Multi-Agency Radiological Laboratory Analytical Protocols (MARLAP) manual (EPA 2004b).

7.3 Reconciliation with Data Quality Objectives

The goal of data validation is to determine the quality of each data point and to identify data that do not meet the project DQOs. Data may be qualified as being unusable or rejected (R), as based on established EPA and DOD data quality review protocols. An explanation of the rejected data will be included in the data validation report. If the rejected data are needed to make a decision, then it may be necessary to resample. Data qualified as estimated (J) are less precise, or less accurate, than unqualified data but are still acceptable for use. The data users and the NWI PM are responsible for assessing the effect of the inaccuracy or imprecision of the qualified data on

statistical procedures and other data uses. The data quality report will include all available information regarding the direction or magnitude of bias or the degree of imprecision for qualified data to facilitate the assessment of data usability. The data reporting will include a discussion of data limitations and their effect on data interpretation activities.

8. CHEMICAL DATA QUALITY REVIEW REPORT

The NWI Project Chemist or designee will generate a chemical data quality report (CDQR). The laboratory data packages shall be reviewed as required by EM 200-1-3, and EM 200-1-6. In addition, radiological data will be reviewed in accordance with the requirements set forth in the MARLAP manual.

The NWI senior chemist or designee will conduct a comprehensive data review and generate a CDQR. Included will be a review of the holding time criteria, cooler and sample receipt condition, and evaluation of the data based on the acceptance criteria defined this QAPP. The senior chemist will assign flagging based on the criteria of the QAPP. Tables of all flagged data will be generated. Tables of the comparison between QC samples will be generated. Preceding the tables will be a cover page, report contents, pertinent project information, and an executive summary.

The data quality assessment will include the following tabulated information:

- List of all samples, organized by analytical method (indicating which samples were qualified), directing the reader to subsequent tables of specific qualifications
- All known field/laboratory general sampling, documentation, and/or reporting discrepancies
- Sample shipping/receipt condition qualifications (if necessary)
- Analytical hold time qualifications (if necessary)
- Surrogate qualifications (if necessary)
- Laboratory blank qualifications (if necessary)
- MS/MSD qualifications (if necessary)
- Serial dilution qualifications (if necessary)
- LCS/LCSD qualifications (if necessary)
- CCV qualifications (if necessary)
- Precision qualifications (if necessary)
- Rejected data (if necessary)

- RL qualifications (if necessary)
- Comparison of primary/QC samples with USACE comparability criteria
- Comparison of results with project-specific sensitivity requirements.

9. REFERENCES

ADEC, 2002. Alaska Department of Environmental Conservation Division of Spill Prevention and Response Contaminated Sites Remediation Program, *Underground Storage Tanks Procedures Manual: Guidance for Treatment of Petroleum-Contaminated Soil and Water and Standard Sampling Procedures,* November 2002.

DoD, 2006. *Quality Systems Manual for Environmental Laboratories*, Version 3. U.S. Department of Defense, January 2006.

EPA, 2006, *Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA QA/G-4,* United States Environmental Protection Agency, EPA/240/B-06/001 February.

EPA, 2004a. *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, Final.* EPA 540-R-04-004, U.S. Environmental Protection Agency, October 2004.

EPA, 2004b. *Multi-Agency Radiological Laboratory Analytical Protocols Manual,* EPA 402-B-04-001A, U.S. Environmental Protection Agency, July 2004.

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EPA, 1999. *Contract Laboratory Program National Functional Guidelines for Organic Data Review, Final.* U.S Environmental Protection Agency, Office of Solid Waste, EPA 540-R-99/008, October 1999.

Hassig, N.L., J.E. Wilson, R.O. Gilbert, B.A. Pulsipher, L.L. Nuffer, 2005, *Visual Sample Plan Version 4.0 User's Guide*, Pacific Northwest National Laboratory, Richland, Washington, PNNL-15247.

NWI, 2006. *Field Sampling Plan: Delineation and Remediation of Contaminated Soil, Groundwater and Debris at Stryker Brigade Cantonment and FWA-102 Areas*. North Wind, Inc., NW-AK-06-15, June 2006.

USACE, 2001. *Requirements for the Preparation of Sampling and Analysis Plans*, EM-200-1-3, U.S. Army Corps of Engineers, Feb. 2001.

USACE, 1997. *Chemical Quality Assurance for Hazardous, Toxic and Radioactive Waste (HTRW) Projects*, EM-200-1-6, U.S. Army Corps of Engineers, October 1997.

ATTACHMENT 1

LABORATORY METHOD DETECTION LIMITS AND REPORTING LIMITS FOR SPECIFIC ANALYTES

Quote Number: **7770 A See special instructions below.**

Quote Date: 06/01/06
Quote Good Until: 12/31/06 if accepted before 8/30/06

Client Name/Address: North Wind, Inc.
235 E 8th Ave., Suite 210
Anchorage, AK 99501

Telephone Number: (907)277-5488 **Fax Number:** (907)277-5422

Contact Person(s): Kate Jensen

Job Description: Ft Wainwright **Start Date:** **2006**

SGS Environmental Services Inc., will provide quality analytical data for North Wind, Inc. by performing the attached analysis.

SEE ATTACHED

- The proposal refers to a standard turnaround time of 10 working days.
- When **rush** turnaround times are required, the laboratory *would appreciate* being notified five working days in advance of sample delivery.
- When Data Deliverables and Electronic Data Deliverables are required they must be requested on the Chain of Custody. Level 3 and 4 Data Packages are billed with a $50.00 minimum charge.
- The volume and prompt payment discount applies to invoices paid within thirty days. After the thirty day period an interest rate of 1.5% per month may be applied.
- Please review the attached SGS Environmental Services Inc. Terms and Conditions. Submission of samples indicates acceptance of these terms and conditions unless exceptions are otherwise noted. SGS retains ownership and rights to all data provided to client prior to payment.
- **If you have any questions please contact your Project Manager.**

Proposal Submitted By:

Signature: _____ **Project Manager: Steve Crupi**
Print Name: George Wolters
Title: Business Development

Proposal Accepted By:

Signature: _____ Estimated Start Date: _____
Print Name: _____
Title: _____
Date: _____

SPECIAL INSTRUCTIONS:

Please refer to Quote number on Chain of Custody to insure proper billing.

Please sign and fax quote to 562-0119 upon acceptance.

- Site Specific MS/MSDs will be considered 2 billable samples and must be clearly identified on the chain of custody. Additional sample volume should be provided to complete the analysis.

- Rush TAT: 4-5 working day TAT will be billed with a 50% surcharge
  3 working day TAT will be billed with a 75% surcharge
  2 working day TAT will be billed with a 100% surcharge
  1 working day TAT (ie., COB next day if received before 11AM) will be billed with a 125% surcharge

*** SGS has provided detection limits for this project. In some cases PQL's may be elevated due to matrix interferences, and /or heavily contaminated samples. This quote is based on SGS's QA/QC, detection limits and standard turn around times. All sevices are contingent on SGS terms and conditions.**

PCB's by GC ECD (S)

MATRIX: Soil/Solid

ACODE: XG.8082..2

Method	Analyte	MD	PQ		Regulated Low	Regulated High	Recovery Limits		RPD Limit
SW8082	Aroclor-1016	15	50	ug/Kg			71	127	30
SW8082	Aroclor-1221	15	50	ug/Kg					30
SW8082	Aroclor-1232	15	50	ug/Kg					30
SW8082	Aroclor-1242	15	50	ug/Kg					30
SW8082	Aroclor-1248	15	50	ug/Kg					30
SW8082	Aroclor-1254	15	50	ug/Kg					30
SW8082	Aroclor-1260	15	50	ug/Kg			65	116	30
SW8082	Decachlorobiphenyl <surr>	0	0	mg/Kg			60	125	

