



**HEALTH RISK ASSESSMENT REPORT
SCAQMD ID Number 008547**

Original Submittal: April, 2009

First Update: October, 2009

Second Update: October, 2010

Third Update: June, 2011

Fourth Update: May, 2013

Fifth Update: May, 2014 (As Requested By SCAQMD)

**Sixth Update: January, 2015: Revision to May, 2014 Report
(After Receipt of Comments from SCAQMD and OEHHA)**

Seventh Update: May, 2015 (Updated Using New OEHHA Guidance)

Prepared by:

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Privileged and Confidential

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HEALTH RISK ASSESSMENT SUMMARY FORM

(Required in Executive Summary of HRA)

Facility Name : Quemetco, Inc.
 Facility Address: 720 S. 7th Avenue
City of Industry, CA 91746
 Type of Business: Secondary Lead Smelter
 SCAQMD ID No.: 008547

A. Cancer Risk*

(One in a million means one chance in a million of getting cancer from being constantly exposed to a certain level of a chemical over 70 years)

1. Inventory Reporting Year : 2012-2014
2. Maximum Cancer Risk to Receptors :
 - a. Offsite 92.7 in a million Location: 221 meters East of WESP Stack (409488, 3765313, Receptor 5252)
 - b. Residence 3.83 in a million Location: 824 meters NW of WESP Stack (408989, 3766076, Receptor 10756)
 - c. Worker 1.62 in a million Location: 212 meters East of WESP Stack (409480, 3765302, Receptor 10138)
3. Substances Accounting for 90% of Cancer Risk: Arsenic, Hexavalent Chromium, TCE, Formaldehyde, EDB,2,3,7,8-TCDF
 Processes Accounting for 90% of Cancer Risk: Secondary Lead Smelting
4. Estimated Population Exposed to Specific Risk Levels
 - a. 1 to <10 in a million 61,583
 - b. 10 to <100 in a million _____
 - c. 100 to <1000 in a million _____
 - d. >=1000 in a million _____
 - e. Total >= 1 in a million 61,583
5. Cancer Burden: 1.74 X 10⁻¹
 Cancer Burden = (cancer risk) x (no. of people exposed to specific cancer risk)
6. Maximum Distance to Edge of 1 x 10⁻⁶ Cancer Risk Isopleth (meters) Approximately 5,100 meters

B. Hazard Indices*

[Long Term Effects(chronic) and Short Term Effects (acute)]

(non-carcinogenic impacts are estimated by comparing calculated concentration to identified reference exposure levels, and expressing this comparison in terms of a "Hazard Index")

1. Maximum Chronic Hazard Indices:
 - a. Residence HI: 0.02 Location: 824 meters NW of WESP Stack toxicological endpoint: Central Nervous System
 - b. Worker HI : 1.78 Location: 212 meters East of WESP Stack toxicological endpoint: Central Nervous System
2. Substances Accounting for 90% of Chronic Hazard Index: Arsenic, Mercury, Nickel, Formaldehyde
3. Maximum Acute Hazard Index:

89 meters SE of WESP Stack (409287, 3765113, Receptor 4753)

 PMI: 0.12 Location: _____ toxicological endpoint: Development & Reproductive Systems
4. Substances Accounting for 90% of Acute Hazard Index: Arsenic, Mercury, Formaldehyde, H₂S, Benzene

*Provide Tables listing contribution of each substance to Maximum Cancer Risk, Acute HI, and Chronic HI.

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Attachments:

- SCAQMD-1 - September 23, 2014 Correspondence from South Coast AQMD
- OEHHA-1 - November 5, 2014 Correspondence from OEHHA
- FAC-1 - Facility Diagram
- A - Emission Rate Guidance & Source Test Results
- B1 - List of Compounds Evaluated
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Executive Summary:

Facility Name: Quemetco, Inc.
Facility Address: 720 S. 7th Avenue
City of Industry, CA 91746
Facility Identification Number: 008547

Description of Facility Operations:

Quemetco, Inc. operates a battery recycling and lead recovery facility in the City of Industry, California. At this facility, used batteries and other lead-bearing materials are received, fragmented and the lead-containing materials are recovered and purified. Various processes are employed to purify the lead until the final alloys are produced. The four processes at the facility which define the “Secondary Lead Smelting and Refining Process” include the Rotary Kiln (feed drying), Reverberatory Furnace (smelting), Electric Arc Furnace (slag processing) and Refining Kettles (purification). The Secondary Lead Smelting and Refining Process has historically accounted for the majority of the health risk associated with Quemetco’s operations. Other emission sources include eleven housekeeping baghouses referred to as “Busch Units”. The Busch Units are used primarily to maintain negative pressure in the buildings where the Secondary Lead Smelting and Refining Process takes place.

In order to comply with the provisions of South Coast Air Quality Management District Rule 1402 (Control of Toxic Air Contaminants from Existing Sources), during 2008 Quemetco installed additional air pollution control equipment to mitigate emissions from the Secondary Lead Smelting and Refining Process. The additional control equipment installed included a Regenerative Thermal Oxidizer (RTO) to reduce organic emissions from the Rotary Kiln and a Wet Electrostatic Precipitator (WESP) to reduce emissions from the Secondary Lead Smelting and Refining Process.

Status of Most Recent Health Risk Assessments:

On December 10, 2013, South Coast Air Quality Management District (South Coast AQMD) sent correspondence to Quemetco requesting that a new Health Risk Assessment be performed. Quemetco submitted the Health Risk Assessment, as requested, on May 9, 2014. On September 23, 2014 South Coast AQMD provided “Initial Comments” on the May 9, 2014 Health Risk Assessment. On November 5, 2014 the California Environmental Protection Agency’s Office of Environmental Health Hazard Assessment (OEHHA) provided additional comments. On January 12, 2015 Quemetco submitted and updated Health Risk Assessment incorporating the comments provided by South Coast AQMD and OEHHA. The January 12, 2015 Health Risk Assessment remains unreviewed and unapproved at this time.

