



Remedial Design Quality Assurance Project Plan

**North Hollywood Operable Unit
Second Interim Remedy
Groundwater Remediation System Design**

Revision 1

September 10, 2012

AMEC Project Number: 4088115718.4100.1



September 10, 2012

Mr. Matt Salazar
United States Environmental Protection Agency, Region IX
75 Hawthorne Street
San Francisco, California 94105

Subject: Remedial Design Quality Assurance Project Plan
North Hollywood Operable Unit
Second Interim Remedy
Groundwater Remediation System Design
AMEC Project 4088115718.4100.1

Dear Mr. Salazar:

AMEC Environment & Infrastructure, Inc. is pleased to submit this Remedial Design Quality Assurance Project Plan for the North Hollywood Operable Unit on behalf of Lockheed Martin Corporation and Honeywell International Inc., to the U.S. Environmental Protection Agency (USEPA), Region IX. This document has been prepared pursuant to the Administrative Settlement Agreement and Order on Consent for Remedial Design dated February 14, 2011 and revised in response to USEPA comments received on August 10, 2012.

If you have any questions regarding this report, please contact Michael Taraszki at (510) 663-3996.

Sincerely,
AMEC Environment & Infrastructure, Inc.

Michael Taraszki, PG, CHG, PMP
Project Manager

mt/pp/smm

Enclosure

Robert Hartwell, PE
Engineering Manager

For Robert Hartwell, PE
with permission

Client:	Honeywell International, Inc. Lockheed Martin Corporation	Remedial Design Quality Assurance Project Plan	
Project:	NHOU Second Interim Remedy Groundwater Remediation Design	Project number:	4088115718.4100.1
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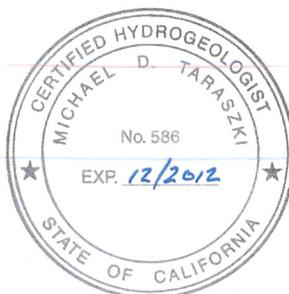
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Michael Taraszki, PG, CHG, PMP
Project Manager




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- B AMEC Responses to USEPA Comments to the Draft Phase I Pre-Design Investigation Work Plan

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ABBREVIATIONS AND ACRONYMS

AMEC	AMEC Environment and Infrastructure, Inc.
AOC	Agreement and Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
CADD	Computer Aided Design and Drafting
COC	chemicals of concern
ESRI	Environmental Systems Research Institute
FGDC	Federal Geographic Data Committee
GIS	Geographic Information System
HASP	Health and Safety Plan
Honeywell	Honeywell International, Inc.
Lockheed Martin	Lockheed Martin Corporation
MS	Microsoft
NHOU	North Hollywood Operable Unit
PDF	Portable Document Format
PE	Professional Engineer
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
QMP	Quality Management Plan
RAOs	Remedial Action Objectives
RD	Remedial Design
ROD	Record of Decision
SAP	Sampling and Analysis Plan
SOW	Scope of Work
SQL	Structured Query Language
USEPA	U.S. Environmental Protection Agency
VE	Value Engineering
VOCs	Volatile Organic Compounds

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1. PROJECT BACKGROUND AND OBJECTIVES

AMEC Environment & Infrastructure, Inc. (AMEC) has been contracted by Honeywell International, Inc. (Honeywell) and Lockheed Martin Corporation (Lockheed Martin) to design the Second Interim Remedy for groundwater remediation at the North Hollywood Operable Unit (NHOU).

AMEC has developed this Remedial Design (RD) Quality Assurance Project Plan (QAPP) to specifically describe those quality assurance activities that will be implemented during the remedial design (RD) portions of the project.. This RD QAPP fits within the overall Quality Management Plan (QMP) and describes how AMEC's Quality Assurance/Quality Control (QA/QC) processes integrate with the technical aspects of the project. The table below lists documents prepared to-date and a description of each.

Document	Description
QMP	Document provides a general description of AMEC's QA/QC system and includes overall details about the NHOU Second Interim Remedy.
RD Work Plan	This plan describes AMEC's scope of work (SOW) on the Second Interim Remedy and provides information on tasks and deliverables.
Data Gaps Analysis Report	Provided a review of existing basin conceptual model and existing data. Developed new groundwater conceptual model based on existing data. Identified data gaps requiring additional data collection to meet Remedial Action Objectives (RAOs).
Sampling Analysis Plan (SAP)/QAPP/Health and Safety Plan (HASP)	Documents prepared for the Phase 1– Pre-Design Investigation. Sampling work plan, QAPP specific to sampling activities described in the work plan, and a HASP.
RD QAPP	QAPP specific to the RD phase of the second interim remedy. Describes activities performed during the design tasks to ensure quality delivery.

As noted in the RD Work Plan, the delivery method for this project, whether design/bid/build or design/build, will be determined near the completion of the Preliminary Design Report and communicated to The U.S. Environmental Protection Agency (USEPA). While the choice of delivery method may change some of the tasks noted in this RD QAPP, this document was written assuming the design/bid/build approach. The delivery methods are more fully described in Section 3.4.4 of the RD Work Plan (AMEC, 2011).

1.1 Regulatory Background

A detailed discussion of the regulatory background for the NHOU can be found in Section 1 of the Data Gap Analysis dated March 14, 2012 (AMEC, 2012).

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1.2 NHOU Remediation and Objectives

A detailed discussion of the site history, current status, and project objectives can be found in Section 2 of the Data Gap Analysis report (AMEC, 2012).

1.3 Goal of Remedial Design

The goal of the RD task is to provide a treatment system capable of treating volatile organic compounds (VOCs) and other chemical of concern (COC) as needed to meet the Applicable or Relevant and Appropriate Requirements (ARAR's) as described in the Interim Action Record of Decision (ROD) for the NHOU, USEPA, September 30, 2009. This design will provide treatment to standards and to comply with RAOs as specified in Section 1.1 of the RD Work Plan submitted to USEPA on October 5, 2011 (AMEC, 2011). COCs will be identified using groundwater data, interpreted contaminant distributions and target capture zones, and simulations of capture through the groundwater modeling effort. The Second Interim Remedy is intended to establish a target capture zone that contains high concentration portions of the COC plumes and other portions above regulatory limits to the extent practicable.

1.4 Project/Task Description

A detailed summary of the tasks associated with the RD portion of the Second Interim Remedy for the NHOU can be found in Section 3 of the RD Work Plan submitted to USEPA on October 5, 2011 (AMEC, 2011). Section 9 of the RD Work Plan also describes the deliverables to be produced. A revised schedule for implementation of the RD was included in the Data Gap Analysis report (AMEC, 2012).

A summary of the expected project approach is summarized below.

- Additional hydrogeologic and groundwater quality data will be obtained as part of the Phase 1 Pre-Design Investigation to fill critical data gaps needed to address RAOs.
- Findings from the Pre-Design Investigation will be used to refine the existing numerical groundwater flow model, which will be used to simulate groundwater flow conditions and aid in estimating the following Second Interim Remedy components:
- Number of new extraction wells required,
- Average and maximum flowrates expected from both new and existing wells
- Extraction well locations, depths, and screened intervals
- Identified COCs distribution and respective hydraulic capture requirements
- Average and maximum COC concentration
- Expected changes in flows or concentrations over time
- Different treatment technologies will be evaluated and the most appropriate selected. The details of evaluation and selection will be documented in the Treatment Options Memorandum.
- A design basis document will be prepared that will document the information comprising the basis for design, including assumptions that may affect the design performance. This document will be prepared during the preliminary design phase, but as a precursor to the Preliminary Design Report, and will be approved by

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Lockheed Martin, Honeywell, and USEPA to facilitate development of the Second Interim Remedy design process.

- AMEC will review data available in industry literature and from other remediation sites with similar characteristics to determine the applicability to the NHOU.
- Vendor tests of proposed treatment technologies will be performed, if needed, to gather additional information relevant for design purposes.
- Develop the modified NHOU treatment system Second Interim Remedy design. Critical path documents include:
 - Preliminary Design
 - Intermediate Design
 - Final Design
- Deliverables associated with these design phases are described in Section 9 of the RD Work Plan (AMEC, 2011).

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2. PROJECT MANAGEMENT

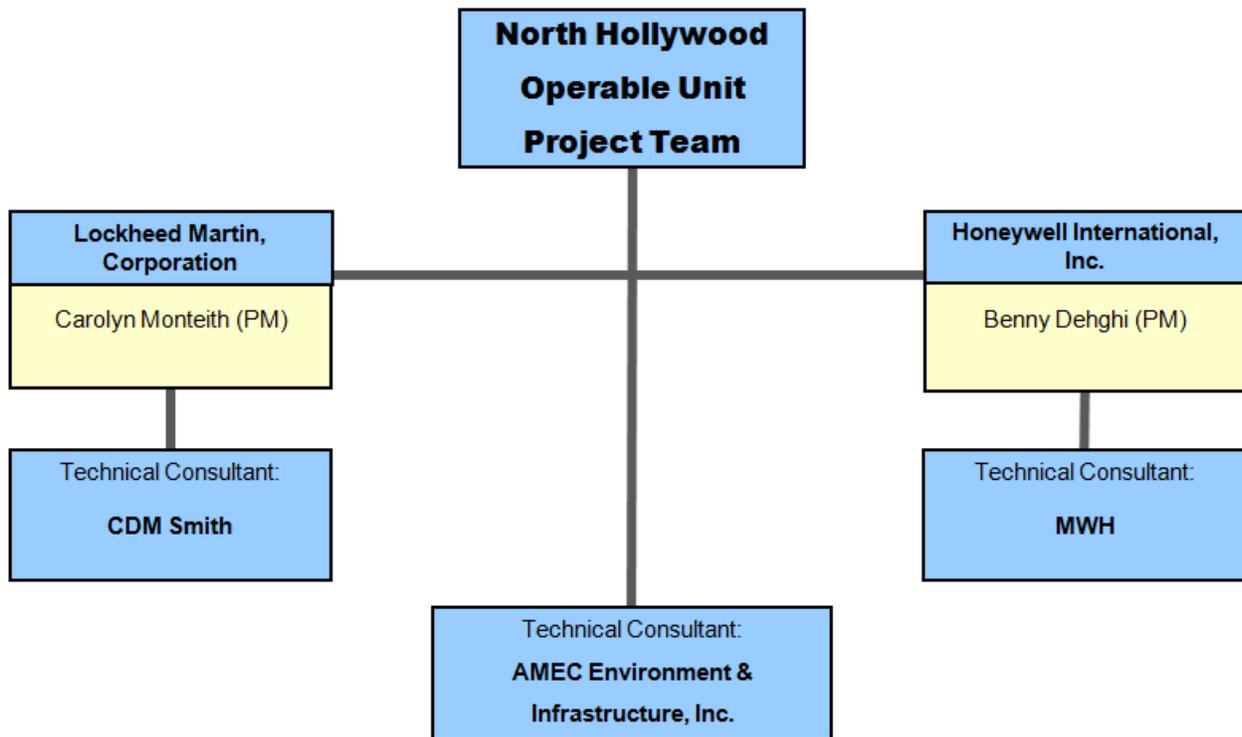
AMEC will provide project management services to complete the data collection, analysis, modeling, and RD portions of the Second Interim Remedy. The primary purpose of these activities is to maintain a high level of communication between the project team and stakeholders.

2.1 Project/Task Organization

The following sections present the project team, key personnel, and responsibilities.

2.1.1 Lockheed Martin and Honeywell Project Team

The Lockheed Martin and Honeywell project team is illustrated in the following updated organization chart.



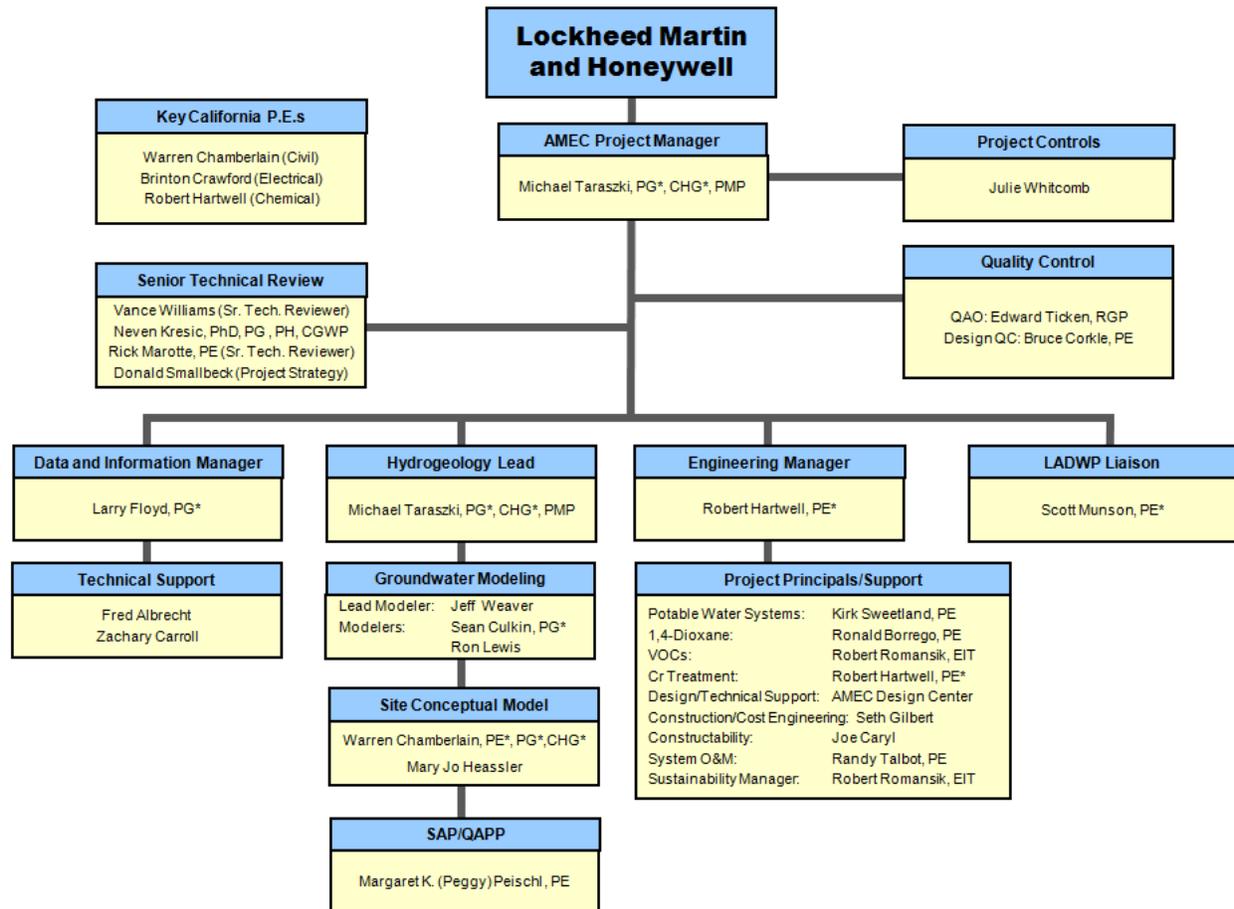
Roles and responsibilities specified in the Agreement and Order on Consent (AOC) are as follows:

Respondents:	Honeywell; Lockheed Martin
Supervising Contractor:	AMEC
Project Coordinator:	Mr. Michael Taraszki (AMEC)
USEPA Project Manager:	Mr. Matt Salazar
USEPA Alternate Project Manager:	Mr. Fred Schaffler
Sustainability Manager:	Mr. Robert Romansik (AMEC)

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2.1.2 AMEC's NHOU Project Team

The AMEC NHOU Project Team includes a Data and Document Management Group, a Hydrogeology Group, and a Design Engineering Group, as illustrated in the following updated organization chart.



