

REVISED REMEDIAL ACTION PLAN ADDENDUM - Contingency Plan for Hexavalent Chromium Generation

*Former 76 Service Station No. 0843 (2349)
1629 Webster Street
Alameda, California*

Loc Case No. RO0000450

*San Francisco Bay Area Regional Water Quality
Control Board No. 01-2455*

GeoTracker Global ID No. T0600102263

Antea Group Project No. C102349219

June 8, 2011

RECEIVED

11:17 am, Jun 10, 2011

Alameda County
Environmental Health

Prepared for:
Mr. Bill Borgh
ConocoPhillips Company
76 Broadway
Sacramento, California
95818

Prepared by:
Antea™Group
11050 White Rock Road
Rancho Cordova, CA 95670
+1 800 477 7411



76 Broadway
Sacramento, California 95818

June 8, 2011

Alameda County Health Agency – Environmental Health Services
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Attention: Ms. Barbara Jakub

Re: Remedial Action Plan Addendum
76 Service Station #0843
1629 Webster Street
Alameda, CA

Dear Ms. Jakub:

I declare under penalty of perjury that to the best of my knowledge the information and/or recommendations contained in the attached report is/are true and correct.

If you have any questions or need additional information, please contact me at (916) 558-7612.

Sincerely,

A handwritten signature in black ink that reads "Bill Borgh". The signature is written in a cursive, slightly slanted style.

Bill Borgh
Site Manager – Risk Management and Remediation

Attachment



Table of Contents

1.0	INTRODUCTION	3
2.0	HEXAVALENT CHROMIUM MONITORING.....	3
3.0	GROUNDWATER CONTAMINATION PLUME MONITORING	3
4.0	SYSTEM OPERATION – CONTINGENCY PLAN FOR HEXAVALENT CHROMIUM GENERATION.....	4
5.0	HEXAVALENT CHROMIUM DISCUSSION.....	5
6.0	LIMITATIONS	5

Figures

Figure 1 Site Map with Revised Sparge Point Locations and System Location

Appendices

Appendix A Contingency Plan Decision Flow Chart

REVISED REMEDIAL ACTION PLAN

ADDENDUM - Contingency Plan for Hexavalent Chromium Generation

*Former 76 Service Station No. 0843 (2349)
1629 Webster Street
Alameda, California*

1.0 INTRODUCTION

This letter is in response to the recent request for additional information by Alameda County Environmental Health Department (ACEHD) in a letter to ConocoPhillips (COP) dated April 6, 2011 related to the *Remedial Action Plan (RAP)* prepared by Antea Group dated March 18, 2011.

The additional information requested by ACEHD was a contingency plan to address the potential generation of Hexavalent Chromium (Cr(VI)) as a result of the addition of ozone into the sub-surface to reduce/destroy hydrocarbon constituents. A contingency plan to address Cr(VI) was not included in the RAP.

Antea Group proposes the following activities in response to ACEHD's request for a Cr(VI) contingency plan

2.0 HEXAVALENT CHORIUM MONITORING

In the RAP, Antea Group proposed to add biodegradation parameters, including total Chromium (Cr) and Cr(VI), to the analyzes performed on monitoring wells MW-5 and MW-6 on a quarterly frequency for a *minimum* of one hydrologic cycle.

3.0 GROUNDWATER CONTAMINATION PLUME MONITORING

Antea Group additionally recommends the addition of analysis for total vanadium and dissolved vanadium to all monitoring wells at the site for at least one hydrologic cycle. Vanadium is a catalyst in oxidizing Chrome III (Cr(III)) to Cr(VI) when manganese becomes depleted.

A sampling event will be performed prior to initiation of proposed remedial activities at the site to establish constituent concentrations prior to implementation of the next phase of remediation.

As noted in the RAP, all monitoring wells will also be monitored and sampled on a quarterly frequency for a *minimum* of one hydrologic cycle. A longer period may be required for monitoring and sampling events once the ozone/oxygen injection is completed.

The RAP proposed ozone injection over a period of several months with scheduled monthly monitoring and sampling. Antea Group recommends modifying the proposed sampling frequency for all on-site monitoring wells, with the exception of MW-3 and MW-4. The modified frequency is to sample all on-site wells, with the exception of MW-3 and MW-4, within one to three days of system startup and semi-monthly thereafter. During pre-startup, after startup (one to three days), and semi-monthly thereafter, field measurements of dissolved oxygen (DO), temperature (TEMP), percent hydrogen (pH), and oxidation-reduction potential (ORP) will be recorded. A short turn-around-time (TAT) of a maximum of three days will be requested on the initial post-application samples to monitor key indicator metals (ferrous iron (FeO), manganese (Mn), vanadium (V), Cr, and Cr(VI)) as well as petroleum hydrocarbon constituents such as total petroleum hydrocarbons as gasoline (TPHg), benzene, toluene, ethyl-benzene, and total xylenes (collectively BTEX), methyl tert-butyl ether (MTBE) and tert-butyl-alcohol (TBA). Once the first three sampling activities after commencement of remedial activities have been performed, analytical results will be evaluated and TAT will be adjusted as appropriate.

