Community Air Monitoring Plan Guidance

California Environmental Protection Agency

Department of Toxic Substances Control

January 2020

Our Vision

Californians enjoy a clean and healthy environment, and as a result of our efforts:

- Communities are confident that we protect them from toxic harm
- Businesses are confident that we engage them with consistency and integrity
- Consumers are confident that we stimulate innovation in the development of safer products

Our Commitment to the People and Environment of California

The Department of Toxic Substances Control's management and staff are committed to protect Californians and their environment from exposure to hazardous wastes by enforcing hazardous waste laws and regulations. The Department takes enforcement action against violators; oversees cleanup of hazardous wastes on contaminated properties; makes decisions on permit applications from companies that want to store, treat or dispose of hazardous waste; and protects consumers against toxic ingredients in everyday products. The Department is committed to engaging the public in a way that gives those most affected by its decisions opportunities to voice their concerns and ask questions.

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Selected Acronyms and Abbreviations

CAMP	Community Air Monitoring Plan
COC	compound of concern
DTSC	Department of Toxic Substances Control
PM10	particulate matter with a diameter of 10 micrometers or less
SCAQMD	South Coast Air Quality Management District
U.S. EPA	United States Environmental Protection Agency
VOC	volatile organic compound

GLOSSARY

air monitoring: The identification and quantification of airborne contaminants in order to determine the level of community protection needed using direct-reading instruments and laboratory analysis of air samples.

block average: Determined from sequential readings during monitoring. A 15-minute block average is calculated from several sequential readings of 15 minutes each, for example.

brownfield: Properties that are contaminated, or thought to be contaminated, and are underused due to perceived remediation cost and liability concerns.

community: A community, as referenced in this guidance, includes off-site receptors, including residences, passersby, public buildings and grounds, and the commercial or industrial establishments adjacent to the site. The community may also include on-site businesses and establishments near the location of the remediation or removal activities.

compound of concern: A contaminant that is present at a site in an amount that creates a potentially unacceptable exposure risk to workers or the community based on the planned site activities.

contaminated site: An area or property with soil constituents at levels that exceed California's screening criteria and may require remediation or removal.

direct-reading instruments: Instruments for detecting and measuring exposures to gases, vapors, aerosols, and fine particulates suspended in air; these instruments permit real-time or near real-time measurements.

emergency response action: Immediate containment and/or remedial actions to ensure that a release or potential release does not threaten the immediate health and safety of humans or the environment.

fugitive emissions: Any particulate matter or vapors becoming airborne directly or indirectly as a result of human activity, other than those emitted from an exhaust stack or duct designed to control flow.

off-site contamination: Any contamination that has moved beyond the real property boundaries of a remedial site via air, indoor air, soil, surface water, or groundwater.

on-site contamination: Any contamination located within the property boundaries of a remedial site.

particulate matter: A complex mixture of extremely small particles and liquid droplets made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles. Any solid material, existing in finely divided form.

PM2.5: Atmospheric particulate matter with a diameter of 2.5 micrometers or less.

PM10: Atmospheric particulate matter with a diameter of 10 micrometers or less.

quality assurance: The total integrated program for assuring the reliability of monitoring and measurement data and which includes a system for integrating planning, assessment, and improvement efforts to meet end-use data quality requirements.

quality control: The routine application of procedures for attaining prescribed standards of performance in the monitoring and measurement process.

receptor: Any humans, plants, or animals that are, have been, or may be expected to be exposed to or affected by a contaminant.

response site: Any property consisting of a parcel, adjacent properties or parcels, or portions of properties or parcels where removal or remedial action occur or are planned to occur.

remedy or remedial action: An action consistent with a permanent remedy taken instead of or in addition to removal actions in the event of a release or threatened release of a hazardous substance into the environment. A remedial action is taken to prevent or minimize the release of hazardous substances so that they do not migrate and cause substantial danger to public health or welfare or the environment.