* CA license

A description of the personnel associated with each group and interaction with one another to achieve the remedial objectives is described below. The entire project will be managed by Mr. Michael Taraszki, who will be responsible for technical, financial, and project scheduling matters and will serve as the main contact with Lockheed Martin and Honeywell project managers. Mr. Taraszki will be responsible for coordination between AMEC, Lockheed Martin, and Honeywell, including regular communication (e.g., weekly teleconference calls) and meetings. Communication procedures include use of email and distribution of files and deliverables via the AMEC SharePoint site. All deliverables will be provided to USEPA and associated stakeholders in an acceptable electronic format (e.g., portable document format (PDF) or Microsoft (MS) Word) unless specifically requested otherwise.

2.1.2.1 Data and Document Management Group

The Data and Document Management group will be managed by Mr. Larry Floyd, who will be responsible for execution of an enterprise information system that facilitates data organization,

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dissemination, project collaboration, geospatial awareness and mapping and implementation of an electronic document library.

2.1.2.2 Hydrogeology Group

Mr. Taraszki will act as a Project Principal and will be responsible for groundwater characterization activities as are needed to support the RD team. Mr. Taraszki will be supported by Mr. Warren Chamberlain and Ms. Mary Jo Heassler to refine the site conceptual model (geology/hydrogeology) and by Mr. Jeff Weaver, Mr. Ron Lewis, and Mr. Sean Culkin to evaluate various groundwater flow and advective transport scenarios in support of the RD process. He will also be supported by Ms. Margaret K. (Peggy) Peischl to develop the SAP, Quality Assurance Plan, and Field Sampling Plan.

2.1.2.3 Design Engineering Group

RD engineering will be managed by Mr. Robert Hartwell P.E. (Chemical) Mr. Hartwell will be responsible for the overall project design and will be assisted by Mr. Warren Chamberlain P.E. (Civil/Structural) and Mr. Brinton Crawford P.E. (Electrical).

The design team will be responsible for development of the basis of design and the deliverables associated with the Second Interim Remedy. The design team is made up of water treatment experts and process designers each having a specific focus. Mr. Ron Borrego will provide expertise on the treatment of 1,4-dioxane and other organic compounds not readily treated with conventional stripping. Mr. Robert Romansik has been selected to lead the engineering task involving removal of VOCs from the extracted groundwater. Mr. Hartwell will be tasked with evaluation of hexavalent chromium removal technologies. These individuals (or others as designated) will act as Project Principals and be responsible for design activities in their respective areas.

The Second Interim Remedy design will be developed upon completion of our technology evaluations with input from MWH Americas, Inc. regarding extraction well NHE-2 treatment. The design team will integrate each of the necessary treatment system components and prepare the preliminary design report. The design team will be augmented with individuals dedicated to providing input on sustainability, constructability, and any ARARs. Our Senior Technical Reviewers, Mr. Vance Williams and Mr. Rick Marotte P.E., will provide technical project review and value engineering (VE) screening.

AMEC design centers will work along with the design teams to take preliminary design documents and produce the physical designs needed for bid and construction. The design teams will oversee the work of the design centers to resolve issues and provide guidance. The design team will have input into and review all drawings and specifications developed by the design centers.

After approval of intermediate design, the design team, along with the design centers will complete the pre-final design and final design.

As this project is located in southern California, Mr. Romansik, Mr. Borrego, Mr. Chamberlain, and Mr. Alfonso Ang will provide a review of each stage of the project based on design requirements, permits, codes, and design philosophy unique to California and this portion of the state. Our interaction with the Los Angeles Department of Water and Power will be facilitated by Mr. Scott Munson throughout the RD process and particularly during the preliminary design phase.

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2.2 Project Delivery

Near the completion of the Preliminary Design Report, the contracting approach for the implementation of the second interim remedy will be determined. This is described more fully in Section 3.4.4 of the RD Work Plan. Should Option 1 (design/bid/build) be chosen, AMEC would continue with the intermediate and final design tasks after approval of the Preliminary Design Report. This complete set of design documents would then be bid to construction contractors to build the second interim remedy. This RD QAPP has been written assuming this method of project delivery.

Should Option 2 (design/build) approach be taken, AMEC will complete the Preliminary Design Report, which is equivalent to a 30% design. Once approved, this report at this stage of design will be used to obtain bids from qualified design/build contractors. The selected contractor will then be responsible for completing the design work to the degree necessary to allow for construction of the second interim remedy.

The tasks associated with each step in the RD are described in Section 3 of the RD Work Plan. The deliverables associated with each part of the RD are listed in Section 9 of the RD Work Plan.

2.3 Special Training/Certification

The RD work will be performed under the direction of Engineers licensed in the State of California. AMEC currently has three licensed California Professional Engineers (PE) assigned to the RD covering Civil, Chemical/Process, and Electrical design. Mr. Warren Chamberlain will serve as the lead civil/structural engineer, Mr. Robert Hartwell as the lead process engineer, and Mr. Brinton Crawford as the lead electrical engineer.

2.4 Documents and Records

Documents and records generated as part of the design work will reside on AMEC's SharePoint project site. This site allows AMEC to organize, manage, and distribute the information generated.

This RD QAPP is an example of a document that will be stored on the SharePoint site. Access to the SharePoint site is managed by the Data and Information Manager (Mr. Larry Floyd) to ensure that the project team has the most current version of each deliverable. As a document is updated, the site maintains separate documents such that older versions are retained; however only the most recent version is available for download. Notifications will be sent to each project team member letting them know that a new version of the document is available. The final version of each document is provided to the USEPA and Stakeholders, who have limited access to the SharePoint site designed specifically to facilitate document distribution.

As background information is obtained, it is published for review by the project team. Design information developed during this project may include but not be limited to:

- Calculations
- Vendor reports
- Drawings
- Specifications

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- Cost Estimates
- VE reports
- Schedules

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3. DATA GENERATION AND ACQUISITION

The Data Gaps Analysis report has identified critical data gaps that must be resolved prior to the implementation of the Second Interim Remedy RD. To fill these data gaps, AMEC has developed a Pre-Design Investigation that will involve collection of additional groundwater samples and field testing. This work is covered under the following documents prepared by AMEC and submitted to USEPA.

- SAP (including a QAPP and Field Sampling Plans)
- Work Plan
- HASP

These documents will cover Phase 1 of the work associated with data generation and acquisition as anticipated to fill critical data gaps necessary to proceed with developing the Second Interim Remedy design. The need for a second phase will be determined upon completion of Phase 1 in consideration of the RAOs included in the AOC.

3.1 Non-Direct Measurements

During the design portion of the project, information and other data may be obtained that were not directly measured nor under the control of AMEC. It is important that these data be reviewed and that their applicability to the NHOU is determined prior to use in the RD.

3.1.1 Literature Sources

Literature sources provide significant amounts of information regarding treatment technology, design parameters, dosages, reaction times, etc. Literature sources to be used in the NHOU RD as part of calculations will be reviewed and approved for use by the Project Principals or the Engineering Manager. These data will be examined for applicability to the NHOU groundwater and other systems, and the limitations of the data will also be identified and noted within the calculations.

3.1.2 Vendor Provided Data

Vendor-provided data will be utilized during the RD. These data may include, but not be limited to, equipment information, process design (sizing), and information generated by the vendor through calculations, computer programs, or equipment performance information. Vendor provided data will be reviewed by the Project Principal for reasonableness and conformance to input parameters.

3.1.3 Data Collected from other Remediation Sites

Data used in the design effort may be obtained from other groundwater remediation sites where similar treatment technologies proposed in the ROD and Focused Feasibility Study (USEPA, 2009a and 2009b) have been or are currently implemented. Available data may be in the form of operational data, research studies, or AMEC's professional experience with same or similar treatment technologies. Data obtained will be reviewed by the Project Principal and the Engineering Manager. These data will be assessed for applicability to the NHOU design.

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3.2 Data Management

This project will utilize a substantial amount of spatial and non-spatial data. These data are critical to the project and will be managed as such through the implementation of an enterprise information system that facilitates data management principles and processes.

Project data will be managed in a centralized data repository and accessed by the project team through a secure web portal and / or web service. The intent of the Data Management QA/QC procedures is to place emphasis on:

- Data Accessibility
- Data Quality
- Time Savings
- Increased Efficiency
- Data Manipulation and Decision Support
- Visual Feedback
- Data Interoperability

3.2.1 Data Management Plan

AMEC will provide a single, centralized, and secure web based Project Management/ E-Document Library portal based on the MS SharePoint platform. The portal is available to the Design Team, Lockheed Martin, Honeywell and the USEPA. The portal will serve as a repository to digitally store project files including reference documents, memoranda, plans, and reports. The portal will also list work tasks, associated schedules, and the status of work tasks so that project progress can be monitored. Document versioning controls are incorporated into the SharePoint program. Facilities will be provided for the administration of user access permissions (e.g., read, write, modify, upload, delete). The Project Management/E-Document Library portal will provide the web-based access point for the Geographic Information System (GIS) and data query tools described above.

During RD, a page on the project site will be set up specifically for the design project files. These files will include external data, background and reference materials, design information and calculations, drawings, specifications, etc. Each design team will be working within their section of the project site and will be responsible for their project files. As the project site allows electronic files to be worked on directly, there is no need to copy the files or transfer them to another location.

Recordkeeping procedures and document control are further discussed in Section 4 of this RD QAPP.

AMEC will maintain the existing centralized data repository that will serve as the Project database; this database includes a replica of the USEPA's San Fernando Valley groundwater monitoring database, updates of which will be integrated as are made available from the USEPA. Other legacy data identified by Lockheed Martin, Honeywell, or the USEPA will be evaluated for inclusion in the Project database based on scope and applicability.

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The Project database will utilize the MS Structured Query Language (SQL) Server database management system, which will allow for high performance concurrent user access through web and GIS applications. The database will be housed on an AMEC-owned server providing secure access by project team members, participating contributors, and agencies (if necessary). The Project database will be designed, normalized, and implemented to allow for the efficient loading of initial data, updating/loading of subsequent data, and querying/reporting of the data. Geospatial data will comply with Federal Geographic Data Committee standards.

Complete or selective copies of the database can be provided to the client and team members as a part of the QA program, in either MS Access or MS SQL Server format. However, these copies shall not be used in lieu of the centralized data available via the Project Management portal.

3.2.2 Document Management

For the Data/Document Management and GIS tasks, AMEC will use the following technologies to support the NHOU project:

- Environmental Systems Research Institute (ESRI) ArcGIS Desktop™ and ArcGIS Server™
- MS ASP.NET™
- MS SQL Server™
- MS SharePoint™

As much as possible, AMEC will utilize standard off-the-shelf software, controls, add-ons, etc. to develop the NHOU project applications. This will allow for rapid application development and increase the community of support. Current versions of all software will be utilized.

AMEC will provide Lockheed Martin, Honeywell, and the USEPA electronic versions of deliverable documents using MS Word™ ensuring backward compatibility with older versions of this word processing application, unless recipients indicate that a more recent version is acceptable. Graphical files will be provided using PDF format whenever possible. Deliverables will be submitted electronically (no hard copies) to the USEPA in compliance with the AOC SOW.

3.2.3 Data Quality and Integrity

AMEC will maintain the quality and integrity of the data by focusing on the database structure, data workflow and database security.

The database structure will be normalized to the 3rd order and designed in an Entity-Relationship diagram. An evaluation will be made of how data management functions are related to the overall flow of data to ensure that an appropriate data workflow is applied. Additionally, a review will be made on who has access to data for data entry and editing, data retrieval rights for accessing the entire database(s), and limited rights for retrieving select subsets of the data.

3.2.4 Geospatial Data and Maps

To organize and analyze the vast amounts of sampling data involved with this project, AMEC will develop an NHOU GIS to visualize, manage, and analyze NHOU data. ESRI ArcGIS software will be utilized to create the project GIS. The system will be integrated with

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groundwater elevation and analytical laboratory data stored in the project database. The GIS will integrate these non-spatial data with geospatial features including major roadways, buildings, and existing production, remedial extraction and monitoring wells. The GIS will allow for efficient spatial and temporal data management, map query, and creation of custom maps and reports. Additionally, the GIS will be used to perform contouring, area/volume estimates, and other advanced spatial queries.

AMEC will utilize the NHOU GIS to produce a web-based GIS that will be accessible via the Project Management/E-Document Library portal. This portal will provide a navigation and investigation tool for accessing/reporting water quality (chemistry), water-level data, production well information, and well logs. The web-based GIS will allow users to quickly identify monitoring and sampling locations, either through visual clues (such as streets or other landmarks) or through menus. Pop-up menus for locations will provide options for displaying available data for that location in a tabular format or as files (e.g. well or boring logs). Additional search or filtering tools will be provided on the tabular results, allowing users to define/select/sort the data. The ability to select multiple locations at a time will be provided. The tabular results can also be used to generate XY graphical output, such as time-concentration graphs and hydrographs. There will be an option from the pop-up menus and tabular results to download data in a format such as Excel or a specifically formatted text file that is usable by modelers or other members of the users' community. The download file based on the tabular results will incorporate any filters or sorting criteria applied when generating the data table.

Geospatial data will comply with standards set forth by the Federal Geographic Data Committee (FGDC). FGDC develops geospatial data standards for implementing the National Spatial Data Infrastructure. This will be applied to NHOU GIS, Computer Aided Design and Drafting (CADD), and cell phone-based data collected on this project.

Geospatial and CADD data will have the appropriate spatial reference set and projection will be defined on delivery.

In accordance with Executive Order 12906 (Federal Register, 1994) all GIS and associated maps will contain associated metadata; specifics are defined by the Content Standard for Digital geospatial Metadata as defined by FGDC. AMEC will make use of the USEPA Metadata Editor to ensure compliance of the metadata requirements.

3.2.5 Technologies

AMEC will implement an enterprise level relational database management system with a spatial data engine to handle the geospatial content and its relationships. The web-based portal will sit on top of the SharePoint 2010 foundation and integrate third party controls from ESRI and AutoCad to enable mapping and design functions.

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4. REMEDIAL DESIGN QUALITY PROCEDURES

The QA/QC procedures shown in this section have been tailored specifically for the design work tasks on this project. This RD QAPP is intended to be the governing document for QA/QC procedures during the RD. This section is generally consistent with information contained in the QMP but has been slightly reorganized, streamlined, and augmented with text to provide additional clarity.

4.1 Assessments and Response Actions

Each Project Principal will report directly to the Engineering Manager on both the Quality Assurance (QA) and the technical aspects of the project. Each Project Principal shall ensure that the RD QAPP is implemented and that persons assigned to the project are complying with plan requirements. The Quality Assurance Officer (QAO) shall conduct independent reviews and audits of QA practices and procedures on work assignments that require testing and analysis. The QAO will report to the Project Manager and Engineering Manager on the results of these audits. Copies of all such reports will be provided to each Project Principal.

While implementing the quality management program for this contract, AMEC will ensure that:

- The QAO will have technical and administrative authority for all QA/QC;
- The QAO will ensure that facilities and equipment are inspected and maintained;
- Project Principals will adhere to the following restrictions when generating data;
- The precision and accuracy of all data will be reviewed,
- Data collection and data handling procedures will be implemented,
- Data processing procedures will be audited, and
- QA activities will be audited.
- QA deficiencies will be corrected;
- Results of QA audits and corrective actions will be reviewed with all staff;
- The RD QAPP will be reviewed and updated as needed; and
- Sufficient resources will be allocated to implement the RD QAPP.

AMEC will require its subcontractors to adhere to project QA procedures. Project specific QA requirements will be included as part of subcontracting documents. AMEC will periodically audit subcontractor activities to ensure compliance with QA requirements, and the QAO will have the authority to stop work on any subcontracting efforts that do not meet project QA standards.

4.2 Design QA/QC Procedures

Design projects require frequent review and adjustment as the project proceeds and/or additional information is developed. Each element also requires professional judgment in planning, interpretation of findings, statement of conclusions, and the development of recommendations. Design reviews, in addition to including data validation and computation checks, take the form of professional peer reviews.