Method	Analyte	Reporting Limit (mg/L)	Detection Limit (mg/L)	Control Limits (%R)		Precision (%RPD)
SW6020 (water)	Aluminum	0.05	0.0021	89	120	15
	Antimony	0.002	0.000036	90	110	15
	Arsenic	0.002	0.0005	88	110	15
	Barium	0.001	0.00096	90	112	15
	Beryllium	0.001	0.000078	85	113	15
	Bismuth	0.005	0.001	80	120	20
	Cadmium	0.001	0.000074	90	110	15
	Calcium	0.05	0.015	88	133	15
	Chromium	0.002	0.00092	89	118	15
	Cobalt	0.001	0.000057	88	121	15
	Copper	0.002	0.000056	90	113	15
	Iron	0.05	0.017	86	121	15
	Lead	0.001	0.000066	88	116	15
	Magnesium	0.05	0.00079	90	115	9
	Manganese	0.001	0.000087	90	118	15
	Molybdenum	0.001	0.0006	90	112	15
	Nickel	0.002	0.000098	90	111	15
	Phosphorus	0.05	0.032	80	120	20
	Selenium	0.002	0.0017	88	111	15
	Silver	0.001	0.00003	89	118	15
	Sodium	0.05	0.011	89	119	15
	Strontium	0.005	0.00028	90	112	20
	Thallium	0.001	0.00034	90	116	15
	Vanadium	0.01	0.0031	85	117	15
	Zinc	0.005	0.001	90	112	15

Method	Analyte	Reporting Limit (mg/kg)	Detection Limit (mg/kg)	Control Limits (%R)		Precision (%RPD)
SW6020 (soil)	Aluminum	5	0.16	85	125	20
	Antimony	0.2	0.01	79	110	20
	Arsenic	0.2	0.0498	76	110	20
	Barium	0.1	0.04	83	110	20
	Beryllium	0.1	0.01	72	110	20
	Bismuth	0.5	0.1	80	120	35
	Boron	5	0.5	74	110	35
	Cadmium	0.1	0.01	78	110	20
	Calcium	5	0.84	80	120	35
	Chromium	0.2	0.047	83	110	20
	Cobalt	0.1	0.01	84	114	20
	Copper	0.2	0.011	83	110	20
	Iron	5	1.1	87	120	20
	Lead	0.1	0.01	80	111	20
	Magnesium	5	0.11	83	126	35
	Manganese	0.1	0.01	82	116	20
	Molybdenum	0.1	0.01	88	110	20
	Nickel	0.2	0.01	84	110	20
	Phosphorus	5	1.7	80	120	35
	Potassium	5	0.5	80	120	35
	Selenium	0.2	0.025	70	110	20
	Silver	0.1	0.01	53	124	47
	Sodium	5	0.68	80	120	35
	Strontium	0.5	0.1	84	111	35
	Thallium	0.1	0.036	90	118	20
	Vanadium	1	0.43	76	110	20
	Zinc	0.5	0.1	75	110	20

Method	Analyte	Reporting Limit (ug/L)	Detection Limit (ug/L)	Control Limits (%R)		Precision (%RPD)
6850 (water)	Perchlorate	0.5	0.082	80	120	15

Method	Analyte	Reporting Limit (ug/kg)	Detection Limit (ug/kg)	Control Limits (%R)		Precision (%RPD)
6850 (soil)	Perchlorate	1.2	0.4	80	120	15

Method	Analyte	Reporting Limit (mg/L)	Detection Limit (mg/L)	Control Limits (%R)		Precision (%RPD)
SW7470 (water)	Mercury	0.0002	0.000107	83	121	17

Method	Analyte	Reporting Limit (mg/L)	Detection Limit (mg/L)	Control Limits (%R)		Precision (%RPD)
SW7471 (soil)	Mercury	0.04	0.00858	80	122	17

Method	Analyte	Reporting Limit (ug/L)	Detection Limit (ug/L)	Control Limits (%R)		Precision (%RPD)
SW8081 (water)	Aldrin	0.05	0.0021	59	112	26
	alpha-BHC	0.05	0.0059	56	115	21
	beta-BHC	0.05	0.0047	71	115	33
	delta-BHC	0.05	0.0029	55	136	35
	gamma-BHC (Lindane)	0.05	0.005	67	119	22
	alpha-Chlordane	0.05	0.0027	74	118	42
	gamma-Chlordane	0.05	0.0028	64	121	30
	4,4'-DDD	0.1	0.004	75	134	32
	4,4'-DDE	0.1	0.0061	77	128	33
	4,4'-DDT	0.1	0.0051	63	133	29
	Dieldrin	0.1	0.0051	80	119	28
	Endosulfan I	0.05	0.0043	76	116	26
	Endosulfan II	0.1	0.012	79	127	28
	Endosulfan sulfate	0.1	0.0042	43	128	28
	Endrin	0.1	0.0054	80	126	29
	Endrin aldehyde	0.1	0.0042	10	114	48
	Endrin ketone	0.1	0.02	70	118	28
	Heptachlor	0.05	0.0032	72	108	26
	Heptachlor epoxide	0.05	0.0021	79	115	27
	Methoxychlor	2	0.027	67	122	29
	Toxaphene	2	0.51	48	142	30
	Decachlorobiphenyl			21	139	0
	Tetrachloro-m-xylene			43	114	0

Method	Analyte	Reporting Limit (ug/kg)	Detection Limit (ug/kg)	Control Limits (%R)		Precision (%RPD)
SW8081 (soil)	Aldrin	1.7	0.1141	58	120	46
	alpha-BHC	1.7	0.1167	42	117	20
	beta-BHC	1.7	0.1177	68	120	20
	delta-BHC	1.7	0.0655	70	130	20
	gamma-BHC (Lindane)	1.7	0.1287	55	124	55
	alpha-Chlordane	1.7	0.2131	67	122	20
	gamma-Chlordane	1.7	0.1553	63	116	20
	4,4'-DDD	3.4	0.2619	67	139	20
	4,4'-DDE	3.4	0.252	68	135	20
	4,4'-DDT	3.4	0.13	65	135	78
	Dieldrin	3.4	0.2243	69	125	49
	Endosulfan I	1.7	0.1719	66	120	20
	Endosulfan II	3.4	0.308	70	135	20
	Endosulfan sulfate	3.4	0.2171	35	132	20
	Endrin	3.4	0.2927	67	136	58
	Endrin aldehyde	3.4	0.1716	18	123	20
	Endrin ketone	3.4	0.235	61	132	20
	Heptachlor	1.7	0.1654	59	126	64
	Heptachlor epoxide	1.7	0.1058	67	122	20
	Methoxychlor	17	1.257	70	130	20
	Toxaphene	67	21.37	51	129	30
	Decachlorobiphenyl			45	128	0
	Tetrachloro-m-xylene			41	124	0

Method	Analyte	Reporting Limit (ug/L)	Detection Limit (ug/L)	Control Limits (%R)		Precision (%RPD)
SW8082 (water)	Aroclor 1016	1	0.27	71	120	33
	Aroclor 1221	1	0.3553	0	0	0
	Aroclor 1232	1	0.13	0	0	0
	Aroclor 1242	1	0.2	0	0	0
	Aroclor 1248	1	0.1127	0	0	0
	Aroclor 1254	1	0.32	0	0	0
	Aroclor 1260	1	0.25	72	132	28
	Decachlorobiphenyl			21	135	0
	Tetrachloro-m-xylene			44	116	0