The results of this Health Risk Assessment were as follows:

Table 1 - Summary of Results from Health Risk Assessment Submitted January 12, 2015

Exposure Assessment	Result	Location (UTME, UTMN)
Off-Site Point of Maximum Impact (PMI)	9.27×10^{-5}	221 meters East of WESP Stack (409488, 3765313, Receptor 5252)
Maximum Exposed Individual Resident (MEIR)	3.83×10^{-6}	824 meters NW of WESP Stack (408989, 3766076, Receptor 10756)
Maximum Exposed Individual Worker (MEIW)	1.62×10^{-6}	212 meters East of WESP Stack (409480, 3765302, Receptor 10138)
Cancer Burden	1.74×10^{-1}	See 1 In One Million Isopleth
Chronic Health Index, Resident (HICR)	0.02	824 meters NW of WESP Stack (408989, 3766076, Receptor 10756)
Chronic Health Index, Worker (HICW)	1.78	212 meters East of WESP Stack (409480, 3765302, Receptor 10138)
Acute Health Index (HIA)	0.12	89 meters SE of WESP Stack (409287, 3765113, Receptor 4753)

The use of emission rates for the Health Risk Assessment submitted January 12, 2015 was approved in an e-mail received from South Coast AQMD on May 2, 2014. The May 2, 2014 e-mail from South Coast AQMD is included with Attachment A along with the source tests approved by South Coast AQMD for use in this Health Risk Assessment. As described in the uncertainty section of this report, the emission rates used for the Health Risk Assessment were primarily developed during the second half of 2013, particularly for emission rates for metals from the WESP stack.

On March 6, 2015 the South Coast AQMD Governing Board adopted updated risk assessment guidelines developed by OEHHA. On March 17, 2015 South Coast AQMD requested that Quemetco prepare a new Health Risk Assessment utilizing the updated OEHHA guidelines, although Rules 1401 and 1402 have not yet been amended. This submittal addresses the request from South Coast AQMD to prepare a Health Risk Assessment utilizing the updated OEHHA guidelines.

Because South Coast AQMD is requiring that an updated Health Risk Assessment be prepared using updated risk assessment guidance, the use of updated emission rates obtained by South Coast AQMD during October, 2014, Quemetco during November and December, 2014 or the Xact 640 Multi-Metals Monitor which has been collecting metals emission rate information for the WESP stack since April, 2015 as a part of the Rule 1420.1 demonstration program should be used to reflect the upgrades to the WESP since the 2013 testing. Upgrades made to the WESP and changes in WESP operating conditions were initiated in October/November, 2014 in anticipation of the lowering of the Rule 1420.1 arsenic limit beginning in January, 2015. Upgrade and operational changes include:

- Larger heat exchanges for each WESP cell.
- Upgraded T/R units for each WESP cell.
- Redundant Cooling Tower installation.
- Increased secondary voltage for each WESP cell.

Focusing specifically on Arsenic emissions from the WESP stack, the primary risk driver, the most recent data obtained by South Coast AQMD, Quemetco and jointly through the demonstration program seem to suggest that the test results South Coast AQMD obtained in October, 2013 using an unapproved modification to CARB Method 436 are an invalid outlier. To summarize the various data sets:

Table 2 - Summary of Recent SCAQMD and Quemetco WESP Arsenic Test Results

Date/Tester/Method	As (lbs/hr)	As (lbs/year)
10/2013: AQMD Unapproved M436 Modification	0.00343	25.53
10/2014: AQMD Announced Test	0.000432	3.78
10/2014:AQMD Unannounced Test	0.000136	1.19
12/2014: Quemetco Compliance Test	0.000621	4.34
4-5/2015: Rule 1420.1 Demonstration, Xact 640 Multi-Metals Monitor (based on 804 valid data points)	0.000266	2.33

In 2014, both South Coast AQMD and Quemetco performed CARB Method 436 unmodified. The difference between South Coast AQMD and Quemetco’s CARB Method 436 testing is that South Coast AQMD ran each test run for four (4) hours while Quemetco ran each test run for ten (10) hours. Nevertheless, the South Coast AQMD and Quemetco test results are similar. While not a certified test method, the data from the Xact 640 demonstration project indicates Arsenic emissions similar to the most recent (2014) test results from both South Coast AQMD and Quemetco. Summaries of the South Coast AQMD and Quemetco 2014 test results are presented in Appendix A. While the Health Risk Assessment must be based on the best available data, Quemetco understands the South Coast AQMD’s desire to present a conservative estimate of risk. Therefore, the Quemetco November/December, 2014 test results, which yielded the highest annual arsenic emissions indicated in the table above, were used to perform this Health Risk Assessment.

Summary of Health Risk Assessments Submitted Since WESP Installation:

A Health Risk Assessment (HRA) for Quemetco was approved by South Coast AQMD on February 23, 2010. This approval was based on an HRA originally submitted in April, 2009 which was updated in October, 2009 as a result of comments received from South Coast AQMD.

On October 22, 2010 an updated Health Risk Assessment was submitted to South Coast AQMD based primarily upon updated tests performed during late 2009 and early 2010. Submittal of this HRA was pursuant to existing South Coast AQMD permit requirements. South Coast AQMD indicated in its September 23, 2014 correspondence that it does not intend to take any action on this HRA submittal.

On June 27, 2011 an updated Health Risk Assessment was submitted to South Coast AQMD. This HRA was submitted pursuant to existing South Coast AQMD permit requirements. This Health Risk Assessment differed from the October 22, 2010 Health Risk Assessment in the following ways:

- Emissions from the Wet Electrostatic Precipitator (WESP) were updated to reflect the testing which was performed during November, 2010 and approved by South Coast AQMD on March 2, 2011.