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- Field and Process Data Recording - Data that have been collected during site visits are reviewed prior to use. Calculations, opinions of probable costs, figures, and tables are reviewed by senior personnel to verify accuracy and consistency. Documentation to support calculations are maintained in project files.
- Document Flow - Documents generated during the design phase include basis of design reports, construction specifications and drawings, operations and maintenance manuals, etc. The Engineering Manager ensures that project personnel prepare design documents in accordance with AMEC project requirements and in accordance with this RD QAPP. The Project Manager is responsible for ensuring that all client/agency comments are addressed, and that the final version of a document incorporates all agreed upon changes. Specific details regarding document flow are provided below.
- Organizational Responsibility - During design, the Engineering Manager is responsible for aspects of the design, coordinates with the Project Manager on key aspects of the project, and ensures that project personnel are fully knowledgeable about site conditions, design criteria, and client requirements. The Engineering Manager will be assisted by Project Principals who will lead specific tasks and be responsible for the technical aspects of their project assignments. The Project Manager has overall responsibility for the project, with oversight by the QAO and with designated technical review, as required.

4.3 NHOU Design Quality Plan

4.3.1 Procedures for Preparing and Checking Individual Plan Details

Design output in the form of drawings, both original documents and check prints, are produced by the design groups for each discipline. Through examination of check prints, review prints, sign-off stamps, and discussion with project staff, the Engineering Manager and Project Principals verify that proper interface between disciplines has produced a final set of integrated documents that are free of inconsistencies. For example, the review must determine if compatibility of documents exists between:

- Multi-discipline drawings;
- Drawings and technical specifications; and
- General conditions, special conditions, and related documents.

All design packages considered as “approved for client review” must receive:

- Approval by the Design Quality Control (QC) Manager, Mr. D. Bruce Corkle, PE (or his designee), that the design documents have been reviewed and found to be in conformance with the RD QAPP, and
- Approval by the Engineering Manager that the design documents are in conformance with project requirements thereby approving the design documents for release to Lockheed Martin and Honeywell.

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Drawing review consists of, but is not limited to, the following components:

1. Checking of drawings shall be performed by a Discipline Checker assigned by the Engineering Manager or Project Principal. The Checker must be an individual other than the person who originated the design, and shall have an equivalent level of knowledge.
2. The Discipline Checker performs a technical review and checks the drawings for appropriate technical requirements, accuracy of technical requirements, compatibility with overall requirements; and verifies that appropriate abbreviations, definitions, codes and standards are included. Typical items to be checked are:
 - a. Drawings are complete, accurate, and suitable for the intended use,
 - b. Details are shown and labelled correctly,
 - c. Design inputs are adequately incorporated in drawings,
 - d. Drawings between disciplines correctly reflect similar work; i.e., site plans, utilities, equipment, and piping,
 - e. The dimensions on the drawings are adequate and accurate,
 - f. The notes on the drawings are clear and concise,
 - g. The details on the drawings are consistent among the drawings,
 - h. Markings are legible and identifiable,
 - i. Orientations of the plans are consistent and complete,
 - j. Drawing titles, numbers and revisions are correct and consistent with index,
 - k. Scales and north arrows are properly shown,
 - l. Correct and adequate abbreviations are shown,
 - m. Title block is correct,
 - n. Line weights are consistent and appropriate to depict existing vs. proposed construction,
 - o. Spelling is correct,
 - p. Compliance with industry standard design criteria and AMEC standards,
 - q. Conformance with project specific CADD Standards.
3. The Discipline Checker marks items to indicate agreement or disagreement. The Checker should use the following color codes:
 - a. Yellow For agreement
 - b. Red For corrections
 - c. Blue For completed corrections
 - d. Green For back-checking
 - e. Black For notes, questions, and clarifications between the originator and the checker.
4. An electronic stamp is applied to each drawing and, upon completion of checking, the checker signs and dates the checked drawing in the space designated in the stamp as "Checked By".
5. The Originator (person who creates the drawing to be checked) makes appropriate corrections to resolve the Checker's comments. Any disagreement must be reconciled with the Checker. On completing the changes, the Originator initials and dates the space designated in the check print stamp as "Corrected By".
6. The Discipline Checker back checks with marks in green and initials.

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7. Completed checked drawings are maintained by the Project Principals as Quality Records.
8. Drawings shall be developed and maintained in AutoCad 2011 (or equivalent) format. Final review will be noted in the appropriate location in the drawing title block.
9. Drawings will be stored on the project SharePoint site to control versions and revisions.

4.3.2 Procedures for Preparing and Checking Design Calculations

Calculations can be performed using standard calculation sheets, spreadsheet programs such as MS Excel, dedicated design programs used for equipment design, or performed by vendors based on proprietary computer programs or calculation sheets.

Calculations which are performed on standard calculation/computation sheets shall be done in a neat and legible format. Information is to be neatly written, title boxes filled in completely, initials used in the sign-off blocks, pages numbered, sketches used as required to clarify the calculations, and all assumptions, references, units and conclusions are to be clearly stated.

Calculations performed using spreadsheets shall be prepared using the first tab as an information tab. This tab should include all of the same information as would be found in the title box of a calculations sheet. It should also include a description of what the calculation is for and the intended output. Assumptions, references, units and conclusions are to be clearly stated.

Calculations are checked for compliance with design input requirements including assumptions, mandated parameters, references, given values and formulas. They are also checked for omissions, and correctness of arithmetic. The Checker is responsible for asking questions of the originator in areas that are not clear or seeking technical advice if unsure of any particular element of the calculation.

Vendor provided calculations shall be reviewed by the individual who requested the information for applicability, correctness of data provided to vendor, and reasonableness of result. These calculations shall be initialed by the initial reviewer and passed to the Checker.

Design calculations, sketches, analyses, reports and/or studies will be maintained electronically as part of the project files. The calculations, whether manual or electronic, should be scanned and placed on the project site.

The following are guidelines for preparing and checking design calculations:

1. Manual computations shall be penciled neatly and legibly on appropriate 8-1/2" x 11" or 11" x 17" standard computation sheets that bear the letterhead of the design firm. Calculation sheets, shall be kept in loose-leaf notebooks until completed and checked. The calculation should then be scanned and place on the project site.
2. The following are guidelines for preparing design calculations:
 - a. Assumptions are adequately described,
 - b. Appropriate design methods are used,
 - c. Calculations are complete, accurate and suitable,
 - d. Calculations conform to and are consistent with design criteria, codes and client standards,
 - e. Reference to computer programs used are indicated,
 - f. Inputs into computer programs is verified,

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- g. Final computer runs are traceable to calculations,
 - h. Calculations are traceable to Originator, date, job and Checker(s), and
 - i. Dimensions are verified on drawings.
3. Checking of calculations shall be performed by an independent individual with no responsibility for the original calculation, but with the same level of technical knowledge as the Originator.
 4. The Checker performs a technical review and checks the calculations for appropriate technical requirements, accuracy of technical requirements, compatibility with overall requirements; and verifies that appropriate abbreviations, definitions, codes and standards are included.
 5. The Checker marks items to indicate agreement or disagreement. The Checker should use the following color codes:
 - a. Yellow for agreement
 - b. Red for corrections
 6. Upon completion of checking, the Checker signs and dates each checked calculation page. For electronic calculations, the Checker indicates that the document has been checked on the information tab.
 7. The Originator makes appropriate corrections to resolve the checker comments. Any disagreement must be reconciled with the Checker.

4.3.3 Procedures for Preparing and Checking Unique or Highly Specialized Designs

If they should be needed, any specialized designs and plans will follow the QA/QC procedures outlined in this section. In addition, a Principal Professional will be designated as a “specialist” in the area required to be reviewed. The Principal Professional will be designated by the Engineering Manager.

4.3.4 Procedures for Coordinating Work Performed by Different Disciplines

Design groups will be working in the following disciplines:

- Construction
- Civil site work
- Electrical/instrumentation and control
- Mechanical/piping
- Process

Discipline responsibilities:

1. The Engineering Manager and the Project Principals are jointly responsible for the Interdisciplinary Design Review coordination.
2. An Interdisciplinary Reviews will be conducted by Project Principals as their work affects other disciplines and near the completion of preliminary, intermediate and pre-final designs prior to submittal to Honeywell and Lockheed Martin. These reviews will include any professionals from subconsultants.

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3. The Interdisciplinary Review will consist of the following checks:
 - a. Plans are up to date and distributed to all Project Principals,
 - b. Proposed designs are consistent with no conflicts,
 - c. Proposed designs can be constructed,
 - d. Proposed designs are within required design and construction safety requirements, and
 - e. Proposed designs reviewed for plan consistency.
4. Each Project Principal will be required to sign an Interdisciplinary Review sheet once they have completed their review.

4.3.5 Audit Procedures to Ensure that the Established Design QA/QC Procedures are Followed

1. Designs will follow and be subject to the procedures outlined in this document. Design team members will be required to read and implement the NHOU RD QAPP. The QAO will audit and document QA/QC performance of Design Team members. This audit will take place at regular intervals or when directed by the Engineering Manager.
2. Each audit will document that the following has been performed:
 - a. Electronic drawing stamp is being used
 - b. Check prints have been completed and kept as quality records
 - c. Interdiscipline check has been completed and documented before each submittal
 - d. Submittal log has been updated
 - e. Design notebooks and records are kept up to date and in order
 - f. Design calculations have been checked, initialled and dated
 - g. Correspondence, meeting minutes, etc. meet quality standards
 - h. Correspondence is being routed properly
 - i. Agendas and Minutes are prepared for meetings
 - j. Previous Audit findings have been incorporated
 - k. Documents are being placed on the project SharePoint site in electronic format
3. A completed Audit Form will be a measure of performance and thus will be used as basis for any required quality improvements. Resulting quality improvements will be noted on the audit form (an example form is included in Attachment A).
4. The Engineering Manager will ensure the above steps have been followed and the appropriate Project Principal has approved all submittals.
5. "Lessons learned" from the audits will be communicated to all appropriate AMEC project staff by the Engineering Manager at regularly scheduled (weekly) staff meetings. The purpose of this discussion will be to implement audit findings into future submittals designed by AMEC.

4.3.6 Procedures and Details for Design "In-progress" Meetings

Weekly design "in-progress" meetings will be held during the design phase of the project. These meetings will be critical for the coordination of design, plan development, schedules, permits, etc. These meetings will include key members of the Design Team as well as representatives from Lockheed Martin and Honeywell as desired. An agenda will be provided by the AMEC

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Engineering Manager. Minutes of each meeting will be the responsibility of the AMEC Project Manager and will include action items. Additional meetings will be held as needed with minutes being prepared and distributed to appropriate team members.

4.3.7 Procedures for Response to Comments from Client

AMEC will provide written responses to comments received from Lockheed Martin and Honeywell. Meetings will be held, when required, to resolve NHOU Second Interim Remedy design issues. After identified issues are resolved, revised plans will be submitted following procedures outlined in the NHOU RD QAPP. The appropriate Project Principal is responsible for ensuring that comments have been fully addressed and incorporated into the plans.

4.3.8 Procedures for Records Retention

Submittals will be filed by the Engineering Manager. Checked plans and design calculations will be filed by the Project Principal. QAO audits will be kept on file, as well. All project documents will be maintained on AMEC's SharePoint project site. At the completion of the design phase of the project, copies of project documents will be sent to both Honeywell and Lockheed Martin.

AMEC will maintain project files for the duration of the AOC and for a period of ten (10) years after receipt of USEPA's notification that work has been completed.

4.3.9 Procedures for Project Submittal Drawings

Before each submittal, the Project Principal shall instruct the design staff to run a new set of plot files. The date and time of the plot will be printed on the drawing, which will allow the Project Principal to ensure that only the most current set of plans are being submitted. The plot files will be in electronic PDF format and will be stored on the project site under the current submittal.

4.4 Overall Design Review

At the completion of the preliminary and intermediate design tasks, an overall design review will be conducted by the Senior Technical Reviewers. These reviewers consider constructability, usability, reliability, maintainability, availability, operability, safety, cost and aesthetics.

At the conclusion of each design review, the reviewer(s) will consolidate comments on comment forms. Then, a comment resolution meeting will be held to achieve mutual agreement on the disposition of each review comment. The comment forms become part of the retained quality records and are checked in the QA audits. The Project Principals and design engineers/professionals as appropriate, will attend the comment resolution meeting as needed.

Upon conclusion of the overall design review, the Engineering Manager and Project Principals certify that final documents are compatible with project functional and technical requirements; meet required design criteria, client directions, and review comments; and reflect good engineering practice.

4.5 Submittal of Designs to Honeywell and Lockheed Martin

As stated earlier, design submittals for the preliminary and intermediate design tasks will be assembled by the Project Principals and submitted for overall design review by the Senior Technical Reviewers. Once this has been completed and internal comments have been resolved, the Engineering Manager will provide the completed design package to the Design QC Manager for final review. The Design QC Manager will also review the pre-final and final design packages.

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When the Design QC Manager completes the review, the Engineering Manager and Project Principals will resolve any final comments and place the design package on the project SharePoint site. The Engineering Manager will then notify the Project Manager that the design package is ready for submittal to Honeywell and Lockheed Martin.

All comments received from Honeywell and Lockheed Martin will be consolidated on comment forms. These comments will be addressed by the project team and the comment resolution, noted on the comment form will be returned to Honeywell and Lockheed Martin for agreement or further discussion (an example form is included in Attachment A). Depending on the nature of the comments, a comment resolution meeting can be scheduled to allow for further discussions.

Submittal stages and review times are shown on the revised project schedule which was submitted with the Data Gap Analysis Report (AMEC, 2012).

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5. REFERENCES

AMEC, 2011. Final Remedial Design Work Plan, North Hollywood Operable Unit, Second Interim Remedy, Groundwater Remediation System Design. October 5.

_____, 2012. Final Data Gap Analysis, North Hollywood Operable Unit, Second Interim Remedy, Groundwater Remediation System Design. March 14.

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USEPA, 2009a. USEPA Superfund Interim Action Record of Decision, North Hollywood Operable Unit, San Fernando Valley (Area 1) Superfund Site, Los Angeles County, California. USEPA ID: CAD980894893. September 30.