Method	Analyte	Reporting Limit (ug/kg)	Detection Limit (ug/kg)	Control Limits (%R)		Precision (%RPD)
SW8082 (soil)	Aroclor 1016	33	8.3	67	123	26
	Aroclor 1221	33	10.51	0	0	0
	Aroclor 1232	33	8.3	0	0	0
	Aroclor 1242	33	8.3	0	0	0
	Aroclor 1248	33	8.3	0	0	0
	Aroclor 1254	33	8.3	0	0	0
	Aroclor 1260	33	8.3	68	130	27
	Decachlorobiphenyl			33	146	0
	Tetrachloro-m-xylene			55	124	0

Method	Analyte	Reporting Limit (ug/L)	Detection Limit (ug/L)	Control Limits (%R)		Precision (%RPD)
SW8260 (water)	cis-1,2-Dichloroethene	1	0.1	78	120	21
	cis-1,3-Dichloropropene	1	0.22	75	120	17
	m-Xylene & p-Xylene	1	0.18	80	122	15
	n-Butylbenzene	1	0.12	65	134	18
	n-Propylbenzene	1	0.15	71	128	16
	o-Xylene	1	0.1	80	122	15
	p-Isopropyltoluene	1	0.13	80	121	18
	sec-Butylbenzene	1	0.12	80	122	19
	tert-Butylbenzene	1	0.14	76	123	23
	trans-1,2-Dichloroethene	1	0.11	79	120	24
	trans-1,3-Dichloropropene	1	0.3	70	123	22
	Acetone	10	5	42	133	36
	Benzene	1	0.13	79	120	15
	Bromobenzene	1	0.18	77	120	16
	Bromochloromethane	1	0.31	79	123	20
	Bromodichloromethane	1	0.14	75	120	16
	Bromoform	1	0.1	62	139	15
	Bromomethane	1	0.08	43	142	47
	Carbon disulfide	2	5	31	179	46
	Carbon tetrachloride	1	0.15	67	146	24
	Chlorobenzene	1	0.12	79	120	15
	Chloroethane	1	0.34	73	121	34
	Chloroform	1	0.12	79	120	18
	Chloromethane	1	0.25	60	125	26
	Dibromochloromethane	1	0.4	78	120	15
	Dibromomethane	1	0.21	78	120	17
	Dichlorodifluoromethane (Freon 12)	1	0.16	49	130	34
	Ethylbenzene	1	0.27	80	121	15
	Hexachlorobutadiene	1	0.22	70	123	21
	Isopropylbenzene	1	0.12	80	126	17
	Methyl tert-butyl ether (MTBE)	2	5	57	146	45
	Methylene chloride	1	0.35	76	120	23
	Naphthalene	1	0.15	80	125	23
	Styrene	1	0.15	80	122	15
	Tetrachloroethene	1	0.38	71	145	18
	Toluene	1	0.25	80	122	18
	Trichloroethene	1	0.31	79	120	18
	Trichlorofluoromethane (Freon 11)	1	0.23	62	140	29
	Vinyl acetate	2	5	29	179	50
	Vinyl chloride	1	0.12	61	129	27
	1,1-Dichloroethane	1	0.1	76	121	21
	1,1-Dichloroethene	1	0.36	75	129	26
	1,1-Dichloropropene	1	0.14	80	129	23
	1,1,1-Trichloroethane	1	0.41	78	127	23
	1,1,1,2-Tetrachloroethane	1	0.1	80	122	17
	1,1,2-Trichloroethane	1	0.31	78	120	16
	1,1,2,2-Tetrachloroethane	1	0.37	61	130	17
	1,2-Dibromo-3-chloropropane (DBCP)	2	0.95	42	130	22
	1,2-Dibromoethane (EDB)	2	0.22	76	120	15
	1,2-Dichlorobenzene	1	0.14	78	120	15
	1,2-Dichloroethane	1	0.22	61	130	16
	1,2-Dichloropropane	1	0.15	77	120	16
	1,2,3-Trichlorobenzene	1	0.14	73	145	26
	1,2,3-Trichloropropane	1	0.3	51	126	15
	1,2,4-Trichlorobenzene	1	0.23	77	134	23
	1,2,4-Trimethylbenzene	1	0.12	80	120	16
	1,3-Dichlorobenzene	1	0.11	78	120	16
	1,3-Dichloropropane	1	0.2	72	120	15
	1,3,5-Trimethylbenzene	1	0.14	80	121	17
	1,4-Dichlorobenzene	1	0.13	77	120	15
	2-Butanone (MEK)	2	5	50	150	44
	2-Chlorotoluene	1	0.26	70	121	16
	2-Hexanone	2	5	49	138	73
	2,2-Dichloropropane	1	0.13	69	128	25
	4-Chlorotoluene	1	0.1	67	124	15
	4-Methyl-2-pentanone (MIBK)	2	5	58	157	48
	4-Bromofluorobenzene			71	123	0
	1,2-Dichloroethane-d4			77	121	0
	Toluene-d8			80	127	0
	Dibromofluoromethane			80	126	0

Method	Analyte	Reporting Limit (ug/kg)	Detection Limit (ug/kg)	Control Limits (%R)		Precision (%RPD)
SW8260 (soil)	cis-1,2-Dichloroethene	5	0.89	78	124	37
	cis-1,3-Dichloropropene	5	0.64	80	129	39
	m-Xylene & p-Xylene	5	0.81	80	123	40
	n-Butylbenzene	5	0.66	78	138	37
	n-Propylbenzene	5	0.9	80	130	42
	o-Xylene	5	2.7	80	120	40
	p-Isopropyltoluene	5	0.63	80	130	40
	sec-Butylbenzene	5	0.75	80	130	40
	tert-Butylbenzene	5	0.54	80	130	42
	trans-1,2-Dichloroethene	5	0.91	79	122	37
	trans-1,3-Dichloropropene	5	0.75	77	135	42
	Acetone	20	5	10	178	48
	Benzene	5	0.73	77	124	37
	Bromobenzene	5	0.52	77	126	40
	Bromochloromethane	5	0.94	74	125	36
	Bromodichloromethane	5	0.53	79	133	37
	Bromoform	5	4.1	68	125	45
	Bromomethane	5	0.86	65	142	38
	Carbon Disulfide	10	5	44	159	25
	Carbon tetrachloride	5	0.53	78	144	43
	Chlorobenzene	5	0.79	80	120	38
	Chloroethane	5	2.6	76	127	34
	Chloroform	5	0.75	80	122	23
	Chloromethane	5	1.5	54	120	36
	Dibromochloromethane	5	2.7	80	131	24
	Dibromomethane	5	0.58	74	127	37
	Dichlorodifluoromethane (Freon 12)	5	0.89	31	139	46
	Ethylbenzene	5	0.86	80	122	41
	Hexachlorobutadiene	5	0.89	69	140	38
	Isopropylbenzene	5	0.52	80	121	41
	Methylene chloride	10	0.84	76	120	25
	Naphthalene	5	0.63	76	137	46
	Styrene	5	0.76	80	125	40
	Tetrachloroethene	5	0.61	80	127	39
	Toluene	5	0.61	80	124	39
	Trichloroethene	5	0.6	80	123	40
	Trichlorofluoromethane (Freon 11)	5	0.8	79	138	32
	Vinyl acetate	10	5	42	140	17
	Vinyl chloride	5	1.6	62	127	37
	1,1-Dichloroethane	5	0.76	79	120	24
	1,1-Dichloroethene	5	1.2	76	124	42
	1,1-Dichloropropene	5	0.86	79	130	38
	1,1,1-Trichloroethane	5	0.8	79	132	43
	1,1,1,2-Tetrachloroethane	5	3	80	123	25
	1,1,2-Trichloroethane	5	2.9	73	130	41
	1,1,2,2-Tetrachloroethane	5	0.68	76	130	31
	1,2-Dibromo-3-chloropropane (DBCP)	5	7.2	36	148	48
	1,2-Dibromoethane (EDB)	10	0.79	76	126	39
	1,2-Dichlorobenzene	5	0.64	80	121	28
	1,2-Dichloroethane	5	0.73	72	128	36
	1,2-Dichloropropane	5	0.6	78	122	38
	1,2,3-Trichlorobenzene	5	0.75	80	130	42
	1,2,3-Trichloropropane	5	0.76	68	127	41
	1,2,4-Trichlorobenzene	5	0.75	80	125	39
	1,2,4-Trimethylbenzene	5	0.51	80	124	41
	1,3-Dichlorobenzene	5	0.75	80	120	41
	1,3-Dichloropropane	5	0.57	78	123	39
	1,3,5-Trimethylbenzene	5	2.4	80	127	42
	1,4-Dichlorobenzene	5	0.78	79	120	38
	2-Butanone (MEK)	10	5	36	137	25
	2-Chlorotoluene	5	0.62	79	126	41
	2-Hexanone	10	5	49	120	23
	2,2-Dichloropropane	5	1.1	64	150	47
	4-Chlorotoluene	5	0.86	78	127	40
	4-Methyl-2-pentanone	10	5	56	120	21
	4-Bromofluorobenzene			60	124	0
	1,2-Dichloroethane-d4			48	160	0
	Toluene-d8			78	120	0
	Dibromofluoromethane			67	142	0

