

# **Chevron Renewal Project Neighborhood Air Quality Monitoring**

## **Work Plan for Monitoring**

### **1. Overview**

This Work Plan for Monitoring (Work Plan) is being submitted to the City of Richmond Planning and Building Services Department in partial completion of Chevron Renewal Project Neighborhood Air Quality Monitoring requirements stated in the Chevron Renewal Project, Richmond Community Benefits Agreement, Section 2.F(2) (RCBA). See Appendix A.

The purpose of the Work Plan is to outline an air quality assessment that provides ground level air quality monitoring data in the neighborhoods surrounding the Chevron Richmond Refinery. The neighborhoods of particular interest are identified in the RCBA as North Richmond [aka. Shields-Reid], Point Richmond, and Atchison Village.

The focus of this Work Plan is to map out the general scope of the project and establish a process for gathering input and review from City staff and neighborhood councils. Technical details such as monitoring equipment specifications, a final list of compounds to be monitored, and the specific analytical methods, will be developed as input from City and neighborhood review helps finalize the project scope.

The RCBA requires Chevron to initiate discussions with the City on this air quality monitoring project by October 1, 2008, submit a work plan for monitoring by October 14, 2008 (i.e. 90 days after the effective date of the RCBA), and initiate monitoring within 90 days of City approval of the Work Plan. Steps taken by Chevron to initiate discussions with the City by October 1, 2008 are summarized in an e-mail from Chamberlin to Thompson, dated September 29, 2008.

The Work Plan herein submitted includes a comprehensive review period in which the City and affected neighborhood councils will have an opportunity to shape the scope of the monitoring program prior to final approval of the Work Plan by the City. This review period is needed to both ensure the study will have credibility with the neighborhood councils and to enable Chevron to anticipate the most probable sampling facilities and get a head start on equipment procurement. This approach is necessary to meet the third schedule requirement, specifically to initiate monitoring within 90 days of City approval of the Work Plan.

Chevron proposes a program for spending \$1 million in accord with the requirements of the RCBA. However, the neighborhood councils may recommend changes to ensure the program addresses their concerns and priorities.

The Chevron proposal includes:

1. Open-path monitoring on approximately one fourth of the refinery fence line that borders the adjacent neighborhoods. Limiting the scope of fence line monitoring allows more comprehensive point sampling in the neighborhoods.
2. Construction of one point-sampling station which is placed in each of the three neighborhoods for a period of 1 year. This approach allows more comprehensive point sampling in the neighborhoods by limiting the cost of sampling facilities. Considering population levels in the areas in and around the three neighborhoods, Chevron

recommends sampling first in Atchison Village, then North Richmond, then Point Richmond.

3. A set of compounds to sample and analyze considering the Refinery's Toxic Risk Inventory reporting, Renewal Project health risk drivers, the Conditional Use Permit (CUP) "6 Elements", BAAQMD toxics monitoring program risk drivers, California Air Resources Board (CARB) SB-25 program chemicals, RCBA requirements, and the costs of the various samples. (e.g. a compound that does not appear to be a significant risk in this area and is expensive to analyze would not be included in the set.)
4. Approximate location of sampling points. Selecting sampling locations is a complex process which considers availability of electric power supplies, security, noise impacts on residents, and proximity to other sources of pollution, such as the rail yard and I-580. Specific locations are best identified through direct discussions with the neighborhood councils during the Work Plan review.
5. Sample frequencies were selected to maximize data for compounds of most interest. Sample frequencies may vary as the project progresses to shift focus as actual sample results become available, and to ensure data is collected during planned refinery events such as planned process unit shutdowns and flaring.
6. Type and formats for disseminating sample data. Chevron's proposal assumes a website developed and managed by the firm that is contracted to supply and operate the sampling facilities. The format and content would be developed with input from the neighborhood councils. Chevron would also be willing to meet periodically with the neighborhood councils to review sampling results.

## **Schedule**

Appendix B presents a preliminary schedule for completing the Work Plan review and monitoring. It shows the Work Plan review, including input from the neighborhood councils and City-review of a final Work Plan occurring from October 2008 through June 2009. Then fence line sampling beginning in September 2009 and the first neighborhood site sampling beginning in January 2010. The schedule also includes follow up meetings with City staff to review progress and make adjustments to the sampling plans (chemicals being sampled, sample schedule, etc.) as sample results are gathered and analyzed.

The schedule will be revised as part of the final Work Plan to reflect actual equipment and site requirements and work out such details as the time needed to move the sample site from one neighborhood to the next.