4.0 SYSTEM OPERATION – CONTINGENCY PLAN FOR HEXAVALENT CHROMIUM GENERATION

A flow chart detailing the below discussed decision factors associated with the contingency plan is included as **Appendix A**.

Due to the possibility of increased Cr(VI) concentrations, Antea Group and ConocoPhillips (COP) recommend the sparge point system be started with air/oxygen injection (biosparging) and slowly introduce ozone into the sparge points to minimize the potential for hexavalent chromium [Cr(VI)] generation. No injection will be performed in the vicinity of any wells containing Cr(VI) above the environmental screening level (ESL) of 11 µg/L. Currently, as Cr(VI) levels are at 12 µg/L in MW-10 as of second quarter 2011 M&S sampling, no injection is intended initially into sparge point TSP-1. Additionally, in order to redistribute the injected ozone, Antea Group recommends the removal of previously proposed sparge well TSP-4, as well as a minor relocation of proposed sparge well TSP-6 slightly south of its originally proposed location. The removal of TSP-4 and the relocation of TSP-6 will allow for more efficient application of air/ozone to the affected subsurface without over-applying to the Cr(VI) affected area in the vicinity of MW-10. A revised site map with proposed locations is included as **Figure 1**.

Once the air/oxygen sparging begins, Antea Group recommends sampling of all site wells, with the exception of MW-3 and MW-4, within one to three days of system startup and semi-monthly thereafter. If, after initial

sampling, Cr(VI) increases above the ESL in some or all onsite monitoring wells, the air/oxygen biosparging will be suspended in sparge points that surround the affected wells, and semi-monthly sampling will continue. If, after initial sampling, Cr(VI) increases above 75% of the ESL in some or all of the onsite monitoring wells, re-sampling of the affected wells will occur on a weekly basis in order to evaluate Cr(VI) stability, while semi-monthly sampling continues in unaffected monitoring wells. As it may indicate elevated potential for oxidation of Cr(III), if, after initial sampling, dissolved Mn decreases, or if it is depleted and dissolved V decreases, in some or all of the onsite monitoring wells, re-sampling of the affected wells will occur on a weekly basis in order to evaluate Cr(VI) stability, while semi-monthly sampling continues in unaffected monitoring wells. If, after initial sampling, Cr(VI) decreases or is static with in laboratory margins of error and is below the ESL in all onsite monitoring wells, ozone will be gradually introduced into all sparge points, and onsite monitoring wells will be sampled on a weekly basis, for a period of two months, to evaluate Cr(VI) stability. If after this period, Cr(VI) levels remain stable, sampling will be performed on a semi-monthly basis.

5.0 HEXAVALENT CHROMIUM DISCUSSION

The First Quarter Monitoring Report for 2011 has shown that Cr(VI) has increased in monitoring well MW-10 to above 14.0 µg/l in groundwater. While it's possible this increase may be a result of the ozone pilot test conducted during August/September 2009, Cr(VI) concentrations reported in monitoring well MW-10 approximately two weeks after the pilot test were <2.0 µg/l. This is consistent with background Cr(VI) concentrations in well MW-10 of 2.0 µg/l during May 2009, prior to performance of the pilot test.


It should also be noted that Cr(VI) was also present above the laboratory's reporting limits in upgradient well MW-1 (2.0 µg/l) prior to performance of the ozone pilot test. This suggests that *background concentrations* of Cr(VI) are present at the site, independent of remedial activities.

6.0 LIMITATIONS

The recommendations contained in this report represent Antea USA, Inc.'s professional opinions based upon the currently available information and are arrived at in accordance with currently accepted professional standards. This report is based upon a specific scope of work requested by the client. The contract between Antea USA, Inc. and its client outlines the scope of work, and only those tasks specifically authorized by that contract or outlined in this report were performed. This report is intended only for the use of Antea USA, Inc.'s client and anyone else specifically identified in writing by Antea USA, Inc. as a user of this report. Antea USA, Inc. will not and cannot be liable for unauthorized reliance by any other third party. Other than as contained in this paragraph, Antea USA, Inc. makes no express or implied warranty as to the contents of this report.