- Emissions from Busch Units B, C, E and H used in the October 22, 2010 Health Risk Assessment were approved by South Coast AQMD. Approval was issued by South Coast AQMD on January 11, 2011.
- As directed by South Coast AQMD, Acrolein emissions were removed due to test method uncertainty.

In its September 23, 2014 correspondence, South Coast AQMD indicated that it does not intend to take any action on this HRA submittal.

On May 9, 2013 an updated Health Risk Assessment was submitted to South Coast AQMD in support of a permit application. The May 9, 2013 iteration of the Health Risk Assessment differs from the Health Risk Assessment submitted in June, 2011 in the following ways:

- Emissions from the Wet Electrostatic Precipitator (WESP) were updated to reflect the testing which was performed during September and October, 2012.
- The Refinery Combustion Stack emissions were removed from the Health Risk Assessment. Emissions previously exhausted through this stack have been ducted to, and are now controlled by, the WESP.
- The Battery Wrecker Enclosure Building, which was constructed since the June, 2011 Health Risk Assessment, has been added to the Health Risk Assessment.
- Busch Units J and K which exhaust the Battery Wrecker Enclosure Building and maintain negative pressure in that building were added to the Health Risk Assessment.
- Emission rates for Lead, Arsenic, Cadmium and Nickel from all Busch Units were updated to reflect the most recent test results approved by South Coast AQMD at the time of submittal.
- As directed by South Coast AQMD, Acrolein emissions were removed due to test method uncertainty.

Review and approval of the May 9, 2013 Health Risk Assessment submittal is pending as a part of South Coast AQMD's ongoing permit application evaluation.

Changes from Previous Report and Uncertainty Related to Unapproved Modifications to Test Methods:

On January 12, 2015 Quemetco submitted an updated Health Risk Assessment incorporating the comments provided by South Coast AQMD and OEHHA. The January 12, 2015 Health Risk Assessment remains unreviewed and unapproved at this time. The January 12, 2015 Health Risk Assessment differed from the May 2, 2013 Health Risk Assessment in the following ways:

- Emissions of Arsenic, Benzene, Cadmium, Copper, Lead, Manganese, Nickel and Zinc from the Wet Electrostatic Precipitator were updated to reflect the results of testing performed by South Coast AQMD during October and November, 2013. While South Coast AQMD has indicated that some emissions have increased, particularly Arsenic and 1,3-butadiene, others have decreased. While no single reason can be provided for the slight mass emission increase or decrease for a single compound, some variation has been observed in each HRA - related test program performed since 2008.

Please note that the method used for the test performed by South Coast AQMD during 2013 for Arsenic, Cadmium, Copper, Lead, Manganese, Nickel and Zinc is not consistent with any of the tests performed for these compounds since the WESP was installed in 2008. Since 2008, South

Coast AQMD has required that Quemetco perform WESP metals testing for the compounds named above according to the provisions of California Air Resources Board (CARB) Method 436. South Coast AQMD did not perform CARB Method 436 testing during the October/November, 2013 test program. Therefore, the results from the South Coast AQMD October/November, 2013 test program cannot be compared with test results obtained using CARB Method 436.

Although this testing was performed prior to the January 10, 2014 amendment to South Coast AQMD Rule 1420.1, please note that Rule 1420.1(k)(14) states, "Testing conducted by the facility, by the District, or by a contractor acting on behalf of the District or the facility to determine compliance with this rule shall be performed according to the most recent District-approved test protocol for the same purpose or compounds." For Arsenic, Cadmium, Copper, Lead, Manganese, Nickel and Zinc, the most recent District-approved test protocol for the Wet Electrostatic Precipitator requires the use of CARB Method 436. No other test methods for these compounds have been specified, with the exception of Lead.

Additionally, Rule 1420.1(k)(9) states "The operator may use alternative or equivalent test methods as defined in U.S. EPA 40 CFR 60.2, approved in writing by the Executive Officer, the Air Resources Board, and the U.S. EPA". Quemetco is unaware of written approval of the test method used by South Coast AQMD for Arsenic, Cadmium, Copper, Lead, Manganese, Nickel and Zinc by either the Air Resources Board or U.S. EPA, although approval of both agencies is required.

The Air Resources Board has long-embraced this concept of test method consistency, particularly for smelters and particularly for Arsenic and Cadmium. In the document *Emission Inventory Criteria and Guidelines for the Air Toxics "Hot Spots" Program* (Effective September 26, 2007), the Air Resources Board specifically addresses source testing and measurement as follows:

"A. Source Testing and Measurement.

- (1) Source testing shall be required for sources set forth in Appendix D for the substances specified and in accordance with the measurement methods set forth therein. Exemptions and alternatives are set forth in the third column of Appendix D.
- (2) The ARB-adopted test methods shall be used to fulfill the source test requirements in section IX.A.(1) when the specified conditions exist,..."

Appendix D of that same document states:

- "(1)Each reference to a measurement requirement includes the following requirements for the substances to be tested and type of test to be performed:
- (a) The test shall measure the quantities of all listed substances whose presence in detectable quantities can be determined using the ARB-adopted test method or other method specified in section IX.A. for the substance indicated....

- (b) ARB-adopted test methods which are necessary to characterize associated source conditions, including stack flow rate and moisture content, shall also be performed to ensure a proper source test for the material indicated. These associated tests shall be identified in the proposed source test protocol in the inventory plan.”

Smelters, such as Quemetco, are listed on page D-5 of Appendix D as sources required to obtain a full set of metals data through stack testing.

Alternatives to the ARB-approved methods for certain compounds, including Arsenic and Cadmium are only allowed if both the District and the state board concur.