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ATTACHMENT A

Forms



Comment, Response, Resolution, & Disposition Form

CLIENT: Honeywell International, Inc. / Lockheed Martin Corporation
CLIENT PROJECT NUMBER:
PROJECT NAME & LIMITS: NHOJ Second Interim Remedy
PROJECT LOCATION: North Hollywood, CA
AMEC PROJECT NUMBER: 4088115718
SUBMITTAL TYPE:
SUBMITTAL LEVEL:

PR (Preliminary Response) Codes:

- A: Concur <provide action taken>
- A/B: Concur, but, not addressed exactly as directed per Comment <provide explanation>; also used if simply answering a question
- B: Discuss <provide explanation>
- C: Disagree <provide explanation>
- D: Not Required At This Submittal Level <provide explanation>
- E: Out of Scope <provide explanation>

FD (Final Disposition) Codes:

- N/A: No FD Code needed if AMEC concurs (usually, PR Code = A or A/B)
- 1: AMEC will do or no action necessary (e.g., when a Comment/Question is posed and answered)
- 2: Discuss further, but, resolve prior to the next submittal <provide explanation (who, what, where, when, etc., of resolution discussion)>
- 3: Comment to be resolved at future submittal <provide explanation (especially, which future submittal?)>
- 4: Delete comment

Comment No.	Reviewer	Discipline	Plan Sheet No.	Sheet Type	Comment	Preliminary AMEC Response		Final Project Team (Client, AMEC, and others) Comment & Response Resolution Disposition		Corrected By	Date	Verified By	Date
						PR Code	Action Taken/Explanation	FD Code	Explanation				
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													



Comment, Response, Resolution, & Disposition Form

CLIENT: Honeywell International, Inc. / Lockheed Martin Corporation
CLIENT PROJECT NUMBER: _____
PROJECT NAME & LIMITS: NHOJ Second Interim Remedy
PROJECT LOCATION: North Hollywood, CA
AMEC PROJECT NUMBER: 4088115718
SUBMITTAL TYPE: _____
SUBMITTAL LEVEL: _____

PR (Preliminary Response) Codes:

- A: Concur <provide action taken>
- A/B: Concur, but, not addressed exactly as directed per Comment <provide explanation>; also used if simply answering a question
- B: Discuss <provide explanation>
- C: Disagree <provide explanation>
- D: Not Required At This Submittal Level <provide explanation>
- E: Out of Scope <provide explanation>

FD (Final Disposition) Codes:

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- 2: Discuss further, but, resolve prior to the next submittal <provide explanation (who, what, where, when, etc., of resolution discussion)>
- 3: Comment to be resolved at future submittal <provide explanation (especially, which future submittal?)>
- 4: Delete comment

Comment No.	Reviewer	Discipline	Plan Sheet No.	Sheet Type	Comment	Preliminary AMEC Response		Final Project Team (Client, AMEC, and others) Comment & Response Resolution Disposition		Corrected By	Date	Verified By	Date
						PR Code	Action Taken/Explanation	FD Code	Explanation				
19													
20													
21													
22													
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24													
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35													



Comment, Response, Resolution, & Disposition Form

CLIENT: Honeywell International, Inc. / Lockheed Martin Corporation
CLIENT PROJECT NUMBER:
PROJECT NAME & LIMITS: NHOJ Second Interim Remedy
PROJECT LOCATION: North Hollywood, CA
AMEC PROJECT NUMBER: 4088115718
SUBMITTAL TYPE:
SUBMITTAL LEVEL:

PR (Preliminary Response) Codes:

- A: Concur <provide action taken>
- A/B: Concur, but, not addressed exactly as directed per Comment <provide explanation>; also used if simply answering a question
- B: Discuss <provide explanation>
- C: Disagree <provide explanation>
- D: Not Required At This Submittal Level <provide explanation>
- E: Out of Scope <provide explanation>

FD (Final Disposition) Codes:

- N/A: No FD Code needed if AMEC concurs (usually, PR Code = A or A/B)
- 1: AMEC will do or no action necessary (e.g., when a Comment/Question is posed and answered)
- 2: Discuss further, but, resolve prior to the next submittal <provide explanation (who, what, where, when, etc., of resolution discussion)>
- 3: Comment to be resolved at future submittal <provide explanation (especially, which future submittal?)>
- 4: Delete comment

Comment No.	Reviewer	Discipline	Plan Sheet No.	Sheet Type	Comment	Preliminary AMEC Response		Final Project Team (Client, AMEC, and others) Comment & Response Resolution Disposition		Corrected By	Date	Verified By	Date
						PR Code	Action Taken/Explanation	FD Code	Explanation				
36													

Client: Honeywell International, Inc. Lockheed Martin Corporation	Project Audit Form	
Project: NHOU Second Interim Remedy Groundwater Remediation Design	Project Number: 4088115718 4100.1	

Project Task:
Project Principal:
Preparer:
Scope of Work:

Audit Date:
Auditor:

Deficiencies

Issue or Document Type/Number	Comments
1.	
2.	
3.	
4.	

Corrective Action

Issue or Document Type/Number	Action Taken / Resolution	Date/Initials
1.		
2.		
3.		
4.		

I have monitored the above noted issues and state that all deficiencies noted have been resolved to my satisfaction.

Date:

Auditor:

ATTACHMENT B

AMEC Responses to USEPA Comments to the
Draft Phase I Pre-Design Investigation Work Plan



10 September 2012

Mr. Matt Salazar
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105

Re: AMEC Responses to EPA Comments (dated August 10, 2012)

“Draft Work Plan, Phase I Pre-Design Investigation, North Hollywood Operable Unit, Second Interim Remedy” and the “Remedial Design Quality Assurance Project Plan, North Hollywood Operable Unit, Second Interim Remedy Groundwater Remediation System Design”

Dear Mr. Salazar:

This letter has been prepared to respond to final comments that USEPA provided to the following documents on August 10, 2012:

- *Draft Work Plan, Phase I Pre-Design Investigation, North Hollywood Operable Unit Second Interim Remedy, Groundwater Remediation System Design (AMEC, April 13, 2012)*
- *Draft Sampling and Analysis Plan, Phase I Pre-Design Investigation, North Hollywood Operable Unit Second Interim Remedy, Groundwater Remediation System Design (AMEC, April 13, 2012)*
- *Health and Safety Plan, North Hollywood Operable Unit Second Interim Remedy, Groundwater Remediation System Design (AMEC, April 13, 2012)*
- *Remedial Design Quality Assurance Project Plan, North Hollywood Operable Unit Second Interim Remedy, Groundwater Remediation System Design (AMEC, May 14, 2012).*

A response follows each comment provided by the USEPA and each document has been revised accordingly.

It is imperative to recognize that development of the Groundwater Management Plan, as a required Institutional Control in the ROD, remains a critical element of the Second Interim Remedy. All Phase I Pre-Design Investigation activities have been based on the expectation that the USEPA and LADWP will develop a Groundwater Management Plan that will not only be a notification of planned pumping, but also will provide a “decision-making process to address any potential conflicts between the LADWP’s pumping plans and the performance of the remedy”. The Groundwater Management Plan was included in the ROD as an Institutional Control to ensure that production well pumping does not negatively impact the performance of the Second Interim Remedy. The current schedule reflects the need for an agreement to proceed on the Groundwater Management Plan prior to the installation of the proposed piezometers under the Phase 1 Pre-Design Investigation and the preparation of the Groundwater Modeling Memo.

Mr. Matt Salazar
U.S. Environmental Protection Agency
September 10, 2012
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Should you have questions regarding our responses to EPA comments, please feel free to call me at (510) 663-3996 to discuss.

Sincerely,
AMEC Engineering & Infrastructure, Inc.



Michael Taraszki, PG, CHG, PMP
Project Manager



Robert Hartwell, PE
Engineering Manager

Attachments:

Attachment A *USEPA Comments on the Draft Work Plan, Phase I Pre-Design Investigation, North Hollywood Operable Unit Second Interim Remedy, Groundwater Remediation System Design and the Remedial Design Quality Assurance Project Plan, North Hollywood Operable Unit Second Interim Remedy, Groundwater Remediation System Design (August 10, 2012)*

WORK PLAN

1. **General comment:** The Work Plan is well written and indicates a comprehensive understanding of both the available site data and the data gaps in the NHOU. Conduct of the work proposed in the Work Plan (and SAP) will improve the conceptual site model for the NHOU and provide important hydrogeologic data required for RD of the Second Interim Remedy.

As stated in Section 2.4 of the Work Plan, “The overall objective of the Phase I Pre-Design Investigation is to fill critical data gaps identified as necessary for the Second Interim Remedy design to meet RAOs...” And Section 4 of the Work Plan states that a second phase of investigation would only be performed “if it is determined that insufficient data exist (at that time) to fill critical data gaps associated with the Second Interim Remedy and comply with RAOs and meet CDPH 97-005 requirements.” However, actions that might fill some of the “critical data gaps” identified in the Final Data Gap Analysis report (pages 5-14 and 5-15) prepared by AMEC (dated March 14, 2012) are not proposed in this Work Plan. Specifically, critical data gaps 4, 5, 6, 8, and 9 listed on pages 5-14 and 5-15 of the Final Data Gap Analysis report seem to be unaddressed, or only partly addressed, by the activities listed in the Work Plan. It seems that either some of the data gaps identified in the Final Data Gap Analysis report are no longer deemed critical, or will simply not be addressed by the proposed Phase I investigation and will be addressed in some other manner. Please revise the Work Plan to provide more clarity regarding which of the critical data gaps are addressed by each proposed field activity, and which critical data gaps are not addressed in the proposed Phase I investigation (together with an explanation of why not, and how they will be addressed in the future). Our comments and/or recommendations for filling these data gaps are summarized below, but could be modified depending on additional information provided by the respondents:

- **Critical Data Gap 4** (“existing monitoring well network insufficient to characterize vadose zone and groundwater conditions beneath known and potential source areas”): The Work Plan should show critical areas for further investigation on a map, or at least describe how the need for further characterization in the vicinity of the “known and potential source areas” would be evaluated and conducted during a Phase II data gaps investigation. The area southwest of NHOU extraction wells NHE-2 and NHE-3, where high concentrations of VOCs and hexavalent chromium have been detected, but are poorly delineated, seems to be of primary concern. It is not clear how the data collection activities described in the Work Plan would fill this data gap or aid in further delineating contaminant concentrations in this particular area. We recommend that at least two new monitoring wells be installed in this area as part of the Phase I investigation.

AMEC Response: As shown on Figure 6-1 in the Final Data Gap Analysis (AMEC, March, 14, 2012), two groundwater monitoring wells have been considered for installation in this area. However, as described in that document and in the Phase I Pre-Design Investigation Work Plan, additional monitoring wells (whether at the locations illustrated on Figure 6-1 or elsewhere) will be considered following the evaluation of data collected as part of Phase I sampling and testing. Depth-discrete analytical data and accurate groundwater elevations from existing monitoring wells are anticipated to be particularly useful in

supporting that assessment. Should it be determined that additional are needed, the number (if any) and location(s) of additional monitoring wells will be determined and installed and sampled as part of the Phase II Pre-Design Investigation.

- **Critical Data Gap 5** (“objective projections of pumping and recharge volumes, including beyond year 2015, are not yet available”): The Work Plan should state that addressing this data gap does not require field activity; rather, discussions are ongoing (presumably) with LADWP and the ULARA Watermaster to develop improved and updated projections of future pumping and recharge volumes.

AMEC Response: Comment acknowledged. The ULARA Watermaster has affirmed that the projections included in his annual Pumping and Spreading reports have been provided by associated municipalities and are presumed to be accurate. AMEC anticipates that forthcoming discussions between the EPA and various stakeholders will clarify how these projections correspond with the 2007 Stipulated Agreement. Table 2-1 has been incorporated into the Final Work Plan to provide further clarification.

- **Critical Data Gap 6** (“performance monitoring wells have not been installed and monitored”): It is unclear whether the proposed piezometers in the Work Plan constitute some or all of the needed performance monitoring wells that comprise this critical data gap. The Work Plan should clarify whether the planned piezometers are expected to address this data gap by themselves, or if installation of additional performance monitoring wells is anticipated to be required in the future, to complete the RD. If so, then the Work Plan should describe how and when decisions about the need for additional performance monitoring wells will be made.

AMEC Response: Proposed piezometers adjacent to NHE-3, NHE-5, and NHE-7 will provide empirical data that will be used to verify, calibrate, and refine the numerical groundwater flow model as needed to support the design of the Second Interim Remedy. It is not anticipated that additional piezometers will be needed to achieve this objective.

- **Critical Data Gap 8** (“available analytical data are insufficient to evaluate A-Zone and, potentially, B-Zone groundwater quality within the future NHO capture zone to meet CDPH 97-005 requirements”): The Work Plan should define whether this is still considered to be a critical data gap, and describe how and when it will be addressed.

AMEC Response: This remains a critical data gap; the Work Plan has been revised to specify that additional data beyond those included in the Phase I Pre-Design Investigation will be required to address CDPH 97-005 requirements. AMEC anticipates that specific groundwater samples (within the anticipated NHO capture zone) will be collected after the groundwater flow model has been refined and calibrated such that the Second Interim Remedy capture area can be more accurately estimated and monitoring wells within that area (from the A-Zone and B-Zone) can be identified. This sampling activity would be integrated into the current NHO sampling program, to the extent possible, and would not comprise a Phase II Pre-Design Investigation. Table 2-1 has been incorporated into the Final Work Plan to provide further clarification.

- **Critical Data Gap 9** (“vertical conduits throughout the NHOU study area have not been sufficiently evaluated”): The Work Plan includes investigative activities to evaluate existing monitoring wells as potential vertical conduits for contaminant migration; however, it does not include plans to evaluate existing inactive production wells. Inactive production wells appear to pose a greater threat of vertical contaminant migration, due to their number, long screens, and large diameter. The Work Plan should describe how and when this part of Critical Data Gap 9 will be addressed (e.g., will it be addressed as part of a future Phase II investigation, and are there any conditions on which such an investigation would depend).

AMEC Response: Figure 4-3 of the Final Data Gap Analysis report shows the locations of probable and suspected vertical conduits at inactive and active municipal production wells. Inspection and/or elimination of vertical conduits at inactive production wells (in particular) is the responsibility of the well owner. This responsibility has been clarified in the additional table and text of the Work Plan (see our response to Comment #5); however, we cannot speculate as to exactly when this critical data gap may be addressed. Honeywell and Lockheed Martin expect that the USEPA will participate in activities required to get well owners, including LADWP, to address the issue of closing vertical conduits at inactive and active supply wells to facilitate the success of the Second Interim Remedy. Table 2-1 has been incorporated into the Final Work Plan to provide further clarification.

2. Table of Contents page iii, Table, Figures, and Appendix sections: The title provided in the table of contents for Table 3-1 is different from the title actually on Table 3-1. The titles for Figure 3-1 and Appendix A are similarly inconsistent with the titles given in the table of contents. Please make the titles listed in the table of contents consistent with the actual titles of the corresponding tables, figures, and appendices.

AMEC Response: Comment acknowledged. The table of contents has been revised to correctly match table and figure titles.

3. Section 2.2, Project Background, page 2-3, first full paragraph: This paragraph paraphrases the key remedial action objectives (RAOs) and relates them to the specific work scope items in the Agreement and Order on Consent (AOC). However, the second sentence in this paragraph focuses exclusively on the second RAO for the NHOU Second Interim Remedy. We recommend that this sentence be modified to also accommodate the fourth remedial action objective (RAO), which is to achieve improved hydraulic containment to inhibit horizontal and vertical contaminant migration in groundwater from the more highly contaminated areas and depths of the aquifer to the less contaminated areas and depths of the aquifer, including the southeast portion of the NHOU near the Erwin and Whitnall production well fields. We assume that this RAO influences the AOC work scope items, as well as the scope of work for the activities described in the Work Plan.

AMEC Response: The second sentence has been modified to acknowledge other production well fields as suggested. Otherwise, please note that the RAOs are represented in full on the previous page and that this paragraph, including the focus on the Rinaldi-Toluca well field, stems from the Record of Decision, Section 2.8, page 2-19.

4. Section 2.3, Previous Investigations, page 2-4, fourth paragraph: The second-to-last sentence in this paragraph states “However, it was concluded that existing data are

insufficient to proceed with a Second Interim Remedy...” We recommend that the sentence be modified to state which entity came to that conclusion, and provide a reference to a document where that conclusion is stated (perhaps the Draft or Final Data Gap Analysis report prepared by AMEC).

AMEC Response: This was the conclusion of AMEC as part of the Final Data Gap Analysis report and has been additionally referenced in the Work Plan for clarity.

5. Section 2.4, Phase I Pre-Design Investigation Objectives, page 2-5, bullets 1 through 6: It is difficult to directly compare these bulleted “specific objectives” of the Phase I Pre-Design Investigation to the “critical data gaps” listed in the Final Data Gaps Analysis report (prepared by AMEC, dated March 14, 2012, see pages 5-14 and 5-15). We recommend adding a table to the Work Plan that lists the critical data gaps provided in the Final Data Gaps Analysis report and then lists the corresponding specific objectives of the Phase I Pre-Design Investigation in an adjacent column. Such a table would allow easier comparison of critical data gaps to objectives of the upcoming investigation, and possibly aid in identification of redundancies or additional needs.

AMEC Response: AMEC has included Table 2-1 in the Work Plan to explicitly reference each task item to a data gap identified in the Final Data Gap Analysis report. This table describes how each data gap will be addressed by the tasks outlined in the Phase I Pre-Design Investigation, or if and when each may be addressed in a subsequent investigation.

6. Section 2.4, Phase I Pre-Design Investigation Objectives, page 2-5, bullet 7: This bullet states that a specific objective of the Phase I Pre-Design Investigation is to “Assess whether sufficient data exist to proceed with designing the Second Interim Remedy...” We recommend adding a discussion in this document or the SAP (and referencing such a location within bullet 7) that describes the process and people who will make such an assessment.