Method	Analyte	Reporting Limit (ug/L)	Detection Limit (ug/L)	Control Limits (%R)		Precision (%RPD)
SW8270 (water)	bis(2-Chloroethoxy)methane	10	1	55	103	40
	bis(2-Chloroethyl) ether	10	0.91	52	101	50
	bis(2-Chloroisopropyl) ether	10	0.6	0	0	0
	bis(2-Ethylhexyl) phthalate	10	1	67	119	19
	Acenaphthene	10	0.54	65	106	18
	Acenaphthylene	10	0.48	57	111	20
	Anthracene	10	1	71	111	13
	Benz(a)anthracene	10	1	72	113	15
	Benzo(a)pyrene	10	3	72	112	15
	Benzo(b)fluoranthene	10	0.69	66	123	26
	Benzo(ghi)perylene	10	0.55	19	163	41
	Benzo(k)fluoranthene	10	0.56	67	117	24
	Butyl benzyl phthalate	10	0.84	66	124	16
	Chrysene	10	0.61	73	113	15
	Di-n-butyl phthalate	10	0.65	69	115	16
	Di-n-octyl phthalate	10	0.71	56	124	38
	Dibenz(a,h)anthracene	10	2	38	147	28
	Dibenzofuran	10	0.4	67	109	21
	Diethyl phthalate	10	0.56	68	117	15
	Dimethyl phthalate	10	0.47	66	106	16
	Fluoranthene	10	0.65	65	126	27
	Fluorene	10	0.52	68	110	17
	Hexachlorobenzene	10	0.56	66	119	15
	Hexachlorobutadiene	10	0.56	45	98	49
	Hexachlorocyclopentadiene	50	5	30	110	55
	Hexachloroethane	10	0.61	35	96	54
	Indeno(1,2,3-cd)pyrene	10	3.4	43	136	34
	Isophorone	10	1	59	107	29
	N-Nitrosodi-n-propylamine	10	0.74	56	105	34
	N-Nitrosodiphenylamine	10	0.54	61	110	19
	Naphthalene	10	0.6	48	104	39
	Nitrobenzene	10	1	54	101	41
	Pentachlorophenol	50	20	22	151	39
	Phenanthrene	10	1	72	113	15
	Phenol	10	0.48	17	57	53
	Pyrene	10	0.73	63	130	24
	1,2-Dichlorobenzene	10	0.65	44	101	48
	1,2,4-Trichlorobenzene	10	0.51	52	98	43
	1,3-Dichlorobenzene	10	0.65	46	93	50
	1,4-Dichlorobenzene	10	0.54	47	94	48
	2-Chloronaphthalene	10	0.47	57	108	22
	2-Chlorophenol	10	0.44	38	105	56
	2-Methylnaphthalene	10	0.48	58	100	29
	2-Methylphenol	10	0.93	47	92	39
	2-Nitroaniline	50	2	63	120	22
	2-Nitrophenol	10	1	35	113	66
	2,4-Dichlorophenol	10	2.6	44	107	51
	2,4-Dimethylphenol	10	2.2	45	97	50
	2,4-Dinitrophenol	50	20	10	145	105
	2,4-Dinitrotoluene	10	0.48	66	124	19
	2,4,5-Trichlorophenol	10	2	36	130	63
	2,4,6-Trichlorophenol	10	2	31	127	72
	2,6-Dinitrotoluene	10	2	67	115	24
	3-Nitroaniline	50	5	46	121	33
	3,3'-Dichlorobenzidine	50	5	42	111	22
	4-Bromophenyl phenyl ether	10	0.52	69	113	15
	4-Chloro-3-methylphenol	10	2	57	111	34
	4-Chloroaniline	10	2	41	95	42
	4-Chlorophenyl phenyl ether	10	0.44	65	110	17
	4-Methylphenol	10	3.44	39	85	38
	4-Nitroaniline	50	5	46	138	32
	4-Nitrophenol	50	20	10	80	67
	4,6-Dinitro-2-methylphenol	50	20	23	143	47
	2-Fluorobiphenyl			44	105	0
	2-Fluorophenol			15	70	0
	2,4,6-Tribromophenol			22	132	0
	Nitrobenzene-d5			44	101	0
	Phenol-d5			10	49	0
	Terphenyl-d14			52	136	0
	2-Chlorophenol-d4			35	98	0
	1,2-Dichlorobenzene-d4			37	99	0