Revised Remedial Action Plan Addendum -
Contingency Plan for Hexavalent Chromium Generation
Former 76 Service Station No. 0843 (2349)
Alameda, California
Antea Group Project No. C102349219





Alan Buehler
Staff Geologist

Date: 6/8/11

Information, conclusions, and recommendations provided by Antea Group in this document regarding the site have been prepared under the supervision of and reviewed by the licensed professional whose signature appears below.

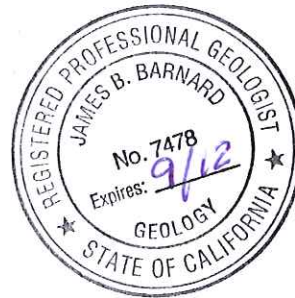
Licensed Approver:



James B. Barnard
Project Manager
California Registered Professional Geologist No. 7478

Date: 8 June 2011









cc: GeoTracker (upload)

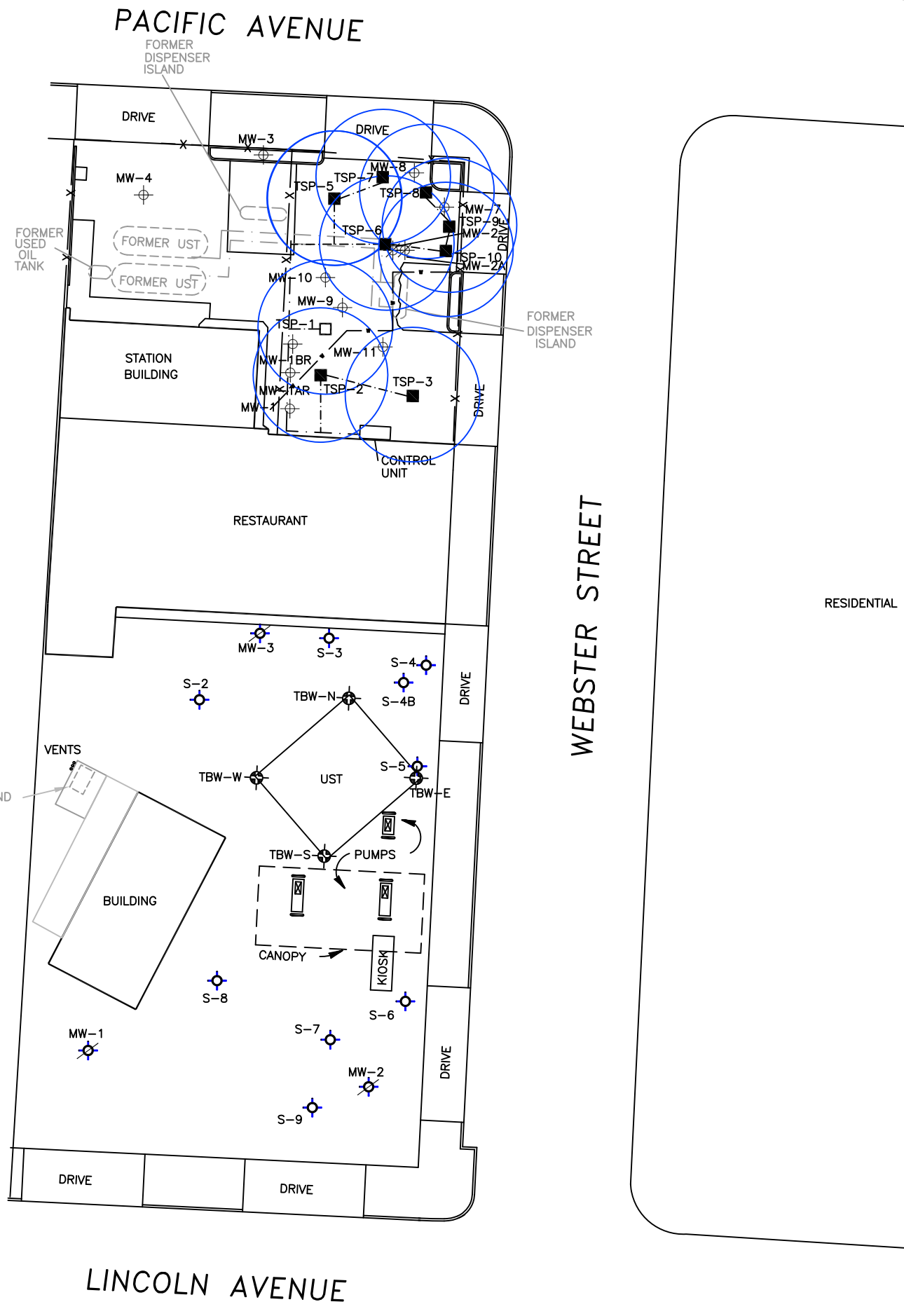
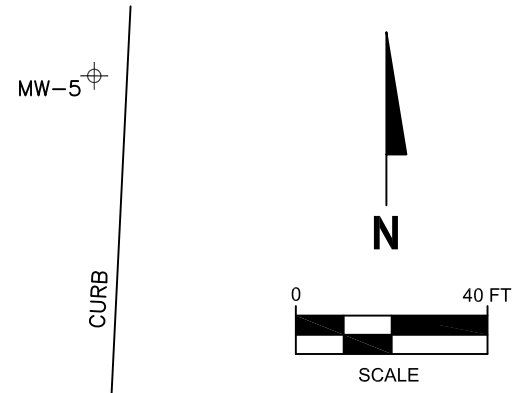