AMEC Response: Text comprising this bullet has been modified to include a reference to a section within the Work Plan that will outline the AMEC’s decision processes regarding determining data sufficiency for the Second Interim Remedy design.

7. Section 3.3.2, Aquifer Testing, page 3-5, first paragraph of section: The second sentence of this paragraph states that “...the vertical extent of capture cannot be determined because pressure responses at depths below the existing NHOU extraction wells does not exist” (sic). We recommend revising this sentence to clarify that *measurements* of pressure responses at depths below the extraction wells do not exist.

AMEC Response: Comment acknowledged. Text has been revised as suggested.

8. Section 3.3.2, Aquifer Testing, page 3-5: During the planned aquifer testing, wells NHE-3, -5, and -7 will alternately be turned off and on, and pumped at different rates during the step-discharge tests. CDPH is concerned that these changes in the relative pumping rates at each extraction well will change the concentrations of contaminants entering the existing NHOU treatment system, particularly 1,4-dioxane and chromium, which are not removed by air stripping. Furthermore, well NHE-5 has not been pumped (or sampled) in several years, so there is substantial uncertainty regarding water quality at this well at present. An evaluation of estimated combined influent concentrations entering the NHOU treatment system during each distinct phase of the planned pumping tests should be provided, indicating the anticipated concentrations of chromium and 1,4-dioxane. This could be accomplished for wells NHE-3 and NHE-7 using a spreadsheet-

based mixing cell calculation, based on anticipated flow rates and recent concentration data. Well NHE-5 should be sampled in advance of the pumping tests to obtain more recent contaminant concentration data and overdue Title 22 monitoring data, in order to complete such an evaluation. Results may indicate that treatment or an alternative disposal method is required to ensure that the water sent to the distribution system meets MCLs and NLS, since the NHOU treatment plant does not remove chromium and 1,4-dioxane. This evaluation should be included in the work plan or provided under separate cover at least six weeks before the aquifer testing commences, to provide adequate time for EPA and CDPH review.

AMEC Response: Anticipated influent water quality will be included in an Appendix B to the Work Plan to evaluate potential changes in hexavalent chromium and 1,4-dioxane concentrations as a result of pumping NHE-5, based on historical and recent NHE extraction well pumping performance and the anticipated pumping rate of NHE-5 during the 72-hour pumping test. Based on our preliminary calculations, increasing the influent hexavalent chromium concentration to above 5 µg/L would require concentrations at NHE-5 to exceed 20 µg/L, which is far higher than historical data at this well or nearby NHE wells. Similarly, increasing the influent 1,4-dioxane concentration to above 1 µg/L would require concentrations at NHE-5 to also exceed concentrations higher than historical data at this well or nearby NHE wells. This is consistent with the relatively low pumping rate expected from NHE-5 compared to the overall treatment system (approximately 10 percent).

As such, there appears to be little cause for concern regarding impacts to water quality as a result of pumping NHE-5. However, AMEC supports the concept of utilizing additional hexavalent chromium and 1,4-dioxane data from the NHOU extraction wells, as obtained by LADWP, to support the Phase I Pre-Design Investigation and the Second Interim Remedy design.

9. Section 3.3.2.1, Monitoring Well Testing, page 3-6: The second sentence of this paragraph states that "...the resulting hydraulic conductivity values (from slug testing) will be incorporated into the groundwater flow model..." We recommend revising this sentence to state that the resulting hydraulic conductivity values from slug testing will be used to guide development of the hydraulic conductivity matrix in the model. Forcing results of slug tests, which focus on local aquifer properties near the well or boring being tested, into the model may degrade numerical model representativeness of the physical system at the site, rather than improve it.

AMEC Response: Comment acknowledged. Text has been revised as suggested.

10. Section 4, Data Management, Data Evaluation, and Reporting, page 4-2: The last sentence of the first full paragraph on this page states that "This report (following the Phase I investigation) will evaluate Phase I data and will recommend that a Phase II Pre-Design Investigation be performed if it is determined that insufficient data exist to fill critical data gaps associated with the Second Interim Remedy and comply with RAOs and meet CDPH 97-005 requirements." As noted in Comment 1, above, some of the critical data gaps described in the Final Data Gap Analysis report are not addressed by the activities proposed in the Work Plan. Therefore, it seems certain that insufficient data will exist to fill those critical data gaps. Please revise so the Work Plan provides a better explanation of why some previously "critical" data gaps may no longer need to be filled.

AMEC Response: See responses to previous comments and, in particular, our response to Comment #5.

SAMPLING AND ANALYSIS PLAN

1. **General comment:** The SAP directly incorporates components of a Quality Assurance Project Plan (QAPP); a stand-alone QAPP is not included. We have no objections to this approach. However, at several locations the SAP text, figures, and Field Sampling Plans (FSPs) refer to “the QAPP.” We recommend that these document components refer to the SAP, rather than the non-existent (at the time of submittal) QAPP.

AMEC Response: Comment acknowledged. References to “the QAPP” have been revised to “the SAP” for consistency and clarity.

2. **Figures:** Figures within the SAP and FSPs do not have consistent title blocks. Some title blocks reference the QAPP, Work Plan, etc. We recommend updating the figure title blocks for consistency.

AMEC Response: Figures with inconsistent title blocks have been revised accordingly.

3. **Table 2-1:** Several discrepancies associated with this table are noted below, and need to be corrected. Similar corrections will also need to be made for Tables A-3 and B-2 located in the appropriate appendices:

a) The table lists EPA Method 8260 as the analytical method to be used for analysis of volatile organic compounds. A more suitable method for analysis of potential drinking water is EPA Method 524.2. The SAP should provide an explanation (perhaps as part of development of data quality objectives) regarding why EPA Method 8260 analysis is appropriate for some or all samples to be obtained under this SAP.

AMEC Response: Previous sampling of monitoring wells in the NHOU have been analyzed using EPA Test Method 8260 and this information will be incorporated into the SAP to justify the continued use of this method over EPA Test Method 524.2, unless lower method detection limits warrant the use of EPA Test Method 524.2 (e.g., 1,1,1-TCA).

b) For perchlorate by EPA Method 331, the sample container is listed as “100 mL Sanitized,” but no container type (e.g. polyethylene) is listed.

AMEC Response: Comment acknowledged. The container type has been added.

c) The column heading marked “MDL” lists a number of values related to each method. This heading implies that the values listed are the achievable method detection limits for each method. However, the values directly correlate with the performance standards listed in Section 2.3.2, page 2-7. Heading either needs to be changed to “Performance Standard,” or the actual, achievable MDLs for each method need to be added instead.

AMEC Response: Actual, achievable MDLs are lab-specific in most cases. AMEC has updated the SAP with the MDL values provided by the analytical laboratory selected to perform these analyses.

4. **Table 2-2:** Several discrepancies associated with this table are noted below, and need to be corrected. Similar corrections will also need to be made for Table A-2 located in the appropriate appendix:

a) The Acceptance Criteria listed for the Temperature blank (under Accuracy, Field) is less than 4 degrees centigrade. However, Table 2-1 lists the appropriate temperature preservation for each method as 4 ± 2 degrees centigrade.

AMEC Response: To be consistent with Table 2-1 and the National Guideline, the Acceptance Criteria listed for the Temperature blank (under Accuracy, Field) has been revised to " 4 ± 2 degrees centigrade".

b) The Acceptance Criteria for Method blanks (under Accuracy, Laboratory) is listed as "No compounds should be detected in the laboratory method blanks." Does this statement imply that all compounds should be detected below the laboratory's MDL, or below the laboratory's reporting limit?

AMEC Response: This statement means that no compound should be detected above its respective Reporting limit in the Method blanks.

c) The Acceptance Criterion for Preparation blanks (under Accuracy, Laboratory) is listed as "%R less than compound specific limit". This criterion is better suited for Laboratory Control Samples (LCS) than the blanks. The similar criteria listed for Method blanks should be used for Preparation blanks.

AMEC Response: Comment acknowledged. Text has been revised as suggested.

5. **Acronyms:** Many acronyms were: 1) not captured in the abbreviations and acronyms list, 2) not defined with the first time use, 3) defined multiple times throughout the SAP, or 4) not used after being defined. Please ensure that the SAP (and appendices) undergoes a comprehensive review to appropriately capture and correct all acronyms and callouts. In addition, the definition of the acronym COC should be determined and used consistently throughout the SAP (e.g. chemical of concern, contaminant of concern, constituent of concern). Finally, the definition of the acronym CSM should be determined and used consistently throughout the SAP (e.g. conceptual site model vs. site conceptual model).

AMEC Response: Comment acknowledged. Acronyms and abbreviations have been properly defined and introduced throughout the revised documents.

6. **Emerging Chemicals:** The SAP is inconsistent when referencing and listing what is considered an emerging chemical (e.g. hexavalent chromium, 1,4-dioxane, 1, 2, 3-trichloropropane, perchlorate, and n-nitrosodimethylamine). In addition, the term "emerging chemical" should replace the term "new chemical" when used within the SAP.

AMEC Response: Text has been revised to be consistent with Attachment 4 in Appendix A (Scope of Work) of the Administrative Settlement Agreement and Order on Consent for Remedial Design (AOC; EPA, 2011).

7. **Section 1.0 Introduction, page 1-1:** In the first paragraph, please add the reference USEPA, 2011, after the AOC callout.

AMEC Response: The citation has been included as suggested.

8. Section 2.0 Project Management, page 2-1: A “Project Method Performance Objectives” bullet should be added after the “Project Data Quality Objectives (DQOs) and criteria for measurement of data” bullet for consistency of summarizing the subsections within Section 2.0.

AMEC Response: A new fifth bullet titled “Method Performance Objectives has been included as suggested

9. Section 2.1.3.5 Role/Responsibility of Data Reviewer, page 2-2: One of the roles listed for the Data Reviewer is performing data validation according to the National Functional Guidelines. However, later in this same section, and in Section 5.1, paragraph 3, the SAP indicates that data validation will be performed by a qualified third party data validator, independent from AMEC. Will the Data Reviewer perform some portion of the data validation, or will all of the validation be performed by third party? Some additional clarification is needed to better describe the role of the Data Reviewer in regards to data validation.

AMEC Response: As specified in the AOC, a qualified third party will perform primary data validation. AMEC’s Data Manger (as clarified in our response to Comment #15) will verify that data validation procedures were followed and completed. SAP text has been revised accordingly.

10. Section 2.2, page 2-3: What is the back-up plan if NHE 1 and 5 cannot be made operational?

AMEC Response: The context of this comment cannot be determined because there is no reference to NHE-1 and NHE-5 in this section or page of the SAP.

11. Section 2.2.3 Impacts to NHOU Groundwater, page 2-4 and 2-5: We recommend listing the eight NHOU extraction wells earlier in this section so that when reference is made to the shutdown of NHE-2 later in the section, the reader understands the well is affiliated with the NHOU Extraction and Treatment System.

AMEC Response: Comment acknowledged. Text has been modified accordingly.

12. Section 2.2.3 Impacts to NHOU Groundwater, page 2-5: Last paragraph, line 6; we recommend deleting the term “NHOU treatment system” and replacing with the term “NHOU Extraction and Treatment System”. Consider making this a global change.

AMEC Response: Comment acknowledged. Text has been revised through the document as appropriate.

13. Section 2.3.1 Potential Measurements, page 2-6: In the second paragraph, line 2, 1,2,3-TCP should be added to the list of chemicals identified for analysis. In addition, this paragraph refers to total alkalinity while Table 2-1 makes reference to alkalinity. Finally, this paragraph refers to pH and specific conductance; however, Table 2-1 does not list these parameters for analysis. We recommend modifying the text to improve the consistency within this section and with Table 2-1.

AMEC Response: Comment acknowledged. Text has been revised accordingly.

14. Section 2.3.2 Applicable Technical Quality Standards and Criteria, page 2-7: We recommend replacing “TCP” with “1,2,3-TCP” for consistency and clarity, in this section and elsewhere in the document as appropriate to consistently abbreviate 1,2,3-trichloropropane.

AMEC Response: Comment acknowledged. Text has been revised accordingly.

15. Section 2.7.2 Laboratory Records, page 2-14, third paragraph: This paragraph indicates that the AMEC Data Manager will have the responsibility for obtaining and tracking GeoTracker deliverables. However, the AMEC Data Manager's roles and responsibilities are not outlined in Section 2.1.3.

AMEC Response: The "Data Reviewer" title in Section 2.1.3 has been revised to "Data Manager" and throughout this document.

16. Section 3.2.1 Groundwater Sample Collection and Flow Monitoring, page 3-4: In the first paragraph, line 8, we believe that 1,2,3-TCP should be added to the list of chemicals identified for analysis, consistent with Table 2-1.

AMEC Response: Comment acknowledged. Text has been revised accordingly.

17. Section 3.2.1 Groundwater Sample Collection and Flow Monitoring, page 3-4: The second and third paragraphs state that vertical flow logs and groundwater level measurements will be obtained from "select existing piezometers." The activities may be performed at monitoring wells, not piezometers, and if so, the text should be modified accordingly.

AMEC Response: Table C-1 lists the monitoring wells planned for vertical profiling. Text has been revised accordingly.

18. Section 6.0 References, page 6-1: The USEPA Guidance on Systematic Planning Using the Data Quality Objectives Process is listed twice, once as 2006 and the other as 2006a. We recommend that one of these duplicate references be deleted, and that corresponding references to this document within the body of the report be modified accordingly.

AMEC Response: Comment acknowledged. The "USEPA, 2006" reference listed in Section 6 has been deleted; citations within the text correctly refer to USEPA, 2006a.

19. Appendix A, Table A-3: If results of groundwater quality sampling are planned for use to support a CDPH policy 97-005 evaluation, the following analytical methods are recommended by CDPH as being more suitable for drinking water analysis than those listed in Table A-3:

a) 1,2,3-trichloropropane (TCP): CDPH SRL "low" method
(<http://www.cdph.ca.gov/certlic/drinkingwater/Pages/123TCPanalysis.aspx>)

b) 1,4-dioxane: EPA Method 522

c) Nitrosodimethylamine: EPA method 521; in addition, CDPH recommends analyzing for all nitrosamines

d) Perchlorate: EPA method 314 (false positives can occur using this method—a backup analytical method using a mass-spectrometer-based analysis is recommended if positive results are detected in excess of the State MCL)

AMEC Response: As mentioned in our response to the Work Plan General Comment #1, additional samples separate from the Phase I Pre-Design Investigation are anticipated to be needed to address CDPH 97-005 requirements and proposed analytical methods are considered appropriate to address RAOs. However, AMEC has reviewed the methods recommended by CDPH and has incorporated them into the SAP tables as appropriate.

20. **Appendix A, Section A1.0 Introduction, page A1-1:** In the second paragraph, line 4, we recommend adding the term “Phase I” in front of the term “Pre-Design Investigation.” This change can be carried into the introduction for Appendix B and C as well.

AMEC Response: Text has been revised accordingly.

21. **Appendix A, Section A1.3 Responsible Agency, page A1-1:** For consistency with Appendix B and C, we recommend adding “Region IX” to the end of the sentence.

AMEC Response: Text has been revised accordingly.

22. **Appendix A, Section A1.4 Project Organization, page A1-2:** Based on our understanding of the Work Plan, Eileen Bailiff is the Field Team Leader for Groundwater Sampling and Monitoring, rather than Sean Culkin. Please clarify.

AMEC Response: Comment acknowledged. Eileen Bailiff will be identified as the Field Team Leader in Appendix A as stated in the Work Plan.

23. **Appendix A, Section A1.5 Statement of the Specific Problem, page A1-2:** We recommend revising the first bullet to read as follows (bold text indicates new text for consideration): “Analytical data are insufficient to delineate the lateral and vertical distribution and temporal variability of COCs **in the NHOU study area with respect to the A-Zone and B-Zone** and to define the necessary target capture area.” This change can also be made to Section A3.2, page A3-2 under “State the Problem”.