Method	Analyte	Reporting Limit (ug/kg)	Detection Limit (ug/kg)	Control Limits (%R)		Precision (%RPD)
SW8270 (soil)	bis(2-Chloroethoxy)methane	330	22	46	96	20
	bis(2-Chloroethyl) ether	330	32	38	101	58
	bis(2-Chloroisopropyl) ether	330	32	0	0	0
	bis(2-Ethylhexyl) phthalate	330	24	51	125	20
	Acenaphthene	330	19	53	105	20
	Acenaphthylene	330	17	50	108	20
	Anthracene	330	27	62	111	20
	Benz(a)anthracene	330	17	61	118	20
	Benzo(a)pyrene	330	20	60	115	20
	Benzo(b)fluoranthene	330	25	55	134	21
	Benzo(ghi)perylene	330	22	38	125	24
	Benzo(k)fluoranthene	330	14	47	124	30
	Butyl benzyl phthalate	330	19	49	130	20
	Chrysene	330	84	61	114	20
	Di-n-butyl phthalate	330	26	60	115	20
	Di-n-octyl phthalate	330	24	24	162	20
	Dibenz(a,h)anthracene	330	17	43	126	20
	Dibenzofuran	330	18	56	107	20
	Diethyl phthalate	330	20	57	119	25
	Dimethyl phthalate	330	23	49	109	27
	Fluoranthene	330	30	58	126	20
	Fluorene	330	15	56	112	20
	Hexachlorobenzene	330	17	57	117	20
	Hexachlorobutadiene	330	33	43	91	20
	Hexachlorocyclopentadiene	1600	25	30	97	31
	Hexachloroethane	330	46	36	89	23
	Indeno(1,2,3-cd)pyrene	330	23	41	126	23
	Isophorone	330	17	47	102	20
	N-Nitrosodi-n-propylamine	330	18	41	98	68
	N-Nitrosodiphenylamine	330	24	57	106	20
	Naphthalene	330	29	42	97	24
	Nitrobenzene	330	76	42	94	36
	Pentachlorophenol	1600	660	46	122	20
	Phenanthrene	330	16	63	113	20
	Phenol	330	19	44	98	20
	Pyrene	330	21	52	126	34
	1,2-Dichlorobenzene	330	42	39	97	20
	1,2,4-Trichlorobenzene	330	27	45	90	20
	1,3-Dichlorobenzene	330	39	42	88	49
	1,4-Dichlorobenzene	330	44	43	89	51
	2-Chloronaphthalene	330	19	48	100	20
	2-Chlorophenol	330	22	44	93	20
	2-Methylnaphthalene	330	54	48	100	45
	2-Methylphenol	330	58	46	100	48
	2-Nitroaniline	1600	45	54	117	20
	2-Nitrophenol	330	30	45	94	20
	2,4-Dichlorophenol	330	21	49	100	21
	2,4-Dimethylphenol	330	167	43	94	28
	2,4-Dinitrophenol	1600	660	10	124	39
	2,4-Dinitrotoluene	330	21	52	126	27
	2,4,5-Trichlorophenol	330	36	54	114	24
	2,4,6-Trichlorophenol	330	53	51	109	21
	2,6-Dinitrotoluene	330	30	54	118	20
	3-Nitroaniline	1600	167	24	121	24
	3,3'-Dichlorobenzidine	1600	330	43	97	44
	4-Bromophenyl phenyl ether	330	23	60	112	20
	4-Chloro-3-methylphenol	330	14	54	113	32
	4-Chloroaniline	330	58	16	82	93
	4-Chlorophenyl phenyl ether	330	14	54	112	20
	4-Methylphenol	330	49	46	102	23
	4-Nitroaniline	1600	37	38	130	28
	4-Nitrophenol	1600	660	40	141	30
	4,6-Dinitro-2-methylphenol	1600	660	24	130	20
	2-Fluorobiphenyl			43	110	0
	2-Fluorophenol			30	93	0
	2,4,6-Tribromophenol			33	125	0
	Nitrobenzene-d5			37	93	0
	Phenol-d5			41	100	0
	Terphenyl-d14			40	165	0
	2-Chlorophenol-d4			37	98	0
	1,2-Dichlorobenzene-d4			23	103	0

Method	Analyte	Reporting Limit (pg/L)	Detection Limit (pg/L)	Control Limits (%R)		Precision (%RPD)
SW8290 (water)	OCDD			78	130	20
	OCDF			70	140	23
	Total HpCDD			0	0	0
	Total HpCDF			0	0	0
	Total HxCDD			0	0	0
	Total HxCDF			0	0	0
	Total PeCDD			0	0	0
	Total PeCDF			0	0	0
	Total TCDD			0	0	0
	Total TCDF			0	0	0
	1,2,3,4,6,7,8-HpCDD			79	130	20
	1,2,3,4,6,7,8-HpCDF			72	132	20
	1,2,3,4,6,7,9-HpCDD	25		0	0	0
	1,2,3,4,6,7,9-HpCDF	25		0	0	0
	1,2,3,4,7-PeCDD			0	0	0
	1,2,3,4,7,8-HxCDD			68	135	20
	1,2,3,4,7,8-HxCDF			78	150	24
	1,2,3,4,7,8,9-HpCDF			67	143	21
	1,2,3,6,7,8-HxCDD			81	128	20
	1,2,3,6,7,8-HxCDF			74	165	32
	1,2,3,7,8-PeCDD			81	128	20
	1,2,3,7,8-PeCDF			76	132	20
	1,2,3,7,8,9-HxCDD			73	147	33
	1,2,3,7,8,9-HxCDF			52	189	54
	1,2,7,8-TCDF	5		0	0	0
	1,3,6,8-TCDD	5		0	0	0
	1,3,6,8-TCDF	5		0	0	0
	1,3,7,9-TCDD	5		0	0	0
	2,3,4,6,7,8-HxCDF			61	177	49
	2,3,4,7,8-PeCDF			63	136	32
	2,3,7,8-TCDD			80	128	20
	2,3,7,8-TCDF			74	132	23

Method	Analyte	Reporting Limit (pg/L)	Detection Limit (pg/L)	Control Limits (%R)		Precision (%RPD)
SW8290 (soil)	OCDD			70	143	25
	OCDF			59	159	25
	Total HpCDD			0	0	0
	Total HpCDF			0	0	0
	Total HxCDD			0	0	0
	Total HxCDF			0	0	0
	Total PeCDD			0	0	0
	Total PeCDF			0	0	0
	Total TCDD			0	0	0
	Total TCDF			0	0	0
	1,2,3,4,6,7,8-HpCDD			76	139	25
	1,2,3,4,6,7,8-HpCDF			72	139	25
	1,2,3,4,6,7,9-HpCDD			0	0	0
	1,2,3,4,6,7,9-HpCDF			0	0	0
	1,2,3,4,7-PeCDD			0	0	0
	1,2,3,4,7,8-HxCDD			66	140	25
	1,2,3,4,7,8-HxCDF			75	158	25
	1,2,3,4,7,8,9-HpCDF			73	144	25
	1,2,3,6,7,8-HxCDD			75	139	25
	1,2,3,6,7,8-HxCDF			71	172	25
	1,2,3,7,8-PeCDD			77	138	25
	1,2,3,7,8-PeCDF			77	139	25
	1,2,3,7,8,9-HxCDD			78	148	25
	1,2,3,7,8,9-HxCDF			73	170	25
	1,2,7,8-TCDF			0	0	0
	1,3,6,8-TCDD			0	0	0
	1,3,6,8-TCDF			0	0	0
	1,3,7,9-TCDD			0	0	0
	2,3,4,6,7,8-HxCDF			71	174	25
	2,3,4,7,8-PeCDF			69	141	25
	2,3,7,8-TCDD			75	137	25
	2,3,7,8-TCDF			76	137	25

Method	Analyte	Reporting Limit (ug/L)	Detection Limit (ug/L)	Control Limits (%R)		Precision (%RPD)
SW8330 (water)	2-Amino-4,6-dinitrotoluene	0.3	0.1	82	125	15
	4-Amino-2,6-dinitrotoluene	0.25	0.02	85	123	15
	3,5-Dinitroaniline	25	1.86	40	140	40
	1,3-Dinitrobenzene	0.25	0.05	89	130	15
	2,4-Dinitrotoluene	0.25	0.02	86	128	15
	2,6-Dinitrotoluene	0.25	0.03	86	127	15
	HMX	0.25	0.03	82	121	15
	Nitrobenzene	0.25	0.05	81	125	15
	Nitroglycerin	0.5	0.13	84	118	18
	4-Nitrotoluene	0.25	0.08	87	124	15
	2-Nitrotoluene	0.25	0.07	90	120	15
	3-Nitrotoluene	0.25	0.08	87	122	15
	PETN	0.5	0.16	75	118	15
	RDX	0.25	0.04	94	124	15
	Tetryl	0.25	0.05	81	126	15
	1,3,5-Trinitrobenzene	0.25	0.02	81	132	16
	2,4,6-Trinitrotoluene	0.25	0.02	86	126	15
	3,4-Dinitrotoluene			84	125	0
	2,4-Dinitrofluorobenzene			72	130	0