“C. Alternatives to Required Source Testing.

- (3) If the proposed alternative method is to determine emissions of arsenic or arsenic compounds, beryllium or beryllium compounds, cadmium or cadmium compounds, chromium (hexavalent), benzo(a)pyrene, or chlorinated dioxins and dibenzofurans, the district may approve the proposed alternative only if both the district and the state board concur that the proposed alternative method complies with section IX.C.(1). If the proposal is not approved, the facility shall undertake source testing as required or shall use an alternative method which is determined by the district and the state board to meet the requirements of section IX.C.(1).”

Excerpts from the document referenced above are included in Attachment A to this Health Risk Assessment. Testing performed by South Coast AQMD during October, 2014 more closely adhered to CARB Method 436. Results from these more properly performed tests are consistent with, and in some cases lower than, historical testing performed from 2008 through 2012. The lack of Arsenic on the filter included downstream of the CARB Method 436 sample trains run by South Coast AQMD indicates that a properly performed CARB Method 436 test sufficiently captures metals, including Arsenic.

- Emissions of 1,3-butadiene from the Wet Electrostatic Precipitator (WESP) and for Busch Units A through K were updated to reflect the results of testing performed by Quemetco during February, 2014 as required by South Coast AQMD Rule 1420.1. Results from this testing were approved by South Coast AQMD on April 8, 2014.
- All remaining emissions from the Wet Electrostatic Precipitator (WESP) were obtained from the testing performed during September and October, 2012. These test results were approved by South Coast AQMD on October 8, 2013.
- Emissions of Arsenic, Cadmium, Copper, Lead, Manganese, Nickel and Zinc from Busch Units B and C were updated to reflect the results of testing performed by South Coast AQMD during October and November, 2013.

Please note that the method used for the test performed by South Coast AQMD during 2013 for Arsenic, Cadmium, Copper, Lead, Manganese and Zinc is not consistent with any of the Busch Unit tests performed for these compounds since 2008. Since 2008, South Coast AQMD has required that Quemetco perform Busch Unit metals testing for the compounds named above according to the provisions of California Air Resources Board (CARB) Method 436. South

Coast AQMD did not perform CARB Method 436 testing during the October/November, 2013 test program. Therefore, the results from the South Coast AQMD October/November test program cannot be compared with test results obtained using CARB Method 436.

Although this testing was performed prior to the January 10, 2014 amendment to South Coast AQMD Rule 1420.1, please note that Rule 1420.1(k)(14) states, “Testing conducted by the facility, by the District, or by a contractor acting on behalf of the District or the facility to determine compliance with this rule shall be performed according to the most recent District-approved test protocol for the same purpose or compounds.” For Arsenic, Cadmium, Copper, Lead, Manganese, Nickel and Zinc, the most recent District-approved test protocol for the Busch Units requires the use of CARB Method 436. No other test methods for these compounds have been specified, with the exception of Lead.

Additionally, Rule 1420.1(k)(9) states “The operator may use alternative or equivalent test methods as defined in U.S. EPA 40 CFR 60.2, approved in writing by the Executive Officer, the Air Resources Board, and the U.S. EPA”. Quemetco is unaware of written approval of the test method used by South Coast AQMD for Arsenic, Cadmium, Copper, Lead, Manganese, Nickel and Zinc by either the Air Resources Board or U.S. EPA, although approval of both agencies is required.

The Air Resources Board has long-embraced this concept of test method consistency, particularly for smelters and particularly for Arsenic and Cadmium. In the document *Emission Inventory Criteria and Guidelines for the Air Toxics “Hot Spots” Program* (Effective September 26, 2007), the Air Resources Board specifically addresses source testing and measurement as follows:

“A. Source Testing and Measurement.

- (4) Source testing shall be required for sources set forth in Appendix D for the substances specified and in accordance with the measurement methods set forth therein. Exemptions and alternatives are set forth in the third column of Appendix D.
- (5) The ARB-adopted test methods shall be used to fulfill the source test requirements in section IX.A.(1) when the specified conditions exist,...

Appendix D of that same document states:

“(1)Each reference to a measurement requirement includes the following requirements for the substances to be tested and type of test to be performed:

- (c) The test shall measure the quantities of all listed substances whose presence in detectable quantities can be determined using the ARB-adopted test method or other method specified in section IX.A. for the substance indicated....
- (d) ARB-adopted test methods which are necessary to characterize associated source conditions, including stack flow rate and moisture content, shall also be performed to ensure a proper source test for the material indicated. These associated tests shall be identified in the proposed source test protocol in the inventory plan.”

Smelters, such as Quemetco, are listed on page D-5 of Appendix D as sources required to obtain a full set of metals data through stack testing.

Alternatives to the ARB-approved methods for certain compounds, including Arsenic and Cadmium are only allowed if both the District and the state board concur.

“C. Alternatives to Required Source Testing.

- (6) If the proposed alternative method is to determine emissions of arsenic or arsenic compounds, beryllium or beryllium compounds, cadmium or cadmium compounds, chromium (hexavalent), benzo(a)pyrene, or chlorinated dioxins and dibenzofurans, the district may approve the proposed alternative only if both the district and the state board concur that the proposed alternative method complies with section IX.C.(1). If the proposal is not approved, the facility shall undertake source testing as required or shall use an alternative method which is determined by the district and the state board to meet the requirements of section IX.C.(1).”

Excerpts from the document referenced above are included in Attachment A to this Health Risk Assessment. Testing performed by South Coast AQMD during October, 2014 more closely adhered to CARB Method 436. Results from these more properly performed tests are consistent with, and in some cases lower than, historical testing performed at Quemetco from 2008 through 2012. The lack of Arsenic on the filter included downstream of the CARB Method 436 sample trains run by South Coast AQMD indicates that a properly performed CARB Method 436 test sufficiently captures metals, including Arsenic.