The actual timing of project execution will be impacted by several factors. It may take longer than expected to reach a suitable level of consensus among the neighborhood councils and other stakeholders on selecting site locations, monitoring priorities, and data display formats. Sampling equipment deliveries may take longer than expected. Field work can be delayed for a variety of reasons. For instance BAAQMD reported that it can take 3-to-6 months just to get an electric service connection from PG&E.

The following Work Plan sections provide information as required by RCBA Section 2.F(2):

### **A. Identification of all potential downwind neighborhoods**

- B. **Identification of the compounds or families of compounds that will be monitored (shall include VOCs, metals, H2S, PAHs, PM-2.5)**
- C. **Identification of the monitoring methodology**
- D. **Means of gathering, maintaining, and disseminating quality-assured data to City, BAAQMD, public for 2 years or more**
- E. **Means of quality assurance and quality control**

## 2. Work Plan

- A. **Identification of all potential downwind neighborhoods considering meteorological data as well as land use, where potential residential exposures to refinery emissions can occur. RCBA 2.F(2)(a).**

Since the wind blows from all directions, all Richmond neighborhoods are potentially downwind from the Refinery. However, focusing on those neighborhoods that are closest to, the refinery makes this air quality survey most useful.

Appendix C is a map of Richmond Neighborhoods showing that the three neighborhoods listed in the RCBA (North Richmond, Point Richmond, and Atchison Village) and Iron Triangle are the closest neighborhoods and that these neighborhoods span the entire refinery boundary with the City of Richmond. A survey of these neighborhoods would be most representative of any refinery impacts. Iron Triangle was not listed in the RCBA. Sampling in North Richmond and Atchison Village would be representative of the northern and southern sections (respectively) of this neighborhood.

All other neighborhoods, except Parchester Village and Point San Pablo are downwind from these neighborhoods when the wind is from the refinery. Parchester Village is only slightly off the line with North Richmond, is 3.5 miles away, and, because of its small size and distance from the refinery, does not experience wind from the refinery very often. The wind rose for Point San Pablo in Renewal Project FEIR Figure 4.3-1 (Appendix D) shows that winds through this neighborhood are almost never from the Refinery

Appendix E is a map of Richmond Neighborhoods with the wind rose for Richmond from Renewal Project FEIR Figure 4.3-1. It shows that the standard ground-level wind pattern is from the San Francisco Bay to the South, through the adjacent neighborhoods, then onto the refinery and north to the San Pablo Bay and Carquinez Straights. Winds from the Refinery do not affect any neighborhood sixty percent of the time. North Richmond, Iron Triangle and Atchison Village are downwind from the refinery only ten-to-fifteen percent of the time. Point Richmond is about twenty percent.

For the above reasons, this Work Plan focuses on the three neighborhoods listed in the RCBA. Specific sampling locations within these neighborhoods would be determined through direct discussions with the City and those neighborhood councils.

- B. **Identification of the compounds or families of compounds that will be monitored. This shall include VOCs, metals, H2S, PAHs, PM-2.5). RCBA 2.F(2)(b).**

The selection of compounds is based on community interest, typical refinery emissions, especially those associated with the Renewal Project, comparable monitoring and studies conducted by the refinery, the Bay Area Air Quality Management District (BAAQMD) and the California Air Resources Board (CARB), and Renewal Project permit requirements. The compounds of most interest are called “focus compounds” in this Work Plan. Sampling methods are selected to ensure focus compounds are analyzed. Additional compounds will be analyzed because they are included in the normal analysis for one or more of the focus compounds. For instance the analysis that identifies any metal in a sample would normally report the quantities of nearly all metals in that sample.

The following table summarizes Appendix F (described in the next paragraph) by listing the focus compounds and their bases for selection.

| <b>Focus Compound</b>                           | <b>Basis for Selection</b>                          |
|---|---|
| <b>VOCs (PAHs listed below)</b>                 |   |
| Total VOC (POC, NMHC, etc.,)                    | RCBA 2.F(2)   |
| 1,3-Butadiene                                   | BAAQMD, CARB  |
| Benzene   | BAAQMD, CARB, Renewal Project                       |
| Ethylbenzene                                    | CARB  |
| <b>Metals</b>                                   |   |
| Arsenic   | CARB, Renewal Project                               |
| Cadmium   | "6 Elements", Renewal Project                       |
| Chromium (including hexavalent)                 | BAAQMD, CARB  |
| Lead  | CARB  |
| Manganese compounds                             | CARB  |
| Nickel  | CARB, Renewal Project                               |
| Vanadium compounds                              | "6 Elements"  |
| <b>PAHs (Polycyclic Aromatic Hydrocarbons)</b>  |   |
| Benzo(a)pyrene                                  | CARB  |
| <b>Criteria Air Pollutants</b>                  |   |
| Hydrogen Sulfide (H <sub>2</sub> S)             | RCBA 2.F(2), Renewal Project, "6 Elements" (sulfur) |
| PM 2.5  | RCBA 2.F(2)   |
| SO <sub>x</sub> (sulfur)                        | "6 Elements" (sulfur)                               |
| <b>Other Toxic Air Contaminants</b>             |   |
| Acetaldehyde                                    | CARB  |
| Carbon Tetrachloride                            | CARB, BAAQMD  |
| Chlorine  | Renewal Project                                     |
| Dioxins/furans                                  | CARB, Renewal Project                               |
| Formaldehyde                                    | CARB, BAAQMD  |
| Methylene Chloride                              | CARB  |
| Sulfur (See H <sub>2</sub> S, SO <sub>2</sub> ) | "6 Elements", Renewal Project                       |
| Tetrachloroethylene (PERC)                      | CARB  |
| Vinyl Chloride                                  | CARB  |