AMEC Response: Text has been revised accordingly in Sections A1.5 and A3.2.

24. **Appendix A, Section A1.5 Statement of the Specific Problem, page A1-2:** We recommend updating the second bullet to read as follows (bold text indicates new text for consideration): “Groundwater elevation data are not surveyed to a common elevation datum to verify and clarify groundwater flow directions **and gradients in some locations**.” This change can also be made to Section A3.2, page A3-2 under “State the Problem”.

AMEC Response: Text has been revised accordingly.

25. **Appendix A, Section A2.1 Site or Sampling Area Description, page A2-1:** We recommend revising the first sentence within the second paragraph, as the description of the system is already provided in the operational history section, as follows: “The NHOU Extraction and Treatment System and associated well field network is located in the San Fernando groundwater basin.” We don’t believe the author intended to claim that the NHOU groundwater production well system consists of eight extraction wells, etc. This change can be carried into the same description within Appendix B and C as well.

AMEC Response: Text in Appendices A, B, and C has been revised accordingly.

26. **Appendix A, Section A2.2 Operational History, page A2-1:** We recommend revising the first sentence of this paragraph as follows: “The NHOU Extraction and Treatment System, which was constructed between 1987 and 1989, consists of eight groundwater extraction wells (NHE-1 through NHE-8), a collector line, and a central treatment system consisting of an air-stripping treatment system to remove VOCs from extracted groundwater, two activated carbon units to remove VOCs from the air stream, a chlorination system, and ancillary equipment.” This change can be carried into the same description within Appendix B and C as well.

In addition, in the last sentence, we recommend deleting “(sans NHE-1)” and adding the following sentences to the end of the paragraph for consistency with Appendix B: “As of June 2011, six of the eight extraction wells remain in service. NHE-1 has never operated as part of the NHOU system and NHE-5 has not operated since 2008.” This change can be carried into the same description within Appendix C as well.

AMEC Response: Text in Appendices A, B, and C has been revised accordingly.

27. Appendix A, Section A2.3 Previous Investigations/Regulatory Involvement, page A2-2: The reference to USEPA, 2009a is not found in the reference list. Please add the correct reference.

AMEC Response: The Second Interim Remedy Record of Decision has been included in Section 6.0 and the citation here has been revised to “USEPA, 2009”.

28. Appendix A, Section A2.4 Geological and Hydrogeological Information, page A2-2: We recommend including a reference for the Data Gap Analysis report (e.g. AMEC, 2012a). This change can be carried into the same section within Appendix B and C as well.

AMEC Response: Comment acknowledged. A citation has been inserted and Section 6.0 has been revised accordingly.

29. Appendix A, Section A2.5 Environmental and/or Human Impact, page A2-2: In line 8, we recommend adding “1,2,3-“ in front of “TCP”. This change can be carried into the same section within Appendix B and C as well.

AMEC Response: Text has been revised accordingly.

30. Appendix A, Section A3.1 Project Task and Problem Definition, page A3-1: We recommend adding the following text to the end of the fifth task: “and to further evaluate the potential utilization of the well (which has never operated as part of the NHOU Extraction and Treatment System) as part of the Second Interim Remedy.”

In addition, is a seventh task justified for addition to the SAP related to NH-10, per the Work Plan (i.e. “At least two depth-discrete samples will be collected from the upper perforation zones of production well NH-10 during a single monitoring event to evaluate groundwater quality in the A-Zone and B-Zones at that location.”)?

AMEC Response: Groundwater samples proposed to be collected from NHE-1 are intended to assess groundwater quality at this location and will not pertain to the evaluation of whether this well could be utilized as an extraction well as part of the Second Interim Remedy. The need for an extraction well at this location will be based, in part, on analytical results from the proposed samples and from numerical model simulation results that will be presented and discussed in the Groundwater Modeling Memorandum.

Similarly, there is no need for a seventh task because the fifth task was specifically written to account for sampling at NH-10 (i.e., “...obtain...groundwater quality samples and groundwater elevation measurement near the NHE-1 extraction well...”). NH-10 is near NHE-1 and, although not specifically mentioned, proposed sampling activities at that location are accounted for in Table A-1, as the comment acknowledges.

31. Appendix A, Section A3.2 Data Quality Objectives (DQOs), page A3-3: Step 6, Item “a”, we recommend including a reference for the Data Gap Analysis report (i.e. AMEC, 2012a).

AMEC Response: Comment acknowledged. A citation has been inserted and Section 6.0 has been revised accordingly.

32. Appendix A, Section A5.1 Analyses Narrative, page A5-1: Table A-1 lists 29 monitoring wells that will be sampled semiannually. Reference to 30 monitoring wells in this paragraph should be updated.

AMEC Response: Section A5.1 intentionally refers to “approximately 30 wells” to acknowledge potential problems associated with accessing proposed monitoring wells. Text has not been revised.

33. Appendix A, Section A8.0 Disposal of Residual Materials, page A8-1: We recommend that AMEC verify whether the reference to Appendix A-2 in the third paragraph should actually be to Appendix A-1, and that this be corrected if necessary.

AMEC Response: Text has been revised accordingly.

34. Appendix A, Section A8.0 Disposal of Residual Materials, page A8-2: The bullets under the statement “The following steps will be followed for document retention:” do not correspond with the same bullets in Appendix B, Section B8.3 Waste Profiling and Documentation with respect to who sends, signs, and receives the profiles and manifests. We recommend revising Appendix A or B, as appropriate.

AMEC Response: Comment acknowledged. Section B8.3 has been updated to include Lockheed Martin in the profiling and manifesting process.

35. Appendix A, Section A9.1.1 Daily Field Records, page 9-1: We recommend that the first paragraph add reference to Appendix A-1 at the end of the second sentence.

AMEC Response: Text has been revised accordingly.

36. Appendix A, Section A9.1.1 Daily Field Records, page 9-1: We recommend that the sixth bullet be updated to read as follows: “Sample media (e.g., groundwater) **and depth of collection.**”

AMEC Response: This information will be recorded on either the Daily Field Record or activity-specific data form as listed near the bottom of page 9-1. Text has not been revised.

37. Appendix A, Section A9.1.2 Activity-Specific Forms, page A9-2 and Section A9.3 Sample Chain-of-Custody Forms, page A9-3: Please provide a sample chain of custody form in Appendix A-1.

AMEC Response: A sample chain-of-custody form was inadvertently omitted from the draft SAP and has been included in the revised SAP.

38. Appendix A, Section A11.0 Field Variances, page A11-1: Please add the following text after the second sentence for consistency with Appendix B: “The AMEC Project Manager will notify the USEPA of major modifications or variances to the field program.” Please modify the text in Appendix B to the previous statement. The same change can be made to this section in Appendix C.

AMEC Response: Text has been revised accordingly.

39. Appendix A, Section A13.0 References, page A13-1: We recommend updating the reference list and/or deleting those references that are not used within Appendix A.

AMEC Response: Comment acknowledged. Unused citations have been deleted as appropriate.

40. Appendix B, Section B1.5, page B1-2: We recommend updating the first bullet to read as follows (bold text indicates new text for your consideration): “Performance monitoring well **and piezometers** have not been installed and monitored to demonstrate the size and shape of the existing NHOU extraction well capture area, **specifically with regard to the A-Zone and B-Zone.**”

AMEC Response: Text has been revised accordingly.

41. Appendix B, Section B1.6 Schedule, page B1-2: In the second line, we recommend deleting the word “sampling” and replacing with the phrase “drilling and piezometer installation”. It is hard to tell whether this Field Sampling Plan is supposed to cover drilling, sampling, or both.

AMEC Response: Text has been revised accordingly.

42. Appendix B, Section B2.1 Site Description, page B2-1: Second paragraph, in addition to listing Figure B-2, it would also be appropriate to list Figures B-4 and B-6.

AMEC Response: Text has been revised accordingly.

43. Appendix B, Section B3.1 Project Task and Problem Definition, page B3-1: Line 6, reference to Figures B-3, B-5, and B-7 should be corrected to reference Figures B-2, B-4, and B-6 instead. Line 8, reference to Figures B-4, B-6, and B-8 should be corrected to reference Figures B-3, B-5, and B-7 instead.

AMEC Response: Text has been revised accordingly.

44. Appendix B, Section B3.2 Data Quality Objectives (DQOs), page B3-2: We recommend adding an item to the second step: “h) Do the NHOU extraction wells need to be deepened to meet RAOs?”

AMEC Response: We respectfully disagree with the recommendation, which refers to an objective within the Second Interim Remedy Record of Decision. That objective does not pertain to the design and location of performance monitoring wells (or piezometers), which is the subject of Appendix B of the SAP. Whether or not NHOU extraction wells may need to be deepened will be one of several actions considered as part of the Groundwater Modeling Memorandum.

45. Appendix B, Section B3.2 Data Quality Objectives (DQOs), page B3-3: The following figure references should be corrected in the fourth step: Items a), c), and e) – Figure B-3 should be updated to call out Figure B-2 instead, and Figure B-8 should be updated to call out Figure B-7 instead.

AMEC Response: Text has been revised accordingly.

46. Appendix B, Section B3.2 Data Quality Objectives (DQOs), page B3-3: Sixth step, item “a”, should include reference to the Data Gap Analysis report (e.g. AMEC, 2012a).

AMEC Response: Text has been revised accordingly.

47. Appendix B, Section B3.5 Data Management and Assessment Oversight, page B3-6: Last paragraph, this section makes reference to a Data Usability Evaluation and Field QA/QC submittal. This submittal may need to be referenced in Appendix A as well.

AMEC Response: Text has been revised accordingly.

48. Appendix B, Section B4 Sampling Rationale, page B4-1: Second paragraph, line 7 – Reference to Table B-1 should be updated to reference Table B-2 instead.

AMEC Response: Text has been revised accordingly.

49. Appendix B, Section B6.7 Piezometer Installation, page B6-4: First paragraph, figure references in the first line on this page should be updated from B-4, B-6, and B-8 and corrected to reference Figures B-3, B-5, and B-7.

AMEC Response: Text has been revised accordingly.

50. Appendix B, Section B6.8.2 Post-Development Groundwater Sampling, page B6-5: Reference to Table B-3 should be updated to reference Table B-2 instead.

AMEC Response: Text has been revised accordingly.

51. Appendix B, Section B9.3 Sample Chain-Of-Custody Forms, page B9-3: First paragraph, consider changing reference from Appendix B-2 to Appendix B-1.

AMEC Response: Text has been revised accordingly.

52. Appendix B, Section B13.0 References, page B13-1: Suggest updating reference list and/or deleting those references that are not used within Appendix B.

AMEC Response: Comment acknowledged. Unused references have been deleted as appropriate.

53. Appendix C, Section C1.6 Schedule, page C1-2: In the first sentence, suggest deleting the phrase “in multiple sampling events” and replace with the word “testing”. In the second sentence, suggest deleting the word “sampling” and replacing with the word “testing”.

AMEC Response: Text has been revised accordingly.

54. Appendix C, Section C2.1 Site or Sampling Area Description, page C2-1: All references to Figures A-1 or A-2 should be updated to reference Figures C-1 or C-2, respectively.

AMEC Response: Text has been revised accordingly.

55. Appendix C, Section C2.4 Geological and Hydrogeological Information, page C2-2: Line 3, suggest adding the phrase “and testing” after the word “sampling”.

AMEC Response: Text has been revised accordingly.

56. Appendix C, Section C3.1 Project Task and Problem Definition, page C3-1: Suggest updating the first item to read as follows: “Slug tests will be performed at 12 monitoring wells screened primarily in either the A-Zone or B-Zone to estimate hydraulic parameters. These data will be used to estimate hydraulic conductivity values as simulated in the current groundwater flow model to define the NHOU extraction well capture zone.”

AMEC Response: The text and Table C-1 have been corrected to cite the 14 monitoring wells as are discussed in the Phase I Pre-Design Investigation Work Plan.

57. Appendix C, Section C3.1 Project Task and Problem Definition, page C3-1: Suggest updating the second item to read as follows (bold text indicates new text for

consideration): “Perform aquifer pumping tests at three NHE extraction wells (NHE-3, NHE-5, and NHE-7) **while monitoring the response to the pumping test in 10 observation wells** to estimate well efficiency and A-Zone hydraulic parameters.

AMEC Response: Text has been revised accordingly.

58. Appendix C, Section C3.1 Project Task and Problem Definition, page C3-1: In the third paragraph, suggest updating the first sentence to read as follows (bold text indicates new text for consideration): “Aquifer tests at NHE wells will consist of a step drawdown test **to evaluate extraction well performance** followed by a constant discharge test **with corresponding recovery tests.**”

AMEC Response: Text has been revised accordingly.

59. Appendix C, Section C3.2 Data Quality Objectives (DQOs), page C3-2: In Step 2, suggest updating the lettering of the items. In Step 3, part “b”, line 1, clarify which “NHE” well is referred to, and suggest adding “as well as other existing monitoring wells” to the end of the line (before “as listed in Table C-1”).

AMEC Response: Text has been revised as appropriate in Steps 2 and 3.

60. Appendix C, Section C3.2 Data Quality Objectives (DQOs), page C3-3: In step 7, delete reference to analytical methodologies as sampling and analysis will not occur as part of this FSP.

AMEC Response: “Analytical methodologies” refers to the analytical methods that will be used to evaluate the aquifer test drawdown data. The first sentence of step 7a) has been revised to state “Aquifer test locations, number of observation wells, and aquifer test evaluation methodologies are proposed herein.”

61. Appendix C, Section C6.4 Decontamination Procedures, page C6-12: At the end of the first paragraph, suggest correcting the acronym FSA to the acronym FSP. At the end of this paragraph, suggest referencing Appendix A of the SAP.

AMEC Response: Text has been revised accordingly.

62. Appendix C, Section C13.0 References, page C13-1: Suggest updating reference list and/or deleting those references that are not used within Appendix C.

AMEC Response: Comment acknowledged. Unused references have been deleted as appropriate.

HEALTH AND SAFETY PLAN

1. Section 1.5, Table in “Chemical Hazards,” page C1-3: The current Threshold Limit Value for TCE is 10 ppm; the table should be clarified or corrected accordingly.

AMEC Response: Text has been revised accordingly.

2. Appendix E, Job Safety Analyses, Pre-ground Disturbance and Clearance Activities: If saw cutting of concrete or asphalt, the Job Safety Analysis may not adequately address use of respiratory protection for dust, or physical controls for use of a chop saw. We recommend that the authors of the HASP consider expanding this discussion if saw cutting is anticipated.

AMEC Response: Text has been revised accordingly.

Remedial Design QUALITY ASSURANCE PROJECT PLAN

1. **Distribution List:** The name of Ms. Acharya (DTSC) appears to be misspelled, and the street address for Mr. Lindquist (CH2M HILL) should be 2525 Airpark Drive (not 2625). Other errors may be present that delay delivery of this or future documents in a timely manner. We recommend that AMEC review and, if necessary, update their distribution list.

AMEC Response: AMEC has reviewed the distribution list and made corrections to Ms. Acharya's name and Mr. Lindquist's street address. Ms. Acharya and Mr. Lindquist were correctly included on the e-mail notification regarding the report's availability for their review. All required document deliveries for this project have consistently been made in a timely manner to the distribution list specified in the AOC.

2. **Section 2.2, Project Delivery, page 2-4, first and second paragraphs:** It appears that the terms "design/bid/build" and "design/build" may have been inadvertently transposed in the first and second paragraphs. This is not a critical issue from a regulatory perspective, but may lead to confusion if the RD QAPP is forwarded to potential construction bidders in the future. We recommend that this potential transposition be checked and corrected, if appropriate.

AMEC Response: AMEC has reviewed the terms noted above and has determined that they were used correctly in the text describing project delivery methods. Text has been added to further clarify the difference in the two delivery methods to prevent future confusion.