- Benzene emissions from Busch Units A through K, were updated to reflect the results of testing performed by South Coast AQMD during October and November, 2013.
- Emissions of Arsenic, Cadmium, Lead and Nickel from Busch Units A, D, F, G, I and J were updated to reflect the results of testing performed by Quemetco during April, 2013. Results from this testing were approved by South Coast AQMD on March 6, 2014.
- Emissions of Arsenic, Cadmium, Lead and Nickel from Busch Units E, H and K were updated to reflect the results of testing performed by Quemetco during February, 2014. Results from this testing were approved by South Coast AQMD on April 8, 2014.
- Residential receptors were added to represent the houses at 14328 Don Julian.

On March 6, 2015 the South Coast AQMD Governing Board adopted updated risk assessment guidelines developed by OEHHA. On March 17, 2015 South Coast AQMD requested that Quemetco prepare a new Health Risk Assessment utilizing the updated OEHHA guidelines. This submittal addresses the request from South Coast AQMD to prepare a Health Risk Assessment utilizing the updated OEHHA guidelines. This Health Risk Assessment (the “May 19, 2015 Health Risk Assessment”) utilizes the Quemetco November/December, 2014 WESP test results to eliminate the uncertainty related to the unapproved modification to the test method used to develop the emission rates used in the January 12, 2015 and May 9, 2014 Health Risk Assessments. However, this Health Risk Assessment differs from the January 12, 2015 Health Risk Assessment in the following ways:

- The updated OEHHA Risk Assessment Guidance adopted by South Coast AQMD on March 6, 2015 has been utilized through the use of the HARP2 program.
- To support the use of HARP2, an updated, site-specific meteorological data set was prepared based on years 2010 through 2014. The meteorological data was prepared based on the 2010 through 2014 information collected by weather station located at the Quemetco facility. A copy of the meteorological data files are included on the CD accompanying this Health Risk Assessment submittal.

Health Impacts & Rule 1402:

Rule 1402 is intended to reduce health risk associated with emissions of toxic air contaminants from existing sources by specifying limits for Maximum Individual Cancer Risk (MICR), Cancer Burden, and noncancer Acute Hazard Index (HIA) and Chronic Hazard Index (HIC).

Maximum Individual Cancer Risk (MICR) is the estimated probability of a potentially maximally exposed individual contracting cancer as a result of exposure to toxic air contaminants over a period of 70 years for residential receptor locations. The MICR for worker receptor locations must also be calculated.

Cancer Burden is the estimated increase in the occurrence of cancer cases in a population subject to an MICR of greater than or equal to one in one million (1×10^{-6}) resulting from exposure to toxic air contaminants.

Acute Hazard Index (HIA) is the ratio of the estimated maximum one-hour concentration of a toxic air contaminant at a receptor location to its acute reference exposure level.

Chronic Hazard Index (HIC) is the ratio of the long-term level of exposure to a toxic air contaminant for a potentially maximally exposed individual to the chronic reference exposure level for the toxic air contaminant.

Rule 1402 establishes Action Risk Levels of 25 in one million for MICR, 0.5 for Cancer Burden and 3.0 for HIA and HIC. As of the date of this Health Risk Assessment, South Coast AQMD has not amended Rule 1402 to reflect the impacts of the new OEHHA guidance.

List Identifying Emitted Substances:

Table 1 identifies historically and currently emitted substances which are evaluated as potential contributors to cancer and non-cancer risk. The list contains the names of 85 compounds as well as their respective CAS numbers. While Acrolein is identified on this list, at the direction of South Coast AQMD Acrolein emissions are not included in the Health Risk Assessment because of test method uncertainty.

Table 3 – List of Emitted Substances

CHEM	CAS	Abbreviation	Pollutant Name
0001	56235	CCl4	Carbon tetrachloride
0002	56553	B[a]anthracene	Benz[a]anthracene
0003	67663	Chloroform	Chloroform
0004	71432	Benzene	Benzene
0005	74839	Methyl Bromide	Methyl bromide {Bromomethane}
0006	74873	Methyl Chloride	Methyl chloride {Chloromethane}
0007	75003	Ethyl Chloride	Ethyl chloride {Chloroethane}
0008	75014	Vinyl Chloride	Vinyl chloride
0009	75070	Acetaldehyde	Acetaldehyde
0010	75092	Methylene Chlor	Methylene chloride {Dichloromethane}
0011	75354	Vinylid Chlorid	Vinylidene chloride
0012	75694	TriClFluorMetha	Trichlorofluoromethane {Freon 11}
0013	76131	CFC-113	Chlorinated Fluorocarbon {CFC-113} {1,1,2-Trichloro-1,2,2-trifluoroethane}
0014	78875	1,2-DiClPropane	1,2-Dichloropropane
0015	79005	1,1,2TriClEthan	1,1,2-Trichloroethane
0016	79016	TCE	Trichloroethylene
0017	115071	Propylene	Propylene
0018	120127	Anthracene	Anthracene
0019	120821	1,2,4TriClBenz	1,2,4-Trichlorobenzene
0020	123911	1,4-Dioxane	1,4-Dioxane
0021	127184	Perc	Perchloroethylene {Tetrachloroethene}
0022	129000	Pyrene	Pyrene
0023	191242	B[g,h,i]perylen	Benzo[g,h,i]perylene
0024	192972	B[e]pyrene	Benzo[e]pyrene
0025	193395	In[1,2,3-cd]pyr	Indeno[1,2,3-cd]pyrene
0026	198550	Perylene	Perylene
0027	205992	B[b]fluoranthen	Benzo[b]fluoranthene
0028	206440	Fluoranthene	Fluoranthene
0029	207089	B[k]fluoranthen	Benzo[k]fluoranthene
0030	208968	Acenaphthylene	Acenaphthylene
0031	218019	Chrysene	Chrysene
0032	1330207	Xylenes	Xylenes (mixed)
0033	50000	Formaldehyde	Formaldehyde
0034	50328	B[a]P	Benzo[a]pyrene
0035	53703	D[a,h]anthracen	Dibenz[a,h]anthracene
0036	79345	TetraClEthane	1,1,2,2-Tetrachloroethane
0037	83329	Acenaphthene	Acenaphthene
0038	85018	Phenanthrene	Phenanthrene