Appendix F is a compendium of these compounds with an “X” showing which of the above groups they belong to. The compounds considered to be typical refinery emissions are those that the refinery includes in the annual EPA Toxic Release Inventory (TRI). Those associated with the Renewal Project are those that are addressed by permit conditions. The following paragraphs

summarize BAAQMD and CARB air sampling programs. A map of sampling sites in Richmond may be found in Appendix G.

BAAQMD operates twenty-five air monitoring stations in the Bay Area. These stations monitor a variety of criteria air pollutants and toxic air contaminant. They are used by the BABQMD to meet federal and state requirements and to guide various air pollution management programs. Two of these stations, plus an H2S monitoring station, are located in Richmond. (See Appendix G.) More information about the BAAQMD's Toxic Air Contaminant Control Program can be found at [http://www.baaqmd.gov/pmt/air\\_toxics/annual\\_reports/index.htm](http://www.baaqmd.gov/pmt/air_toxics/annual_reports/index.htm).

In addition, a special-project monitoring station, similar to one proposed in this Work Plan, and to the one used by CARB for SB-25 sampling in Crockett, is now operating in Berkeley at the corner of 6<sup>th</sup> and Camelia Streets.

[The California Ambient Dioxin Air Monitoring Program](#) (CADAMP) is a rigorous, two-year study on dioxin levels in the Bay Area air basin and in Southern California managed by CARB. BAAQMD staff provides the local support for CADAMP sampling at their Crockett, Oakland, San Jose, Livermore, and **Richmond (7<sup>th</sup> Street)** monitoring stations. The District also operates a sixth sampling site in San Francisco on the same sampling schedule as the CADAMP sites. More information on this program can be found at <http://www.arb.ca.gov/aaqm/qmosopas/dioxins/dioxins.htm>.

CARB, in conjunction with regional air districts, such as the BAAQMD, manages an extensive network of monitoring stations throughout the state. In 2003 CARB completed sampling and reporting of toxic air contaminants for the Children's Environmental Health Protection Program (SB-25). The purpose of SB-25 was to determine if CARB's state-wide air quality monitoring network is representative of air quality in areas where children may have higher exposure. The town of Crockett, 15 miles northeast of Richmond, where Interstate-80 crosses Carquinez Straight, is one of six locations in the state chosen for special monitoring. More information on this program can be found at <http://www.arb.ca.gov/ch/programs/sb25/sb25.htm>.

### **C. Identification of the monitoring methodology**

- i. Total and speciated VOCs by DIAL, or similar (refinery perimeter OK)**
- ii. Single point monitoring in neighborhoods (Atchison Village, Point Richmond, North Richmond)**

The RCBA requires two approaches to community air quality monitoring: open path, fence line sampling, such as DIAL or similar technology, and single point monitoring in the neighborhoods. The Work Plan requires a balance between these two approaches.

To give an idea of this balance, Chevron's initial cost estimates show that installing a fence line system that covers the entire boundary between the refinery and the closest neighborhoods would allow for point sampling in only one neighborhood. If the fence line system was reduced to cover one fourth of the refinery-neighborhood boundary, in the most strategic spot, then point sampling in all three of the neighborhoods specified in the RCBA could be accomplished. Chevron's proposal emphasizes point sampling in the neighborhoods because point sample

systems are capable of analyzing many more compounds and with more accuracy than fence line systems.

The following discussion refers to information contained in Appendix H. This is a proposal prepared by Argos Scientific, Inc. (Argos) to assist Chevron with initial planning for this project. Argos is the company that operates the ConocoPhillips Refinery fence line system. Although the Argos proposal differs in some ways from this Work Plan, it does contain much useful information.