Method	Analyte	Reporting Limit (mg/L)	Detection Limit (mg/L)	Control Limits (%R)		Precision (%RPD)
SW8330 (soil)	2-Amino-4,6-dinitrotoluene	0.3	0.1	91	121	25
	4-Amino-2,6-dinitrotoluene	0.15	0.02	91	121	20
	3,5-Dinitroaniline	0.5	0.057	40	140	40
	1,3-Dinitrobenzene	0.15	0.05	91	121	20
	2,4-Dinitrotoluene	0.15	0.02	90	121	22
	2,6-Dinitrotoluene	0.15	0.03	88	122	31
	HMX	0.15	0.03	87	120	20
	Nitrobenzene	0.15	0.05	91	121	20
	Nitroglycerin	1	0.13	74	112	50
	4-Nitrotoluene	0.5	0.08	91	121	20
	2-Nitrotoluene	0.5	0.08	92	122	46
	3-Nitrotoluene	0.5	0.07	92	122	39
	PETN	1	0.16	75	117	50
	RDX	0.25	0.04	88	118	29
	Tetryl	0.15	0.05	87	119	20
	1,3,5-Trinitrobenzene	0.15	0.02	86	128	20
	2,4,6-Trinitrotoluene	0.15	0.02	89	119	22
	3,4-Dinitrotoluene			81	127	0
	2,4-Dinitrofluorobenzene			61	135	0

1. SW8151A Herbicides

This method is used to determine the concentrations of chlorinated herbicides in extracts from solid and aqueous matrices. ~~All target hits are confirmed by analysis on a second confirmatory column.~~ A measured volume (1L) or weight (30g) of sample is extracted using **SW3535** for liquids and **SW3550B Mod (STL Seattle SOP)** for solids. The final extract is analyzed with a **GC/MS**. The detection limits and RLs for method SW8151 are shown in Tables 1 and 2. The calibration, QC, corrective action, and data flagging requirements are given in Table 3.

Table 1. RLs and QC Acceptance Criteria for Method SW8151A Water – SGS.

Method	Analyte	Detection Limit (µg/L)	Reporting Limit (µg/L)	Control Limits (%R)	Precision (%RPD)
SW8151A (Water)	Dalapon	0.00429	0.05	16-103	≤ 39
	Dicamba	0.00216	0.025	51-125	≤ 19
	Dichloroprop	0.00232	0.025	70-120	≤ 30
	2,4-D	0.00115	0.025	50-130	≤ 28
	2,4,5-TP (Silvex)	0.00208	0.025	52-124	≤ 30
	2,4,5-TP	0.00146	0.025	35-110	≤ 30
	2,4-DB	0.00210	0.025	35-115	≤ 30
	Dinoseb	0.00554	0.025	17-153	≤ 33
	Surrogates DCAA (Sample/LCS)			40-135	

Table 2. RLs and QC Acceptance Criteria for Method SW8151A Soil – SGS.

Method	Analyte	Detection Limit (ug/Kg)	Reporting Limit (ug/Kg)	Control Limits (%R)	Precision (%RPD)
SW8151 (Soil)	Dalapon	0.919	3.33	16-74	≤ 30
	Dicamba	0.182	1.33	48-123	≤ 30
	Dichloroprop	0.289	1.33	45-140	≤ 30
	2,4-D	0.155	1.33	46-136	≤ 30
	2,4,5-TP (Silvex)	0.407	1.33	52-137	≤ 30
	2,4,5-TP	0.111	1.33	45-135	≤ 30
	2,4-DB	0.318	1.33	50-155	≤ 30
	Dinoseb	0.452	3.33	18-157	≤ 30
	Surrogates DCAA (Sample/LCS)			51-129	

Table 3. Summary of Calibration and QC Procedures for Method SW8151A.

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria
Initial Calibration for all analytes	Periodic	% RSD Analytes ≤20% or $r^2 \geq 0.990$, or $r \geq 0.995$	Correct source of problem. Repeat calibration if needed.	Apply J to all results for affected analyte(s) for all samples associated with the calibration
Second Source Calibration Verification	Once per initial calibration	All analytes within ± 20 %	Correct source of problem. Repeat analysis. Recalibrate if needed.	If low recovery, apply R to ND results for affected analyte(s) for all samples associated with the calibration Apply J to detected results for affected analytes
Calibration Verification	Before sample analysis, every 10 injections, and at the end of analytical lot	All analytes within ± 20 %	Evaluate the data. Correct source of problem. Repeat analysis or recalibrate if needed.	If low recovery, apply R to ND results for the affected analyte(s) in all samples since the last acceptable calibration verification Apply J to detected results of affected analytes
Method blank	One per extraction batch	Analyte less than ½ PQL	Evaluate the data. Correct source of problem. Re-extract and reanalyze the batch if needed.	Apply B to positive results for affected analyte(s) in all samples in associated prep batch. No flag for ND results
Laboratory Control Sample	One per extraction batch	Performance-based limits	Repeat analysis or reextract and reanalyze prep batch if needed.	Iif the %R > UCL for any analyte, apply J to all affected analyte positive results If the %R < LCL for any analyte, apply R to all NDs, apply JL to all positive results
Matrix Spike/Matrix Spike Duplicate	One MS/MSD per extraction batch	Performance-based limits	Accept data if LCS in limits.	For the specific analyte(s) in all samples collected from the same site matrix as the parent, apply M if: (1) %R for MS or MSD > UCL or (2) %R for MS or MSD < LCL or (3) MS/MSD RPD > CL
Surrogate Spike	Every sample	Performance-based limits	Repeat analysis/reextract.	If the %R > UCL for any surrogate, apply J to all positive results If the %R < LCL for any surrogate, apply J to all positive results, apply R to all NDs If any surrogate recovery is < 20%, apply R to all results
Instrument Blank	1 per analytical lot	Analyte less than PQL	Correct source of problem and reanalyze related samples in analytical batch.	Apply B to all positive results for the affected analyte(s) in all samples in the associated analytical batch No flag for ND results
Retention time window	Annually or new column	See SW846-8000B sec 7.6		
MDL Study	Once per 12 month period	MDL must be less than one-half of the PQL	Correct source of problem. Re-extract and reanalyze replicates if needed.	Analyst not allowed to conduct method independently
Demonstration of acceptable precision and accuracy	Annually per analyst	Performance based	Repeat analysis if needed.	Analyst not allowed to conduct method independently

1. All corrective actions associated with USACE project work shall be documented in the case narrative and records shall be maintained by the laboratory.
2. Flagging criteria are applied when acceptance criteria were not met and corrective action was not successful or corrective action was not performed.

2. Method AK 101 Gasoline Range Organic Compounds

GRO in water and soils are analyzed using AK101. Soil samples require field preservation (i.e. extraction). This method includes the volatile hydrocarbons between C6 and C10 and volatile aromatic hydrocarbons, and is a purge and trap GC method. An inert gas is bubbled through a water matrix to transfer the volatile hydrocarbons from the liquid to the vapor phase. The volatiles are removed from the inert gas by passing the gas through a sorbent trap, which is then backflushed onto a GC column with a flame ionization detector (FID) to separate and quantify the range of compounds of interest. Soil samples are extracted/preserved in the field using laboratory provided surrogate spiked methanol. Detection limits and RLs for method AK101 are presented in Table 4. RLs for soils will vary with the amount of soil and methanol added in the field and the moisture content of the sample. The calibration, QC, corrective action, and data flagging requirements are given in Tables 5 and 6.

Table 4. Detection and Reporting Limits for Method AK 101 – SGS.

Parameter/Method	Analyte	Water (µg/L)		Soil (mg/Kg)	
		Detection Limit	Reporting Limit	Detection Limit	Reporting Limit
AK101	GRO	10.3	50	0.76	4

Table 5. QC Acceptance Criteria for Method AK 101 – SGS.