CHEM	CAS	Abbreviation	Pollutant Name
0039	86737	Fluorene	Fluorene
0040	91203	Naphthalene	Naphthalene
0041	91576	2MeNaphthalene	2-Methyl naphthalene
0042	95476	o-Xylene	o-Xylene
0043	100414	Ethyl Benzene	Ethyl benzene
0044	100425	Styrene	Styrene
0045	106467	p-DiClBenzene	p-Dichlorobenzene
0046	106934	EDB	Ethylene dibromide {EDB}
0047	106990	1,3-Butadiene	1,3-Butadiene
0048	107028	Acrolein	Acrolein
0049	107062	EDC	Ethylene dichloride {EDC}
0050	108883	Toluene	Toluene
0051	108907	Chlorobenzene	Chlorobenzene
0052	1336363	PCBs	PCBs {Polychlorinated biphenyls}
0053	1746016	2,3,7,8-TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin
0054	3268879	1-8OctaCDD	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin
0055	7439921	Lead	Lead
0056	7439965	Manganese	Manganese
0057	7439976	Mercury	Mercury
0058	7440020	Nickel	Nickel
0059	7440382	Arsenic	Arsenic
0060	7440417	Beryllium	Beryllium
0061	7440439	Cadmium	Cadmium
0062	7440508	Copper	Copper
0063	7440666	Zinc	Zinc
0064	7782492	Selenium	Selenium
0065	7783064	H2S	Hydrogen sulfide
0066	18540299	Cr(VI)	Chromium, hexavalent (& compounds)
0067	19408743	1-3,7-9HxCDD	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin
0068	25321226	DiClBenzenes	Dichlorobenzenes (mixed isomers)
0069	35822469	1-4,6-8HpCDD	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
0070	39001020	1-8OctaCDF	1,2,3,4,6,7,8,9-Octachlorodibenzofuran
0071	39227286	1-4,7,8HxCDD	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin
0072	40321764	1-3,7,8PeCDD	1,2,3,7,8-Pentachlorodibenzo-p-dioxin
0073	51207319	2,3,7,8-TCDF	2,3,7,8-Tetrachlorodibenzofuran
0074	55673897	1-4,7-9HpCDF	1,2,3,4,7,8,9-Heptachlorodibenzofuran
0075	57117314	2-4,7,8PeCDF	2,3,4,7,8-Pentachlorodibenzofuran
0076	57117416	1-3,7,8PeCDF	1,2,3,7,8-Pentachlorodibenzofuran
0077	57117449	1-3,6-8HxCDF	1,2,3,6,7,8-Hexachlorodibenzofuran
0078	57653857	1-3,6-8HxCDD	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin
0079	60851345	2-4,6-8HxCDF	2,3,4,6,7,8-Hexachlorodibenzofuran

CHEM	CAS	Abbreviation	Pollutant Name
0080	67562394	1-4,6-8HpCDF	1,2,3,4,6,7,8-Heptachlorodibenzofuran
0081	70648269	1-4,7,8HxCDF	1,2,3,4,7,8-Hexachlorodibenzofuran
0082	72918219	1-3,7-9HxCDF	1,2,3,7,8,9-Hexachlorodibenzofuran
0083	7440224	Silver	Silver
0084	7440360	Antimony	Antimony

Emission rates, expressed in pounds per hour and pounds per year, for each emission source and contaminant are provided in Attachment B. Facility total emissions are also presented.

Multipathway Substances:

A list of multipathway substances evaluated and the pathways each impacts is displayed below. Possible pathways for this analysis include inhalation, soil (dermal), mother's milk, home-grown vegetables and oral (ingestion).

Table 4 – Multipathway Pollutants & Pathways

Substance	Inhalation	Soil	Mother's Milk	Vegetables	Oral
PAHs	X	X	X	X	X
PCBs	X	X	X	X	X
Cadmium	X	X		X	X
Chromium	X	X		X	X
Beryllium	X	X		X	X
Arsenic	X	X		X	X
Lead	X	X	X	X	X
Mercury	X	X		X	X
Nickel	X	X		X	X
Dioxins & Furans	X	X	X	X	X

Summary of Results:

A summary of the results of the exposure assessment is presented below. Multi-pathway exposure was considered. The Summary of Results includes a location (including UTM coordinates) and description for the point of maximum impact (PMI), maximum exposed individual resident (MEIR), maximum exposed individual worker (MEIW) chronic hazard index (HIC) and acute health index (HIA). For comparison with the January, 2015 HRA the Table 5 reflects the risk at the receptor locations utilized in the January, 2015 HRA.

Table 5 - Summary of Results

Exposure Assessment	Result	Location (UTME, UTMN)
Off-Site Point of Maximum Impact (PMI)	9.27×10^{-5}	221 meters East of WESP Stack (409238, 3765563, Receptor 5252)
Maximum Exposed Individual Resident (MEIR)	3.83	824 meters NW of WESP Stack (408989, 3766076, Receptor 10756)
Maximum Exposed Individual Worker (MEIW)	1.62×10^{-6}	212 meters East of WESP Stack (409480, 3765302, Receptor 10138)
Cancer Burden	1.74×10^{-1}	See 1 In One Million Isopleth
Chronic Health Index, Resident (HICR)	0.02	824 meters NW of WESP Stack (408989, 3766076, Receptor 10756)
Chronic Health Index, Worker (HICW)	1.78	212 meters East of WESP Stack (409480, 3765302, Receptor 10138)
Acute Health Index (HIA)	0.12	89 meters SE of WESP Stack (409287, 3765113, Receptor 4753)

Attachment C contains detailed results, including multipathway results, for each exposure assessment contained in Table 5.