Appendix I contains a report by Chevron technologists that provides an excellent summary of basic air monitoring technologies considered by this Work Plan. The following discussions assume the reader has some familiarity with the technologies described in this document.

### **Fence Line Monitoring**

For the fence line portion of the Work Plan, Chevron plans to install a single open path ultra-violet differential optical absorption spectroscopy (UV-DOAS) air monitoring station. As shown in Table 5 of Appendix H (page 10), the Lidar (DAIL) system listed in the RCBA by itself would cost four times the RCBA's expenditure limit and was not given further consideration. Of the remaining similar open-path technologies shown in this table, UV-DOAS (specifically, a UV Hound Portable Air Monitor described in Appendix J) was selected on account of its lower cost and wider range of chemicals it can sample. The facility would also include a meteorological station and equipment for canister sampling should additional speciation be needed.

The UV fence line monitor can be set up to measure total VOCs, benzene, toluene, xylene, ozone, sulfur dioxide, carbon disulfide, phenol and chlorine per EPA Reference Method TO-16.

This monitor would cover a 900 meter section of the refinery fence line near Atchison Village. This location would be between monitoring sites 3 and 5 in Appendix G. It would operate for a period of 2 years per the RCBA.

### **Single Point Monitoring in Neighborhoods**

For single point monitoring in neighborhoods, Chevron plans to purchase and assemble a monitoring station that would be contained within a trailer, a van, or an enclosure that can be placed on the roof of a building. Continuous and discrete sampling equipment would be employed as needed to gather useful measurements for the focus compounds (and others as yielded by the measurement methods). The monitoring station would be operated in each of the three neighborhoods for one year (three years total).

In order to produce reliable data that can be compared to similar BAAQMD and CARB studies and monitoring programs, equipment and sample analysis methods and protocols will be the same or similar to ones used in those programs. The details of these methods and protocols will be developed more fully and finalized in conjunction with the Work Plan review process.

Chevron conferred with CARB and BAAQMD to determine if there was an opportunity to incorporate this study with other studies or programs being pursued by these agencies. None were found.

Brief descriptions of the types of analytical equipment, reference methods, and sampling schedules can be found in the following cost estimate summary. (See Appendix K.)

### **Cost Estimate:**

As a starting point, this Work Plan includes an initial cost estimate of the proposed facilities and sampling program. The estimate confirms that Chevron's full \$1 million commitment will be utilized and gives an idea of the cost impact of changes, such as increasing sampling frequency or adding sampling instruments, which might be considered.

These estimates are based on very preliminary data and without the benefit of knowing exactly which facilities will be provided and in which locations. As with any complex project, actual costs are expected to differ from this estimate due to better development and understanding of details in the scope of work, changes in costs of equipment and materials, changes in sample analytical costs and frequencies, dealing with unexpected problems at the sampling sites, bad weather, equipment failures, and so on. The estimate will be developed more fully in conjunction with the Work Plan review and will be maintained as the project progresses to provide information on remaining project funds.

Chevron anticipates that the project scope will also be adjusted throughout the project as actual costs data is gathered—similar to the scope adjustments to be made as sample results are attained. These changes will be reviewed with the City during the regular project review meetings. Chevron will monitor project costs in detail with the comprehensive cost management system used for all refinery projects.

#### **D. Means of gathering, maintaining, and disseminating quality-assured data to City, BAAQMD, public for 2 years or more**

The facilities included in the Work Plan include provisions for setting up and operating a publicly available web site that posts continuous and discrete sample data as it is produced and certified. All sample results and meteorological data will be posted on this site. The content and form of the web site will be finalized during the Work Plan review process.

#### **E. Means of quality assurance and quality control**

As described in Section 2.B above sampling and analysis will follow rigorous protocols to ensure the data from this study can be compared to similar data produced by CARB and BAAQMD studies and monitoring programs. The details of these methods and protocols will be developed more fully and finalized in conjunction with the Work Plan review process.

### **3. List of Appendices:**

- A. Richmond Community Benefits Agreement Section 2.F(2).
- B. Richmond Community Monitoring Project Schedule
- C. Richmond Neighborhood Map
- D. Renewal Project FEIR Figure 4.3-1. Wind Roses...
- E. Richmond Neighborhood Map with Wind Rose
- F. Compounds Selection Table
- G. Richmond Neighborhood Map showing BAAQMD, CARB, and Chevron Monitoring Sites
- H. Argos Scientific, Inc. Proposal for Fenceline and Community Monitoring Network at the Chevron Richmond Refinery.
- I. *Novel Facility Fenceline Ambient Monitoring Techniques* by Chevron ETC Technology Development Project
- J. UV Hound Technical Brochure
- K. Cost Estimate and Measurement Methods