removal or removal action: The cleanup or removal of released hazardous substances from the environment. Such actions as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances, the disposal of removed material, or to prevent, minimize, or mitigate damage to the public health or welfare or to the environment which may otherwise result from a release or threat of release.

running average: In air monitoring, obtained by taking the average of the initial fixed subset of a number series, then excluding the first number of the series and including the next value in the subset.

soil activities: For the purpose of this guidance, any activity on a DTSC Brownfield or Site Mitigation and Restoration Program site where soil with applicable compounds of concern are being moved or uncovered. These activities can include excavation, grading, cut-and-fill operations, loading or unloading, and adding to or removing from stockpiles.

Superfund: A federal government program designed to fund the cleanup of toxic wastes.

volatile organic compounds: Organic chemicals that have a high vapor pressure at ordinary room temperature, which causes large numbers of molecules to evaporate from the source and enter the surrounding air.

wind rose chart: A graphic tool used to give a succinct view of how wind speed and direction are typically distributed at a particular location over a specific time period.

Introduction

This Community Air Monitoring Plan (CAMP) guidance emphasizes the coordinated role of the Department of Toxic Substances Control (DTSC) Site Mitigation and Restoration Program—including the Human and Ecological Risk Office—and Health and Safety Program to ensure that public health and safety are protected, long-term environmental risks are properly managed, and the appropriate regulations are followed.

A CAMP is required at response sites under DTSC's oversight whenever remediation or removal activities may release compounds of concern (COCs) into the air. The CAMP helps to minimize the amount of fugitive emissions (i.e., dust and vapor) containing these compounds during authorized work.

The CAMP describes air monitoring protocols that must be performed during soil activities when fugitive emissions could be released. The protocols will protect the community and ensure that site workers react quickly to make appropriate changes to emission control measures, as needed.

The CAMP also describes operational controls to reduce dust emissions during soil activities. See Appendix A, "Best Management Practices for Dust and Odor Control."

Worker respiratory protections are a separate issue. The CAMP's community air monitoring must be integrated with the worker exposure monitoring program found in the site-specific Health and Safety Plan required for each response site.

Regulatory Framework

Perimeter air monitoring during soil activities may be required by federal law, by state law or regulations, by a local regulatory agency such as an air quality management district, or by a city or county building department.

Federal Requirements

The U.S. Environmental Protection Agency (U.S. EPA) has established National Ambient Air Quality Standards for pollutants considered harmful to public health and the environment. The Clean Air Act identifies two types of national ambient air quality standards. Primary standards provide public health protection, including protecting the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

U.S. EPA has developed the Regional Screening Levels for exposures to contaminants in air at Superfund sites.

California Requirements

The California Air Resources Board has adopted California Ambient Air Quality Standards (CAAQS) that define clean air in order to protect even the most sensitive individuals in our communities. The Air Resources Board's implementation of these state standards is like U.S. EPA's practice with the federal standards.

In addition to CAAQS, the State Nuisance Law of California prohibits the "discharge from any source whatsoever [of] such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public." See California Health and Safety Code section 41700.

DTSC has modified the U.S. EPA Regional Screening Levels for some contaminants in accordance with the Toxicity Criteria Rule for Human Health Risk Assessments. These DTSC-modified screening levels should be used at hazardous waste sites and permitted facilities in California.

The Department may also require the use of short-term risk-based criteria in addition to the established standards and screening levels.

Local Requirements

California's 35 local air pollution control districts have the primary authority to regulate operations that create fugitive emissions of dust or vapors. Where local air districts have directly applicable rules, these rules should apply.

For example, South Coast Air Quality Management District (SCAQMD) regulates the amount of off-site fugitive dust emissions containing toxic air contaminants by reducing particulate emissions in the ambient air as a result of earth-moving activities of soil that contains applicable toxic air contaminants from DTSC Brownfield or Site Mitigation and Restoration Program sites. See SCAQMD Rule 1466(c)(15).