Attachment D contains maps depicting the locations of the PMI, MEIR, MEIW, HIC (Residence), HIC (Worker) and HIA. A list of sensitive receptors within the Zone of Impact is also included in Attachment D.

Summary of Cancer Risk:

Attachment C contains tables presenting an overview of the total potential multipathway cancer risk, by substance, at the PMI, MEIR and MEIW. The risk at the MEIR is 3.83 in one million. The risk at the MEIW is 1.62 in one million.

In each location, Arsenic is the primary contributor to risk and Chromium (VI) is the second highest contributor to risk. For each of the three (3) evaluations (PMI, MEIR and MEIW) the top three (3) risk drivers are the same:

- Arsenic
- Chromium (VI)
- TCE

The tables in Attachment C indicate, by rank, the contribution of each contaminant to risk as well as the cumulative contribution. Attachment C is used to demonstrate for each evaluation the contributors causing 90% or more of the risk.

Summary of Chronic Health Risk:

Maximum Chronic Health Risk (Residential) is 0.02. The Central Nervous System pathway provides the greatest chronic health risk with Arsenic as the primary contributor.

Maximum Chronic Health Risk (Worker) is 1.78. The Central Nervous System pathway provides the greatest chronic health risk with Arsenic as the primary contributor.

Summary of Acute Health Risk:

Maximum Acute Health Risk is 0.12. The Development and Reproductive Systems are the pathways with the highest impact. Arsenic and Mercury are the primary contributors to acute health risk.

Subpopulations:

No subpopulations of concern were identified when reviewing the areas within the one in one million isopleth.

Summary of Cancer Burden (Population Exposure):

The Cumulative Cancer Burden associated with facility operations is 1.74×10^{-1} . Based on the data contained in the HARP program, a population of approximately 61,583 is located within the boundary of the 1 In One Million Isopleth (see Attachment D). Cancer burden and population estimates from HARP are included in Attachment C.

Lead Non-Cancer Assessment:

Non-cancer health risks from lead are not assessed using the standard Hazard Index approach. Instead, in 2001 ARB prepared an alternate risk assessment methodology, *Risk Management Guidelines for New, Modified, and Existing Sources of Lead* (Lead RM Guidelines), that is referred to in Appendix F of the OEHHA Air Toxics Hot Spot Program Guidance Manual (2003). This guidance should typically be followed for lead-emitting facilities conducting an AB 2588 HRA. SCAQMD's emission limits for lead, however, are more stringent than the Lead RM Guidelines. The SCAQMD's Rule 1420.1 requires Quemetco to meet an ambient concentration of $0.15 \mu\text{g}/\text{m}^3$ lead averaged over any 30 consecutive days. This threshold is designed to ensure compliance with the lead National Ambient Air Quality Standard (NAAQS) established in 2008 of $0.15 \mu\text{g}/\text{m}^3$ lead averaged over a rolling 3-month average. The Rule 1420.1 ambient lead concentration limit is more stringent than either the current state or the pre-2008 lead NAAQS available at the time that the Lead RM Guidelines were issued. SCAQMD staff determined (with the concurrence of staff from OEHHA and ARB) that since Quemetco's offsite concentrations met the Rule 1420.1 limit of $0.15 \mu\text{g}/\text{m}^3$ during the HRA period, the risks would be

below thresholds established in the Lead RM Guidelines. Therefore, Quemetco's May, 2015 HRA does not include an evaluation of non-cancer impacts from lead.

Dispersion Modeling & Exposure Assessment:

All modeling and exposure assessments were performed using the California Air Resources Board's Hotspots Analysis and Reporting Program, Version 2 (HARP2). Exposure assessment was performed according to the procedures outlined in the document, "Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments", OEHHA, 2015 (the "OEHHA Guidance Manual").

Hazard Identification:

In performing the Health Risk Assessment, the substances identified in Table 1 (presented earlier) were evaluated. Substances were selected for evaluation based on historical emissions, process knowledge and direction by South Coast Air Quality Management District to include specific substances in testing programs designed to determine the effectiveness of facility air pollution control devices. Each substance listed in Table 1 (except for Acrolein) was evaluated for cancer risk and/or noncancer acute and chronic health impacts. Refer to Attachment B for 1-hour and annual emission rates (where applicable) for each substance listed in Table 3.

Information on the Facility and Its Surroundings:

Facility Name: Quemetco, Inc.

Facility Identification
Number: 008547

Facility Location: 720 S. 7th Avenue
City of Industry, CA 91746

UTM Coordinates: 409087.73 E 3765313.27 N, Zone 11 (Southwest Corner of Facility)

Land Use Type: Urban

Source Description and Release Parameters:

Table 6 contains the source description and release parameter information for each source of emissions at the facility.