Figure

Figure 1 Site Map with Revised Sparge Point Locations and System Locations

LEGEND:

- MW-1  ACTIVE 76 MONITORING WELL
- MW-2A  ABANDONED 76 MONITORING WELL
- TSP-1  CURRENT SPARGE POINT
- S-1  SHELL MONITORING WELL
- MW-1  DESTROYED SHELL MONITORING WELL
- TBW-N  TANK BACKFILL WELL
- TSP-2  PROPOSED SPARGE POINT
- - - - - SPARGE LINE ABOVE-GROUND PIPING
- - - - - SPARGE LINE TRENCHING
-  20 FT RADIUS OF INFLUENCE
- - - - - EXISTING WATER LINE



PLAN ADAPTED FROM A SURVEY BY MORROW SURVEYING
DATED FEBRUARY 2009.

FIGURE 1
SITE PLAN WITH CURRENT MONITORING WELLS, SPARGE
POINTS & PROPOSED REMEDIAL SYSTEM LOCATIONS
FORMER 76 STATION NO. 0843
1629 WEBSTER ROAD
ALAMEDA, CALIFORNIA

PROJECT NO. C102349217	PREPARED BY AB	DRAWN BY JH
DATE 05/31/11	REVIEWED BY JBB	FILE NAME 76-0843-S



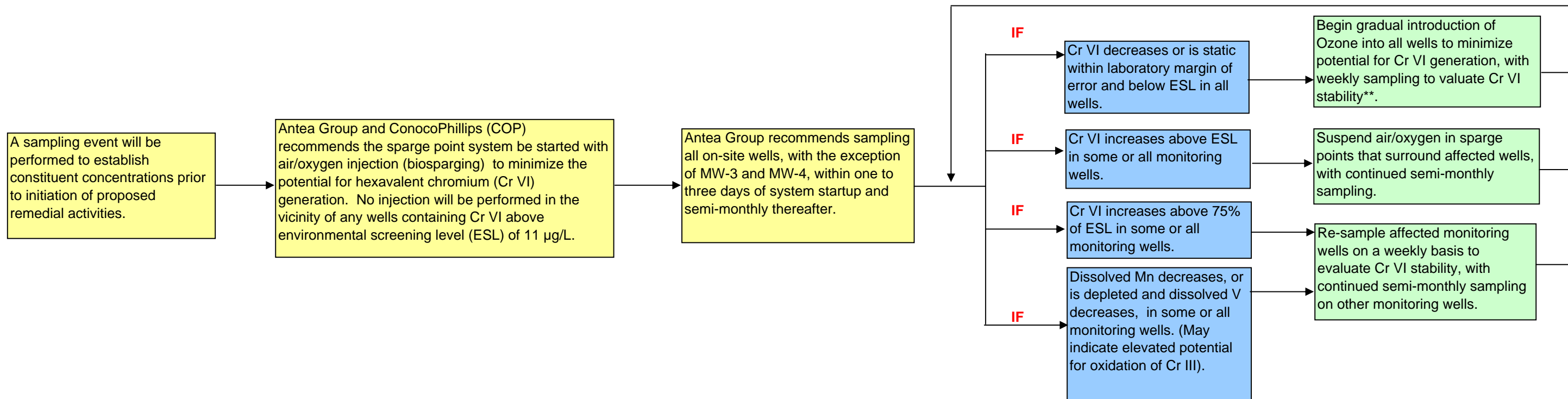
**Revised Remedial Action Plan Addendum -
Contingency Plan for Hexavalent Chromium Generation**
Former 76 Service Station No. 0843 (2349)
Alameda, California
Antea Group Project No. C102349219



Appendix A

Contingency Plan Decision Flow Chart

DECISION FLOW CHART
Ozone Injection Contingency Plan
Former 76 Service Station No. 0843 (2349)
1629 Webster Street
Alameda, California



** If Cr VI levels are observed to be stable within laboratory margin of error for a period of 2 months, sampling will be performed on a semi-monthly basis.