For example, Butte County Air Quality Management District (BCAQMD) limits the emission of volatile organic compounds (VOCs) from soil excavation and remediation, or treatment of soil that has been contaminated by VOCs. See BCAQMD Rule 237 (Soil Decontamination).

Other Guidance to Be Considered

Because soil activities involve not only the potential release of fugitive dust but also compounds of concern (COCs), it is necessary to identify chemical-, action-, and location-specific guidance to be considered during the site mitigation process. Additionally, other guidance may to be considered when local requirements are unavailable.

The Department has identified SCAQMD Rules 403 (Fugitive Dust), 1166 (Volatile Organic Compound Emissions from Decontamination of Soil), and 1466 (Control of Particulate Emissions from Soils with Toxic Air Contaminants) as the preferred guidance for soil activities at DTSC response sites for fugitive emissions containing COCs.

In general, planned soil activities need to follow only the substantive aspects of guidance, not with corresponding administrative requirements.

Occupational Exposure Limits—Not Applicable

Occupational exposure limits are not appropriate for community air monitoring and, thus, should not be used in the CAMP.

Project and Site Description

The project description should briefly describe the nature of the project (e.g., emergency response action, remediation action, or removal action) and the work tasks, objectives, and personnel requirements. The proposed start date, the project duration, anticipated work hours, and the associated air monitoring periods shall also be described.

The site description must summarize the information regarding known or potential COCs on site. Include the location, physical state, chemical characteristics, and range of concentrations of COCs found to date by medium (i.e., groundwater, soil, and soil vapor). Also, include information regarding any other risk factors (e.g., volatile vapors, methane gas, heavy metals) and how these issues are being addressed as part of the project.

General site information must include the slope of the site surface, its proximity to surface water, the depth to groundwater, and on-site and surrounding land uses and potential receptors.

The site description must also describe the distance between air monitoring equipment and all nearby potential obstructions to air flow, along with their height. Such obstructions include, but are not limited to, trees, buildings, and topographic features.

A site map must be included as part of the site description.

Personnel Description

The CAMP must describe roles and responsibilities of site personnel for the project. This section shall include a listing of air monitoring firms and subcontractors, laboratories, and the site contacts, including the Site Health and Safety Officer.

Air Monitoring

The CAMP must specify the air monitoring protocols proposed for the project. These protocols must be performed during soil activities when fugitive emissions could be released. The protocols shall protect the community and ensure that site workers react quickly to make appropriate changes to soil activities and control measures to reduce these emissions.

Air Monitoring Objectives

The primary objectives of air monitoring are to:

- Determine if airborne concentrations of fugitive dust and COCs exceed action levels or regulatory limits established for the site;
- Develop a relationship between fugitive dust levels and concentrations of COCs, so that direct-reading particulate measurements can be used as a surrogate for COC concentrations in dust;
- Develop a relationship between total VOC levels and concentrations of COCs, so that direct-reading total VOC measurements can be used as a surrogate for site VOC concentrations; and
- Ensure that engineering controls and work practices are effective to minimize potential community impacts.

Soil Activities

Air monitoring under the CAMP will be required during all soil activities that may potentially release fugitive vapors, particulate matter, or aerosols. COCs can become airborne when surface or subsurface soil is disturbed or exposed.

Air Monitoring Locations

Air monitoring locations must be located upwind and downwind of the daily work area where soil activities are anticipated. Downwind measurements should be compared to upwind measurements to determine whether on-site soil activities are contributing to community exposures.

Concentrations of COCs upwind of the work area must be measured at the start of each workday, and periodically thereafter, to establish background conditions. Furthermore, the upwind and downwind monitoring locations may need to be moved during the workday when wind direction or the work location changes.

Special spacing and location requirements shall apply to work within 20 feet of potentially exposed individuals or structures and for work located near residences or facilities.

More detailed information about location and spacing information for air monitoring locations can be found in Appendix B, "Spacing and Locating Air Monitoring Equipment."