Method	Analyte	Accuracy Water (% R)	Precision Water (% RPD)	Accuracy Soil (% R)	Precision Soil (% RPD)
AK 101	GRO	60-120	≤ 20	60-120	≤ 20
	Surrogates				
	4-Bromoflourobenzene (LCS)	60–120		60–120	
	4-Bromoflourobenzene (Sample)	50-150		50-150	

Table 6. Summary of Calibration and QC Procedures for Method AK 101.

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria
Initial Calibration for all analytes	Periodic	cal RF RSD ≤25 % for GRO OR: $r^2 \geq$ 0.99 or r ≥ 0.995 cal RF RSD ≤10 % for 602 OR: $r^2 \geq$ 0.99 or r ≥ 0.995	Correct source of problem. Repeat analysis. Recalibrate if needed.	Apply J to all results for specific analyte(s) for all samples associated with the calibration
Second Source Calibration Verification	Once per initial calibration	Within ± 25%	Correct source of problem. Repeat analysis. Recalibrate if needed.	If low recovery, apply R to all results for specific analyte(s) for all samples associated with the calibration Apply J to detected results
Calibration Verification	Beginning, after 20 analyses, and at the end	Recovery within ± 25% of true value	Evaluate the data. Correct source of problem. Repeat analysis if needed. Recalibrate if needed.	If low recovery, apply R to all results for the specific analyte(s) in all samples since the last acceptable calibration verification Apply J to detected results
Method Blank	One MB per extraction batch	Analytes below 1/2 the PQL	Evaluate the data/prep info. Correct source of problem.	Apply B to all positive results for the specific analyte(s) in all samples in the associated analytical batch No flag for ND results
Laboratory Control Sample/Laboratory Control Sample Duplicate	LCS Dup only required when there is insufficient sample for MS/MSD	60-120% recovery, RPD≤ 20%	Repeat analysis or reextract entire prep batch if needed.	If the %R > UCL for any analyte, apply J to all positive results If the %R < LCL for any analyte, apply R to all NDs, apply JL to all positive results
Matrix/Matrix Spike Duplicate	One MS/MSD per 20 client samples by client request	60-120% recovery, performance based limits RPD ≤ 20%		For the specific analyte(s) in all samples collected from the same site matrix as the parent, apply M if: (1) %R for MS or MSD > UCL or (2) %R for MS or MSD < LCL or (3) MS/MSD RPD > CL
Surrogate Spike	Every sample	50-150% recovery for field surrogate, performance based limits for laboratory surrogate	Evaluate the data/prep info. Repeat analysis or reextract the sample. If bromofluorobenzene low due to moisture, report dry weight corrected recovery.	If the %R > UCL for any surrogate, apply J to all positive results If the %R < LCL for any surrogate, apply J to all positive results, apply R to all NDs If any surrogate recovery is < 20%, apply R to all results
Instrument Blank	Daily	< PQL	Repeat analysis if needed.	Apply B to all positive results for the specific analyte(s) in all samples in the associated analytical batch No flag for ND results
MDL Study	Once per 12 month period	MDL must be 3x less than PQL	Correct source of problem. Recalibrate if needed.	Analyst not allowed to conduct method independently
Demonstration of acceptable precision and accuracy	Once per analyst per method	4 successful LCSs	Repeat analysis or reextract if needed.	Analyst not allowed to conduct method independently

1. All corrective actions associated with USACE project work shall be documented in the case narrative and records shall be maintained by the laboratory.
2. Flagging criteria are applied when acceptance criteria were not met and corrective action was not successful or corrective action was not performed.

ATTACHMENT 2

LABORATORY STANDARD OPERATING PROCEDURES

ATTACHMENT 3

APPROVED VARIANCES TO THE DEPARTMENT OF DEFENSE QUALITY SYSTEMS MANUAL, VERSION 3

ATTACHMENT 4

QAP-10-151, CONTROL OF NONCONFORMING ITEMS

QAP-151

Control of Nonconforming Items

Revision 1

August 28, 2006

Approved:

Leslie Diggins *(See letter number NW-2006-156)*	08/28/06
Quality Assurance Manager	Date
Sylvia Medina *(See letter number NW-2006-156)*	08/28/06
President	Date

REVISION HISTORY

Revision No.	Effective Date	Sections Affected	Description
0	03/01/05	All	This procedure supersedes QAP-13, Control of Nonconforming Product Rev. 0 dated 03/12/02 which stated that this quality requirement was not applicable therefore not addressed. This procedure now addresses Control of Nonconforming Items to meet ISO 9001:2000 and NQA-1 requirements.
1	08/28/06	All	Revised document numbers for corporate plans, policies, procedures, and forms, and corrected references to these documents, to reflect the number changes per Letter NW-2006-156. Also made minor formatting changes (i.e., moved definitions and acronyms to the front of the document and changed page numbers) per QAP-061_Rev 2.

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DEFINITIONS

Accept-As-Is or Use-As-Is	The nonconforming item, with its reported discrepancy, is acceptable for use without correction.
Nonconformance	A deficiency in characteristic, documentation, or procedure that renders the quality of an item or activity unacceptable or indeterminate.
Reject	The item cannot be further processed in any manner to meet specified acceptance criteria.
Repair	Requires that the item be reworked to a configuration that meets the fit and performance characteristics of the design or acceptance criteria.
Rework	Requires that the item be reworked to its original intended specifications in a documented and specified manner so that it meets all characteristics of the design or acceptance criteria.

ACRONYMS

CPA	Corrective/Preventive Action
NCR	Nonconformance Report
PQP	Project Quality Plan
PWI	Project Work Instruction
QAP	Quality Assurance Procedure

1. PURPOSE

The purpose of this procedure is to define the system for identifying requirements and responsibilities for controlling items that do not conform to customer requirements to prevent unintended installation, use, or delivery.

2. SCOPE

This procedure applies to all North Wind Inc. functions and operations and encompasses all products that fail receiving, in-process, or final inspections and tests.

This process does not apply to: 1) deficiencies controlled by operation and maintenance tracking systems that are reworked as normal corrective maintenance, 2) nonconforming items identified while in an in-process status and reworked within the scope of the work process control, 3) items related to North Wind Inc. facility safety, reliability, or operation (e.g., office utilities, water, sewage, heating, cooling, lighting, and electrical).

Because of the dynamic nature of North Wind Inc.'s projects and clients, it is not possible to address all probable scenarios in this procedure. If project and customer requirements are not specifically covered under this procedure, the required information will be defined in the Project Quality Plan (PQP) and the Project Work Instructions

3. RESPONSIBILITIES

3.1 Employees

- Identifies and reports items that could be categorized as nonconforming.

3.2 Contracts Manager

- Notifies the customer when nonconforming items have left our facility.
- Initiates and records results of all North Wind Inc. product recall activities, requests for concessions (including requests for waivers and deviations), and documents customer responses.

3.3 Document Control Specialist

- Maintains every Nonconformance Report (NCR) and documentation for supporting closure as a quality record in accordance with QAP-171, Records Control.

3.4 Line Manager

- Ensures that this procedure is effectively implemented.
- Promotes an open environment and culture to support the identification and resolution of nonconforming items in such a manner that employees feel free to report a nonconformance without fear of reprisal.

- Ensures that nonconforming items under their responsibility are identified, documented, and resolved in an effective and timely manner.
- Ensures that nonconforming items that pose a threat to employee or customer safety and health, or that present an imminent threat to the environment, the public, or property are safely isolated and evaluated.

3.5 Project Manager

Responsible and accountable to the Line Manager to complete all actions pertaining to a nonconforming item, which include:

- Ensures that nonconforming items are properly tagged or segregated to prevent inadvertent use.
- Reviews and concurs with conditional use evaluations for nonconforming item dispositions.
- Ensures that conditional use evaluations are performed, if needed.
- Ensures that corrective action plans identify root cause and that technical justifications for accept-as-is or repair dispositions are documented.
- Ensures that corrective and preventive action plans are reviewed, approved, implemented as scheduled, validated, closed, and that necessary documentation for supporting closure is provided to the Document Control Specialist to be maintained as a quality record.