3. **Section 4.3.8, Procedures for Records Retention, page 4-7, first paragraph:** This paragraph states that various records will be filed and retained, but does not state the period of retention nor that it is consistent with the Records Retention section of the AOC. We recommend that the RD QAPP include the duration for records retention and maintenance of files on a SharePoint site.

AMEC Response: AMEC has revised Section 4.3.8 to make it consistent with the records retention section of the AOC.

ATTACHMENT A

USEPA Comments on the *Draft Work Plan, Phase I Pre-Design Investigation, North Hollywood Operable Unit Second Interim Remedy, Groundwater Remediation System Design* and the *Remedial Design Quality Assurance Project Plan, North Hollywood Operable Unit Second Interim Remedy, Groundwater Remediation System Design (August 10, 2012)*



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 9
75 Hawthorne Street
San Francisco, California

August 10, 2012

Michael Taraszki
AMEC for Honeywell and Lockheed
1330 Broadway Street, Ste 1702
Oakland, CA 94612

RE: *Comments on "Draft Work Plan, Phase I Pre-Design Investigation, North Hollywood Operable Unit, Second Interim Remedy Groundwater Remediation System Design" and the " Remedial Design Quality Assurance Project Plan, North Hollywood Operable Unit, Second Interim Remedy Groundwater Remediation System Design"*

Dear Mr. Taraszki:

EPA has reviewed the above-referenced document, and provides the following comments in the attached file. These comments should be addressed and resubmitted with the final drafts of the above referenced documents, which are due **thirty days** from the date of this letter.

The attached comments are comprehensive, and the following agencies/firms commented or had an opportunity to comment, in addition to EPA:

- the Los Angeles Department of Water and Power (LADWP)
- the Upper Los Angeles River Area (ULARA) Watermaster
- the Los Angeles Regional Water Quality Control Board (Regional Board)
- CH2M HILL, consultant to EPA

Please include a separate letter which addresses each of the general and major comments specifically, and indicates how the responses to the comments have been incorporated into the final.

Please let me know if you have any questions.

Sincerely,

A handwritten signature in blue ink, appearing to read "Matt Salazar", written over a light blue horizontal line.

Matt Salazar
EPA Project Manager

The review focused on significant technical issues; we have not commented on typographical or grammatical errors except where such errors may lead to confusion on technical issues. Following are our comments on these submittals.

Work Plan

1. **General comment:** The Work Plan is well written and indicates a comprehensive understanding of both the available site data and the data gaps in the NHOU. Conduct of the work proposed in the Work Plan (and SAP) will improve the conceptual site model for the NHOU and provide important hydrogeologic data required for RD of the Second Interim Remedy.

As stated in Section 2.4 of the Work Plan, “The overall objective of the Phase 1 Pre-Design Investigation is to fill critical data gaps identified as necessary for the Second Interim Remedy design to meet RAOs...” And Section 4 of the Work Plan states that a second phase of investigation would only be performed “if it is determined that insufficient data exist (at that time) to fill critical data gaps associated with the Second Interim Remedy and comply with RAOs and meet CDPH 97-005 requirements.” However, actions that might fill some of the “critical data gaps” identified in the Final Data Gap Analysis report (pages 5-14 and 5-15) prepared by AMEC (dated March 14, 2012) are not proposed in this Work Plan. Specifically, critical data gaps 4, 5, 6, 8, and 9 listed on pages 5-14 and 5-15 of the Final Data Gap Analysis report seem to be unaddressed, or only partly addressed, by the activities listed in the Work Plan. It seems that either some of the data gaps identified in the Final Data Gap Analysis report are no longer deemed critical, or will simply not be addressed by the proposed Phase 1 investigation and will be addressed in some other manner. Please revise the Work Plan to provide more clarity regarding which of the critical data gaps are addressed by each proposed field activity, and which critical data gaps are not addressed in the proposed Phase 1 investigation (together with an explanation of why not, and how they will be addressed in the future). Our comments and/or recommendations for filling these data gaps are summarized below, but could be modified depending on additional information provided by the respondents:

- **Critical Data Gap 4** (“existing monitoring well network insufficient to characterize vadose zone and groundwater conditions beneath known and potential source areas”): The Work Plan should show critical areas for further investigation on a map, or at least describe how the need for further characterization in the vicinity of the “known and potential source areas” would be evaluated and conducted during a Phase II data gaps investigation. The area southwest of NHOU extraction wells NHE-2 and NHE-3, where high concentrations of VOCs and hexavalent chromium have been detected, but are poorly delineated, seems to be of primary concern. It is not clear how the data collection activities described in the Work Plan would fill this data gap or aid in further delineating contaminant concentrations in this particular area. We recommend that at least two new monitoring wells be installed in this area as part of the Phase 1 investigation.
- **Critical Data Gap 5** (“objective projections of pumping and recharge volumes, including beyond year 2015, are not yet available”): The Work Plan should state that addressing this data gap does not require field activity; rather, discussions are ongoing (presumably) with LADWP and the ULARA Watermaster to develop improved and updated projections of future pumping and recharge volumes.

- **Critical Data Gap 6** (“performance monitoring wells have not been installed and monitored”): It is unclear whether the proposed piezometers in the Work Plan constitute some or all of the needed performance monitoring wells that comprise this critical data gap. The Work Plan should clarify whether the planned piezometers are expected to address this data gap by themselves, or if installation of additional performance monitoring wells is anticipated to be required in the future, to complete the RD. If so, then the Work Plan should describe how and when decisions about the need for additional performance monitoring wells will be made.
 - **Critical Data Gap 8** (“available analytical data are insufficient to evaluate A-Zone and, potentially, B-Zone groundwater quality within the future NHOU capture zone to meet CDPH 97-005 requirements”): The Work Plan should define whether this is still considered to be a critical data gap, and describe how and when it will be addressed.
 - **Critical Data Gap 9** (“vertical conduits throughout the NHOU study area have not been sufficiently evaluated”): The Work Plan includes investigative activities to evaluate existing monitoring wells as potential vertical conduits for contaminant migration; however, it does not include plans to evaluate existing inactive production wells. Inactive production wells appear to pose a greater threat of vertical contaminant migration, due to their number, long screens, and large diameter. The Work Plan should describe how and when this part of Critical Data Gap 9 will be addressed (e.g., will it be addressed as part of a future Phase II investigation, and are there any conditions on which such an investigation would depend).
2. **Table of Contents page iii, Table, Figures, and Appendix sections:** The title provided in the table of contents for Table 3-1 is different from the title actually on Table 3-1. The titles for Figure 3-1 and Appendix A are similarly inconsistent with the titles given in the table of contents. Please make the titles listed in the table of contents consistent with the actual titles of the corresponding tables, figures, and appendices.
 3. **Section 2.2, Project Background, page 2-3, first full paragraph:** This paragraph paraphrases the key remedial action objectives (RAOs) and relates them to the specific work scope items in the Agreement and Order on Consent (AOC). However, the second sentence in this paragraph focuses exclusively on the second RAO for the NHOU Second Interim Remedy. We recommend that this sentence be modified to also accommodate the fourth remedial action objective (RAO), which is to achieve improved hydraulic containment to inhibit horizontal and vertical contaminant migration in groundwater from the more highly contaminated areas and depths of the aquifer to the less contaminated areas and depths of the aquifer, including the southeast portion of the NHOU near the Erwin and Whitnall production well fields. We assume that this RAO influences the AOC work scope items, as well as the scope of work for the activities described in the Work Plan.
 4. **Section 2.3, Previous Investigations, page 2-4, fourth paragraph:** The second-to-last sentence in this paragraph states “However, it was concluded that existing data are insufficient to proceed with a Second Interim Remedy...” We recommend that the sentence be modified to state which entity came to that conclusion, and provide a reference to a document where that conclusion is stated (perhaps the Draft or Final Data Gap Analysis report prepared by AMEC).
 5. **Section 2.4, Phase 1 Pre-Design Investigation Objectives, page 2-5, bullets 1 through 6:** It is difficult to directly compare these bulleted “specific objectives” of the Phase 1 Pre-Design Investigation to the “critical data gaps” listed in the Final Data Gaps Analysis report (prepared by AMEC, dated March 14, 2012, see pages 5-14 and 5-15). We recommend adding a table to the Work Plan that lists the critical data gaps provided in the Final Data Gaps Analysis report and then

lists the corresponding specific objectives of the Phase 1 Pre-Design Investigation in an adjacent column. Such a table would allow easier comparison of critical data gaps to objectives of the upcoming investigation, and possibly aid in identification of redundancies or additional needs.

6. **Section 2.4, Phase 1 Pre-Design Investigation Objectives, page 2-5, bullet 7:** This bullet states that a specific objective of the Phase 1 Pre-Design Investigation is to “Assess whether sufficient data exist to proceed with designing the Second Interim Remedy...” We recommend adding a discussion in this document or the SAP (and referencing such a location within bullet 7) that describes the process and people who will make such an assessment.
7. **Section 3.3.2, Aquifer Testing, page 3-5, first paragraph of section:** The second sentence of this paragraph states that “...the vertical extent of capture cannot be determined because pressure responses at depths below the existing NHOU extraction wells does not exist” (sic). We recommend revising this sentence to clarify that *measurements* of pressure responses at depths below the extraction wells do not exist.
8. **Section 3.3.2, Aquifer Testing, page 3-5:** During the planned aquifer testing, wells NHE-3, -5, and -7 will alternately be turned off and on, and pumped at different rates during the step-discharge tests. CDPH is concerned that these changes in the relative pumping rates at each extraction well will change the concentrations of contaminants entering the existing NHOU treatment system, particularly 1,4-dioxane and chromium, which are not removed by air stripping. Furthermore, well NHE-5 has not been pumped (or sampled) in several years, so there is substantial uncertainty regarding water quality at this well at present. An evaluation of estimated combined influent concentrations entering the NHOU treatment system during each distinct phase of the planned pumping tests should be provided, indicating the anticipated concentrations of chromium and 1,4-dioxane. This could be accomplished for wells NHE-3 and NHE-7 using a spreadsheet-based mixing cell calculation, based on anticipated flow rates and recent concentration data. Well NHE-5 should be sampled in advance of the pumping tests to obtain more recent contaminant concentration data and overdue Title 22 monitoring data, in order to complete such an evaluation. Results may indicate that treatment or an alternative disposal method is required to ensure that the water sent to the distribution system meets MCLs and NLs, since the NHOU treatment plant does not remove chromium and 1,4-dioxane. This evaluation should be included in the work plan or provided under separate cover at least six weeks before the aquifer testing commences, to provide adequate time for EPA and CDPH review.
9. **Section 3.3.2.1, Monitoring Well Testing, page 3-6:** The second sentence of this paragraph states that “...the resulting hydraulic conductivity values (from slug testing) will be incorporated into the groundwater flow model...” We recommend revising this sentence to state that the resulting hydraulic conductivity values from slug testing will be used to guide development of the hydraulic conductivity matrix in the model. Forcing results of slug tests, which focus on local aquifer properties near the well or boring being tested, into the model may degrade numerical model representativeness of the physical system at the site, rather than improve it.
10. **Section 4, Data Management, Data Evaluation, and Reporting, page 4-2:** The last sentence of the first full paragraph on this page states that “This report (following the Phase 1 investigation) will evaluate Phase 1 data and will recommend that a Phase 2 Pre-Design Investigation be performed if it is determined that insufficient data exist to fill critical data gaps associated with the Second Interim Remedy and comply with RAOs and meet CDPH 97-005 requirements.” As noted in Comment 1, above, some of the critical data gaps described in the Final Data Gap Analysis report are not addressed by the activities proposed in the Work Plan. Therefore, it seems certain that insufficient data will exist to fill those critical data gaps. Please revise so the Work Plan

provides a better explanation of why some previously “critical” data gaps may no longer need to be filled.

SAP

1. **General comment:** The SAP directly incorporates components of a Quality Assurance Project Plan (QAPP); a stand-alone QAPP is not included. We have no objections to this approach. However, at several locations the SAP text, figures, and Field Sampling Plans (FSPs) refer to “the QAPP.” We recommend that these document components refer to the SAP, rather than the non-existent (at the time of submittal) QAPP.
2. **Figures:** Figures within the SAP and FSPs do not have consistent title blocks. Some title blocks reference the QAPP, Work Plan, etc. We recommend updating the figure title blocks for consistency.
3. **Table 2-1:** Several discrepancies associated with this table are noted below, and need to be corrected. Similar corrections will also need to be made for Tables A-3 and B-2 located in the appropriate appendices:
 - a) The table lists EPA Method 8260 as the analytical method to be used for analysis of volatile organic compounds. A more suitable method for analysis of potential drinking water is EPA Method 524.2. The SAP should provide an explanation (perhaps as part of development of data quality objectives) regarding why EPA Method 8260 analysis is appropriate for some or all samples to be obtained under this SAP.
 - b) For perchlorate by EPA Method 331, the sample container is listed as “100 mL Sanitized,” but no container type (e.g. polyethylene) is listed.
 - c) The column heading marked “MDL” lists a number of values related to each method. This heading implies that the values listed are the achievable method detection limits for each method. However, the values directly correlate with the performance standards listed in Section 2.3.2, page 2-7. Heading either needs to be changed to “Performance Standard,” or the actual, achievable MDLs for each method need to be added instead.
4. **Table 2-2:** Several discrepancies associated with this table are noted below, and need to be corrected. Similar corrections will also need to be made for Table A-2 located in the appropriate appendix:
 - a) The Acceptance Criteria listed for the Temperature blank (under Accuracy, Field) is less than 4 degrees centigrade. However, Table 2-1 lists the appropriate temperature preservation for each method as 4 ± 2 degrees centigrade.
 - b) The Acceptance Criteria for Method blanks (under Accuracy, Laboratory) is listed as “No compounds should be detected in the laboratory method blanks.” Does this statement imply that all compounds should be detected below the laboratory’s MDL, or below the laboratory’s reporting limit?
 - c) The Acceptance Criterion for Preparation blanks (under Accuracy, Laboratory) is listed as “%R less than compound specific limit”. This criterion is better suited for Laboratory Control

Samples (LCS) than the blanks. The similar criteria listed for Method blanks should be used for Preparation blanks.

5. **Acronyms:** Many acronyms were: 1) not captured in the abbreviations and acronyms list, 2) not defined with the first time use, 3) defined multiple times throughout the SAP, or 4) not used after being defined. Please ensure that the SAP (and appendices) undergoes a comprehensive review to appropriately capture and correct all acronyms and callouts. In addition, the definition of the acronym COC should be determined and used consistently throughout the SAP (e.g. chemical of concern, contaminant of concern, constituent of concern). Finally, the definition of the acronym CSM should be determined and used consistently throughout the SAP (e.g. conceptual site model vs. site conceptual model).
6. **Emerging Chemicals:** The SAP is inconsistent when referencing and listing what is considered an emerging chemical (e.g. hexavalent chromium, 1,4-dioxane, 1, 2, 3-trichloropropane, perchlorate, and n-nitrosodimethylamine). In addition, the term “emerging chemical” should replace the term “new chemical” when used within the SAP.
7. **Section 1.0 Introduction, page 1-1:** In the first paragraph, please add the reference USEPA, 2011, after the AOC callout.
8. **Section 2.0 Project Management, page 2-1:** A “Project Method Performance Objectives” bullet should be added after the “Project Data Quality Objectives (DQOs) and criteria for measurement of data” bullet for consistency of summarizing the subsections within Section 2.0.
9. **Section 2.1.3.5 Role/Responsibility of Data Reviewer, page 2-2:** One of the roles listed for the Data Reviewer is performing data validation according to the National Functional Guidelines. However, later in this same section, and in Section 5.1, paragraph 3, the SAP indicates that data validation will be performed by a qualified third party data validator, independent from AMEC. Will the Data Reviewer perform some portion of the data validation, or will all of the validation be performed by third party? Some additional clarification is needed to better describe the role of the Data Reviewer in regards to data validation.
10. **Section 2.2, page 2-3:** What is the back-up plan if NHE 1 and 5 cannot be made operational?
11. **Section 2.2.3 Impacts to NHOU Groundwater, page 2-4 and 2-5:** We recommend listing the eight NHOU extraction wells earlier in this section so that when reference is made to the shutdown of NHE-2 later in the section, the reader understands the well is affiliated with the NHOU Extraction and Treatment System.
12. **Section 2.2.3 Impacts to NHOU Groundwater, page 2-5:** Last paragraph, line 6; we recommend deleting the term “NHOU treatment system” and replacing with the term “NHOU Extraction and Treatment System”. Consider making this a global change.
13. **Section 2.3.1 Potential Measurements, page 2-6:** In the second paragraph, line 2, 1,2,3-TCP should be added to the list of chemicals identified for analysis. In addition, this paragraph refers to total alkalinity while Table 2-1 makes reference to alkalinity. Finally, this paragraph refers to pH and specific conductance; however, Table 2-1 does not list these parameters for analysis. We recommend modifying the text to improve the consistency within this section and with Table 2-1.
14. **Section 2.3.2 Applicable Technical Quality Standards and Criteria, page 2-7:** We recommend replacing “TCP” with “1,2,3-TCP” for consistency and clarity, in this section and elsewhere in the document as appropriate to consistently abbreviate 1,2,3-trichloropropane.