Table 6 - Source Description and Release Parameter Information

Source ID	Stack ID	Stack Name	Release Type	UTM East (m)	UTM North (m)	Elevation (ft)	Release Height (ft)	Temp (Deg F)	Velocity (ft/min)	Stack Diameter (ft)
S001	23	WESP Stack	Point	409269.1	3765291.4	303.9	70	80.9	2,494.880	6.67
S002	5	Busch Unit A	Point	409168.7	3765360.9	301.8	33.13648	102.5	3,516.203	3.871
S003	6	Busch Unit B	Point	409172.7	3765357.8	301.8	33.13648	98.8	2,776.09	3.871
S004	7	Busch Unit C	Point	409176.6	3765353.9	301.8	33.13648	111.6	1,735.034	3.871
S005	8	Busch Unit D	Point	409180.6	3765350.4	301.8	33.13648	137.8	1,7156.262	3.871
S006	9	Busch Unit E	Point	409280.9	3765382.8	298.5	33.13648	85.7	2,785.353	3.871
S007	10	Busch Unit F	Point	409284.3	3765387.0	298.5	33.13648	91.5	3,975.901	3.871
S008	11	Busch Unit G	Point	409287.7	3765391.1	297.4	33.13648	89.9	4,211.205	3.871
S009	12	Busch Unit H	Point	409291.1	3765395.1	295.9	33.13648	101.5	2,290.965	3.871
S010	13	Busch Unit I	Point	409294.5	3765399.3	295.2	33.13648	103.2	2,654.341	3.871
S011	14	Busch Unit J	Point	409302.0	3765377.1	298.5	33.13648	80.8	4,436.133	3.871
S012	15	Busch Unit K	Point	409303.6	3765378.9	298.1	33.13648	74	4,514.776	3.871

Source Operating Schedule:

The operating schedule is defined by a permit condition limiting furnace feed to 600 tons per day. The facility operates up to 24 hours per day. The facility is typically shut down several days each year for furnace rebuild and significant maintenance projects. However, for the purposes of this Health Risk Assessment emissions are calculated assuming that the facility feeds 600 tons of lead bearing materials to its furnace each day, 365 days per year.

Emission Control Equipment:

Emissions are reduced by baghouses and scrubbers throughout the facility. The four main processing units are controlled by the WESP which achieves greater than 95% reduction of Arsenic and Lead. Furnaces are operated under negative pressure, as required by South Coast AQMD Rule 1420.1, assuring that furnace emissions are routed through the appropriate air pollution control systems. The RTO achieves significant reduction in organic emissions from the Rotary Kiln. Busch Units

significantly reduce particulate emissions from the general ventilation areas with all buildings maintained under negative pressure as required by South Coast AQMD Rule 1420.1.

Emissions Data Grouped By Source:

Refer to Attachment B.

Emissions Data Grouped By Substance:

Refer to Attachment B.

Emission Estimation Methods:

As described in the *Changes from Previous Report* section, emissions from the WESP and the Busch Units are based on source tests performed on each unit.

- Emissions rates for Arsenic, Benzene, Cadmium, Copper, Lead, Manganese, Nickel and Zinc from the Wet Electrostatic Precipitator were obtained directly from the results of testing performed by Quemetco during November and December, 2014. See Attachment A for these results.
- Emissions of 1,3-butadiene from the Wet Electrostatic Precipitator (WESP) were obtained directly from the results of testing performed by Quemetco during November and December, 2014. Emissions of 1,3-butadiene for Busch Units A through K were obtained directly from the results of testing performed by Quemetco during February, 2014 as required by South Coast AQMD Rule 1420.1. Results from this testing were approved by South Coast AQMD on April 8, 2014. See Evaluation of Source Test Report R14108 included in Attachment A.
- All remaining emissions from the Wet Electrostatic Precipitator (WESP) were obtained directly from the testing performed during November and December, 2014.
- Emissions of Arsenic, Cadmium, Copper, Lead, Manganese, Nickel and Zinc from Busch Units B and C were obtained directly from the results of testing performed by South Coast AQMD during October and November, 2013. See Attachment A for these results.
- Benzene emissions from Busch Units A through K, were obtained directly from the results of testing performed by South Coast AQMD during October and November, 2013. See Attachment A for these results.
- Emissions of Arsenic, Cadmium, Lead and Nickel from Busch Units A, D, F, G, I and J were obtained directly from the results of testing performed by Quemetco during April, 2013. Results from this testing were approved by South Coast AQMD on March 6, 2014. See Evaluation of Source Test Report R13502 included in Attachment A.
- Emissions of Arsenic, Cadmium, Lead and Nickel from Busch Units E, H and K were obtained directly from the results of testing performed by Quemetco during February, 2014. Results from

this testing were approved by South Coast AQMD on April 8, 2014. See Evaluation of Source Test Report R14107 included in Attachment A.

Meteorological Data:

The source of meteorological data is on-site met station information. A five-year data set (2010 – 2014) suitable for use with HARP2 has been developed from data collect at Quemetco's on site weather station. The electronic meteorological data file is included on the CD provided with the Health Risk Assessment submittal.

Model Selection and Modeling Rationale:

All modeling and exposure assessments were performed using the California Air Resources Board's Hotspots Analysis and Reporting Program, Version 2 (HARP2). A 100 meter x 100 meter grid was established around the facility with receptors placed at 100 meter intervals.

Air Dispersion Modeling Results:

All air dispersion modeling results are provided on the CD provided with this Health Risk Assessment submittal. The source and the time period used are described in the Meteorological Data section of this report. As required, all modeling and exposure assessments were performed using the California Air Resources Board's Hotspots Analysis and Reporting Program, Version 2 (HARP2). Model options reflect the directives stipulated by South Coast AQMD in their August 7, 2009 correspondence. A 100 meter x 100 meter grid was established around the facility with receptors placed at 100 meter intervals.

Health Risk Assessment Results and Reports:

The results of the Health Risk Assessment are presented in the Executive Summary. All electronic files required to confirm the results of the Health Risk Assessment are included on the CD accompanying this submittal.

Risk Characterization:

All information describing multipathway cancer and non-cancer risks are discussed in the Executive Summary. Supporting documentation is provided in Attachments A through D and on the CD which accompanies this submittal.