3.6 Quality Assurance Manager

- Overall responsibility for the nonconforming items control process, including the issuance and maintenance of this procedure. All proposed changes and other suggestions for improvement of this procedure should be submitted to the Quality Assurance Manager in accordance with QAP-061, Document Control.
- Requests Contracts Manager to notify the customer when nonconforming items have left our facility.
- Ensures that personnel preparing, verifying, and closing each NCR are appropriately trained in this procedure and qualified to complete any required actions to implement this procedure.
- Performs Quality Engineer or Quality Representative functions, when necessary.

3.7 Quality Engineer or Quality Representative

- Investigates and evaluates nonconforming items to determine disposition.

- Performs verification inspections of implemented corrective actions.
- Applies and removes quality nonconformance control status tags, as appropriate.

4. PROCESS FOR CONTROLLING NONCONFORMING ITEMS

The primary objective of the nonconforming items control process defined in this procedure is to prevent the unintended use or further processing of products failing to pass required inspections or tests upon receipt or throughout all stages of production and delivery. There are five phases used to control a nonconforming item: 1) identification, 2) segregation, 3) disposition and notification, 4) correction, and 5) analysis. Sections 4.1 through 4.5 define the process and responsibilities for each phase.

4.1 Identification

Responsibility	Step	Action
Employee		
	4.1.1	Identifies nonconforming items originating from product monitoring and measurement (see QAP-101, Inspection, and QAP-121, Control of Measuring and Test Equipment), variance in procurement specifications (see COP-003, Procurement), customer complaints (see QAP-005, Customer Satisfaction), or other variance that does not meet documented customer requirements (e.g., contract, statement of work).
	4.1.2	When items have been identified as nonconforming, the employee making that determination prepares and tags them as nonconforming in a manner that is not detrimental to the items.

4.2 Segregation

Responsibility	Step	Action
Employee		
	4.2.1	Ensures that the tagged, nonconforming items are moved to a clearly designated hold area as soon as practical. **Note:** The items do not have to be moved to a hold area if it is not feasible to move them; however, they must be clearly tagged as nonconforming.
	4.2.2	Notifies Quality Engineer or Quality Representative and Project Manager of nonconforming items.

Quality Engineer or Quality Representative

4.2.3 Manages all hold areas to ensure that nonconforming items identification status remains clearly visible.

4.3 Disposition and Notification

Responsibility	Step	Action
Project Manager		
	4.3.1	Initiates a QAF-151.1 Nonconformance Report (NCR) to describe a specific defect. **Note:** If practical, a copy of the NCR remains with the nonconforming item until review and disposition is completed.
	4.3.2	Forwards a copy of the NCR to the Quality Engineer or Quality Representative and Quality Assurance Manager.
Quality Assurance Manager		
	4.3.3	Requests Contracts Manager to notify the customer when nonconforming items have left our facility.
Contracts Manager		
	4.3.4	Initiates and records results of all North Wind Inc. product recall activities, requests for concessions (including requests for waivers and deviations), and documents customer responses.
Quality Engineer or Quality Representative		
	4.3.5	Conducts a preliminary review with input from technical personnel as needed, and customer approval, as required.
	4.3.6	Determines the disposition of the nonconforming items which will include one or a combination of the following actions: **a) *Rework:*** Requires that the item be reworked to its original intended specifications in a documented and specified manner so that it meets all characteristics of the design or acceptance criteria. **b) *Repair:*** Requires that the item be reworked to a configuration that meets the fit and performance characteristics of the design or acceptance criteria. **Note:** Written technical justification is required for a repair disposition and shall be approved by the customer.

c) ***Accept-As-Is:*** The nonconforming item, with its reported discrepancy, is acceptable for use without correction.

Note: Written technical justification is required for *Accept-As-Is* disposition and shall be approved by the customer.

d) ***Reject:*** The item cannot be further processed in any manner to meet specified acceptance criteria.

4.3.7 Notifies the Quality Assurance Manager, Project Manager, and Contracts Manager of the disposition.

4.4 Correction

Responsibility	Step	Action
Project Manager		
	4.4.1	Corrects the nonconforming items and summarizes the disposition and correction activity on the NCR, with input from the Quality Assurance Manager, Quality Engineer or Quality Representative, and the customer, as needed.
	4.4.2	Forwards the NCR to the Quality Engineer or Quality Representative to reexamine, validate correction activities, and submits for closure.
Quality Engineer or Quality Representative		
	4.4.3	Reinspects, re-tests, or assesses, as appropriate, the reworked items to their original specifications upon completion of the correction.
	4.4.4	Validates correction activities and completes NCR.
	4.4.5	Forwards completed NCR and supporting documentation to Quality Assurance Manager for analysis.
Quality Assurance Manager		
	4.4.6	Reviews the NCR and supporting documentation, verifies that all related actions are complete, signs the completed NCR, and forwards it along with supporting documentation to the Document Control Specialist for maintenance as a quality record.
Document Control Specialist		
	4.4.7	Files and maintains each NCR and supporting documentation in accordance with QAP-171, Records Control.

4.5 Analysis

Responsibility	Step	Action
Quality Assurance Manager		
	4.5.1	Reviews NCR to determine the need for preventive action and, as required, initiates a Corrective or Preventive Action (CPA) in accordance with QAP-161, Corrective, Preventive or Improvement Actions.
	4.5.2	Records the CPA number on the NCR.
	4.5.3	Periodically reviews the NCR data, audit results conducted per QAP-181, Quality Audits, and other relevant data to determine the effectiveness and efficiency of the process for controlling nonconforming items.
	4.5.4	Initiates additional corrective and preventive action per QAP-161, Corrective, Preventive or Improvement Actions, as required.
	4.5.5	Identifies and reports trends and related recommendations to top management for review and action during management reviews per QAP-004, Quality Management Planning and Review.

5. RECORDS

The Document Control Specialist shall maintain the following records in accordance with QAP-171, Records Control:

- Each NCR (QAF-151.1 Nonconformance Report) and supporting documentation.

6. REFERENCES

The following internal documents are referenced in this procedure to define their interaction with the control of nonconforming items process.

QAF-151.1, Nonconformance Report

QAP-004, Quality Management Planning and Review

QAP-005, Customer Satisfaction

QAP-061, Document Control

QAP-101, Inspection

COP-002, Procurement

QAP-121, Control of Measuring and Test Equipment

QAP-161, Corrective, Preventive or Improvement Actions

QAP-171, Records Control

QAP-181, Quality Audits

APPENDIX A, Example, QAF-151.1, Nonconformance Report

NONCONFORMANCE REPORT (NCR)

NONCONFORMANCE REPORT NO: _____

SECTION 1 – To be completed by Project Manager

Identified by: Date Identified:

Description of Nonconformance:

Cause of Nonconformance:

Requirements Violated:

Corrective Action:

Assigned To: _____ Due Date: _____

Approvals: _____ Project Manager _____ Quality Representative _____ Date

SECTION 2 – To be completed by Quality Representative

Verification of Corrective Action:

Approval: _____ Quality Representative _____ Date

SECTION 3– To be completed by Project Manager

Preventive Action:

Action Assigned To: Due Date:

SECTION 4– To be completed by Quality Representative

Verification of Preventive Action:

Approval: _____ Quality Representative _____ Date

SECTION 5– To be completed by Quality Assurance Manager

Finalizing NCR (Verification of Completion):

Approval: _____ Quality Assurance Manager _____ Date

Estimated Cost: $

EXAMPLE