15. **Section 2.7.2 Laboratory Records, page 2-14, third paragraph:** This paragraph indicates that the AMEC Data Manager will have the responsibility for obtaining and tracking GeoTracker deliverables. However, the AMEC Data Manager's roles and responsibilities are not outlined in Section 2.1.3.
16. **Section 3.2.1 Groundwater Sample Collection and Flow Monitoring, page 3-4:** In the first paragraph, line 8, we believe that 1,2,3-TCP should be added to the list of chemicals identified for analysis, consistent with Table 2-1.
17. **Section 3.2.1 Groundwater Sample Collection and Flow Monitoring, page 3-4:** The second and third paragraphs state that vertical flow logs and groundwater level measurements will be obtained from "select existing piezometers." The activities may be performed at monitoring wells, not piezometers, and if so, the text should be modified accordingly.
18. **Section 6.0 References, page 6-1:** The USEPA Guidance on Systematic Planning Using the Data Quality Objectives Process is listed twice, once as 2006 and the other as 2006a. We recommend that one of these duplicate references be deleted, and that corresponding references to this document within the body of the report be modified accordingly.
19. **Appendix A, Table A-3:** If results of groundwater quality sampling are planned for use to support a CDPH policy 97-005 evaluation, the following analytical methods are recommended by CDPH as being more suitable for drinking water analysis than those listed in Table A-3:
 - a) 1,2,3-trichloropropane (TCP): CDPH SRL "low" method (<http://www.cdph.ca.gov/certlic/drinkingwater/Pages/123TCPanalysis.aspx>)
 - b) 1,4-dioxane: EPA Method 522
 - c) Nitrosodimethylamine: EPA method 521; in addition, CDPH recommends analyzing for all nitrosamines
 - d) Perchlorate: EPA method 314 (false positives can occur using this method—a backup analytical method using a mass-spectrometer-based analysis is recommended if positive results are detected in excess of the State MCL)
20. **Appendix A, Section A1.0 Introduction, page A1-1:** In the second paragraph, line 4, we recommend adding the term "Phase 1" in front of the term "Pre-Design Investigation." This change can be carried into the introduction for Appendix B and C as well.
21. **Appendix A, Section A1.3 Responsible Agency, page A1-1:** For consistency with Appendix B and C, we recommend adding "Region IX" to the end of the sentence.
22. **Appendix A, Section A1.4 Project Organization, page A1-2:** Based on our understanding of the Work Plan, Eileen Bailiff is the Field Team Leader for Groundwater Sampling and Monitoring, rather than Sean Culkin. Please clarify.
23. **Appendix A, Section A1.5 Statement of the Specific Problem, page A1-2:** We recommend revising the first bullet to read as follows (bold text indicates new text for consideration): "Analytical data are insufficient to delineate the lateral and vertical distribution and temporal variability of COCs **in the NHOU study area with respect to the A-Zone and B-Zone** and to define the necessary target capture area." This change can also be made to Section A3.2, page A3-2 under "State the Problem".
24. **Appendix A, Section A1.5 Statement of the Specific Problem, page A1-2:** We recommend updating the second bullet to read as follows (bold text indicates new text for consideration):

“Groundwater elevation data are not surveyed to a common elevation datum to verify and clarify groundwater flow directions **and gradients in some locations.**” This change can also be made to Section A3.2, page A3-2 under “State the Problem”.

25. **Appendix A, Section A2.1 Site or Sampling Area Description, page A2-1:** We recommend revising the first sentence within the second paragraph, as the description of the system is already provided in the operational history section, as follows: “The NHOU Extraction and Treatment System and associated well field network is located in the San Fernando groundwater basin.” We don’t believe the author intended to claim that the NHOU groundwater production well system consists of eight extraction wells, etc. This change can be carried into the same description within Appendix B and C as well.

26. **Appendix A, Section A2.2 Operational History, page A2-1:** We recommend revising the first sentence of this paragraph as follows: “The NHOU Extraction and Treatment System, which was constructed between 1987 and 1989, consists of eight groundwater extraction wells (NHE-1 through NHE-8), a collector line, and a central treatment system consisting of an air-stripping treatment system to remove VOCs from extracted groundwater, two activated carbon units to remove VOCs from the air stream, a chlorination system, and ancillary equipment.” This change can be carried into the same description within Appendix B and C as well.

In addition, in the last sentence, we recommend deleting “(sans NHE-1)” and adding the following sentences to the end of the paragraph for consistency with Appendix B: “As of June 2011, six of the eight extraction wells remain in service. NHE-1 has never operated as part of the NHOU system and NHE-5 has not operated since 2008.” This change can be carried into the same description within Appendix C as well.

27. **Appendix A, Section A2.3 Previous Investigations/Regulatory Involvement, page A2-2:** The reference to USEPA, 2009a is not found in the reference list. Please add the correct reference.

28. **Appendix A, Section A2.4 Geological and Hydrogeological Information, page A2-2:** We recommend including a reference for the Data Gap Analysis report (e.g. AMEC, 2012a). This change can be carried into the same section within Appendix B and C as well.

29. **Appendix A, Section A2.5 Environmental and/or Human Impact, page A2-2:** In line 8, we recommend adding “1,2,3-“ in front of “TCP”. This change can be carried into the same section within Appendix B and C as well.

30. **Appendix A, Section A3.1 Project Task and Problem Definition, page A3-1:** We recommend adding the following text to the end of the fifth task: “and to further evaluate the potential utilization of the well (which has never operated as part of the NHOU Extraction and Treatment System) as part of the Second Interim Remedy.”

In addition, is a seventh task justified for addition to the SAP related to NH-10, per the Work Plan (i.e. “At least two depth-discrete samples will be collected from the upper perforation zones of production well NH-10 during a single monitoring event to evaluate groundwater quality in the A-Zone and B-Zones at that location.”)?

31. **Appendix A, Section A3.2 Data Quality Objectives (DQOs), page A3-3:** Step 6, Item “a”, we recommend including a reference for the Data Gap Analysis report (i.e. AMEC, 2012a).

32. **Appendix A, Section A5.1 Analyses Narrative, page A5-1:** Table A-1 lists 29 monitoring wells that will be sampled semiannually. Reference to 30 monitoring wells in this paragraph should be updated.

33. **Appendix A, Section A8.0 Disposal of Residual Materials, page A8-1:** We recommend that AMEC verify whether the reference to Appendix A-2 in the third paragraph should actually be to Appendix A-1, and that this be corrected if necessary.
34. **Appendix A, Section A8.0 Disposal of Residual Materials, page A8-2:** The bullets under the statement “The following steps will be followed for document retention:” do not correspond with the same bullets in Appendix B, Section B8.3 Waste Profiling and Documentation with respect to who sends, signs, and receives the profiles and manifests. We recommend revising Appendix A or B, as appropriate.
35. **Appendix A, Section A9.1.1 Daily Field Records, page 9-1:** We recommend that the first paragraph add reference to Appendix A-1 at the end of the second sentence.
36. **Appendix A, Section A9.1.1 Daily Field Records, page 9-1:** We recommend that the sixth bullet be updated to read as follows: “Sample media (e.g., groundwater) **and depth of collection.**”
37. **Appendix A, Section A9.1.2 Activity-Specific Forms, page A9-2 and Section A9.3 Sample Chain-of-Custody Forms, page A9-3:** Please provide a sample chain of custody form in Appendix A-1.
38. **Appendix A, Section A11.0 Field Variances, page A11-1:** Please add the following text after the second sentence for consistency with Appendix B: “The AMEC Project Manager will notify the USEPA of major modifications or variances to the field program.” Please modify the text in Appendix B to the previous statement. The same change can be made to this section in Appendix C.
39. **Appendix A, Section A13.0 References, page A13-1:** We recommend updating the reference list and/or deleting those references that are not used within Appendix A.
40. **Appendix B, Section B1.5, page B1-2:** We recommend updating the first bullet to read as follows (bold text indicates new text for your consideration): “Performance monitoring well **and piezometers** have not been installed and monitored to demonstrate the size and shape of the existing NHOU extraction well capture area, **specifically with regard to the A-Zone and B-Zone.**”
41. **Appendix B, Section B1.6 Schedule, page B1-2:** In the second line, we recommend deleting the word “sampling” and replacing with the phrase “drilling and piezometer installation”. It is hard to tell whether this Field Sampling Plan is supposed to cover drilling, sampling, or both.
42. **Appendix B, Section B2.1 Site Description, page B2-1:** Second paragraph, in addition to listing Figure B-2, it would also be appropriate to list Figures B-4 and B-6.
43. **Appendix B, Section B3.1 Project Task and Problem Definition, page B3-1:** Line 6, reference to Figures B-3, B-5, and B-7 should be corrected to reference Figures B-2, B-4, and B-6 instead. Line 8, reference to Figures B-4, B-6, and B-8 should be corrected to reference Figures B-3, B-5, and B-7 instead.
44. **Appendix B, Section B3.2 Data Quality Objectives (DQOs), page B3-2:** We recommend adding an item to the second step: “h) Do the NHOU extraction wells need to be deepened to meet RAOs?”
45. **Appendix B, Section B3.2 Data Quality Objectives (DQOs), page B3-3:** The following figure references should be corrected in the fourth step: Items a), c), and e) – Figure B-3 should be updated to call out Figure B-2 instead, and Figure B-8 should be updated to call out Figure B-7 instead.

46. **Appendix B, Section B3.2 Data Quality Objectives (DQOs), page B3-3:** Sixth step, item “a”, should include reference to the Data Gap Analysis report (e.g. AMEC, 2012a).
47. **Appendix B, Section B3.5 Data Management and Assessment Oversight, page B3-6:** Last paragraph, this section makes reference to a Data Usability Evaluation and Field QA/QC submittal. This submittal may need to be referenced in Appendix A as well.
48. **Appendix B, Section B4 Sampling Rationale, page B4-1:** Second paragraph, line 7 – Reference to Table B-1 should be updated to reference Table B-2 instead.
49. **Appendix B, Section B6.7 Piezometer Installation, page B6-4:** First paragraph, figure references in the first line on this page should be updated from B-4, B-6, and B-8 and corrected to reference Figures B-3, B-5, and B-7.
50. **Appendix B, Section B6.8.2 Post-Development Groundwater Sampling, page B6-5:** Reference to Table B-3 should be updated to reference Table B-2 instead.
51. **Appendix B, Section B9.3 Sample Chain-Of-Custody Forms, page B9-3:** First paragraph, consider changing reference from Appendix B-2 to Appendix B-1.
52. **Appendix B, Section B13.0 References, page B13-1:** Suggest updating reference list and/or deleting those references that are not used within Appendix B.
53. **Appendix C, Section C1.6 Schedule, page C1-2:** In the first sentence, suggest deleting the phrase “in multiple sampling events” and replace with the word “testing”. In the second sentence, suggest deleting the word “sampling” and replacing with the word “testing”.
54. **Appendix C, Section C2.1 Site or Sampling Area Description, page C2-1:** All references to Figures A-1 or A-2 should be updated to reference Figures C-1 or C-2, respectively.
55. **Appendix C, Section C2.4 Geological and Hydrogeological Information, page C2-2:** Line 3, suggest adding the phrase “and testing” after the word “sampling”.
56. **Appendix C, Section C3.1 Project Task and Problem Definition, page C3-1:** Suggest updating the first item to read as follows: “Slug tests will be performed at 12 monitoring wells screened primarily in either the A-Zone or B-Zone to estimate hydraulic parameters. These data will be used to estimate hydraulic conductivity values as simulated in the current groundwater flow model to define the NHOU extraction well capture zone.”
57. **Appendix C, Section C3.1 Project Task and Problem Definition, page C3-1:** Suggest updating the second item to read as follows (bold text indicates new text for consideration): “Perform aquifer pumping tests at three NHE extraction wells (NHE-3, NHE-5, and NHE-7) **while monitoring the response to the pumping test in 10 observation wells** to estimate well efficiency and A-Zone hydraulic parameters.
58. **Appendix C, Section C3.1 Project Task and Problem Definition, page C3-1:** In the third paragraph, suggest updating the first sentence to read as follows (bold text indicates new text for consideration): “Aquifer tests at NHE wells will consist of a step drawdown test **to evaluate extraction well performance** followed by a constant discharge test **with corresponding recovery tests.**”
59. **Appendix C, Section C3.2 Data Quality Objectives (DQOs), page C3-2:** In Step 2, suggest updating the lettering of the items. In Step 3, part “b”, line 1, clarify which “NHE” well is referred to, and suggest adding “as well as other existing monitoring wells” to the end of the line (before “as listed in Table C-1”).

60. **Appendix C, Section C3.2 Data Quality Objectives (DQOs), page C3-3:** In step 7, delete reference to analytical methodologies as sampling and analysis will not occur as part of this FSP.
61. **Appendix C, Section C6.4 Decontamination Procedures, page C6-12:** At the end of the first paragraph, suggest correcting the acronym FSA to the acronym FSP. At the end of this paragraph, suggest referencing Appendix A of the SAP.
62. **Appendix C, Section C13.0 References, page C13-1:** Suggest updating reference list and/or deleting those references that are not used within Appendix C.

HASP

1. **Section 1.5, Table in “Chemical Hazards,” page C1-3:** The current Threshold Limit Value for TCE is 10 ppm; the table should be clarified or corrected accordingly.
2. **Appendix E, Job Safety Analyses, Pre-ground Disturbance and Clearance Activities:** If saw cutting of concrete or asphalt, the Job Safety Analysis may not adequately address use of respiratory protection for dust, or physical controls for use of a chop saw. We recommend that the authors of the HASP consider expanding this discussion if saw cutting is anticipated.

Remedial Design QAPP

1. **Distribution List:** The name of Ms. Acharya (DTSC) appears to be misspelled, and the street address for Mr. Lindquist (CH2M HILL) should be 2525 Airpark Drive (not 2625). Other errors may be present that delay delivery of this or future documents in a timely manner. We recommend that AMEC review and, if necessary, update their distribution list.
2. **Section 2.2, Project Delivery, page 2-4, first and second paragraphs:** It appears that the terms “design/bid/build” and “design/build” may have been inadvertently transposed in the first and second paragraphs. This is not a critical issue from a regulatory perspective, but may lead to confusion if the RD QAPP is forwarded to potential construction bidders in the future. We recommend that this potential transposition be checked and corrected, if appropriate.
3. **Section 4.3.8, Procedures for Records Retention, page 4-7, first paragraph:** This paragraph states that various records will be filed and retained, but does not state the period of retention nor that it is consistent with the Records Retention section of the AOC. We recommend that the RD QAPP include the duration for records retention and maintenance of files on a SharePoint site