Air Monitoring Parameters

Applicable air monitoring parameters include using direct-reading instruments and laboratory analysis of air samples for meteorological conditions, particulate matter/aerosols, and VOCs.

Meteorological Parameters

Measurement of atmospheric conditions—primarily ambient temperature, barometric pressure, and wind speed and direction—simultaneously with monitoring for target contaminants is crucial for the accurate calculation of contaminant concentrations and data interpretation. See Appendix C, "Weather Station Equipment."

Particulate Matter/Aerosols

Particulate matter and aerosols generated from a contaminated site may pose a health concern because COCs adsorbed to particles in soil can become airborne and migrate during soil activities. For these COCs adsorbed to soil, fugitive dust monitoring may be used as a surrogate for COCs released to the air during soil activities.

Accordingly, particulate matter and aerosol monitoring shall be used to determine whether on-site soil activities are a significant source of adsorbed COCs leaving the work area. See Appendix D, "Air Monitoring and Sampling Equipment."

Volatile Organic Compounds

Organic compounds with high vapor pressures (typically above 0.1 millimeters of mercury) can volatilize readily but, when present in soil, are generally adsorbed to organic carbon in soil or trapped in soil pore spaces. During soil activities, these VOCs can be released into the air.

Air monitoring for VOCs is needed to determine whether soil activities are a significant source of VOCs leaving the work area. See Appendix D, "Air Monitoring and Sampling Equipment."

Monitoring Schedules

A schedule should specify the frequency and duration of air monitoring for COCs, particulate matter, aerosols, and VOCs to establish baseline measurements prior to soil disturbance and throughout the project. Periodic air monitoring may also be required during a spill response or for nonintrusive activities such as sample collections.

Baseline Monitoring

Air monitoring for at least two days prior to the start of soil activities must be conducted to determine baseline concentrations of COCs; a longer period may be needed to capture seasonal fluctuations in wind direction.

Daytime air monitoring should be conducted for eight to 10 hours during the baseline period to represent a construction work shift.

Documentation Monitoring

Documentation air monitoring must be conducted at the site to determine whether results from direct-reading instruments correlate with air sampling results. With prior DTSC approval, measurements from direct-reading instruments can be used as a surrogate for airborne COC concentrations in lieu of air sampling results.

Documentation air monitoring is needed to quantify concentrations of selected parameters based on the following work criteria:

- At the project start-up;
- At the beginning of site activities in new areas;
- If the real-time monitoring thresholds (i.e., action limits) for COCs, or their surrogates, are exceeded; and
- To address specific off-site air quality concerns upon DTSC request.

Continuous Monitoring

Continuous monitoring is required for all soil activities (e.g., uncovered stockpiles, uncovered disturbed ground, other earthmoving activities) and during the demolition of contaminated or potentially contaminated structures.

To enable a direct comparison of the results from air monitoring, the same direct-reading and sampling methods selected during the baseline period should be used during project start-up, at the commencement of new site activities, and for ongoing activities in new areas of the site.

With prior approval from DTSC, air monitoring frequency may be reduced based on initial air monitoring results.

Periodic Monitoring

Periodic monitoring for VOCs shall be required during nonintrusive activities such as the collection of soil samples, the collection of groundwater samples from existing monitoring wells, or during a spill response.

Air Monitoring Equipment

Monitoring equipment should be calibrated at least daily prior to the start of work activities for site-specific COCs or for an appropriate surrogate as called for in the manufacturer's instructions.

Particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter with a diameter of 10 micrometers or less, and able to calculate a running 15-minute average.

Monitoring equipment for VOCs should be able to calculate a running 15-minute average and eight-hour time-weighted average concentrations for the types of VOCs potentially at the site.

All direct-reading instruments shall be equipped with an audible alarm set to indicate exceedance of the action level.

See Appendix D, "Air Monitoring and Sampling Equipment," for appropriate air monitoring equipment to use in measuring the types of contaminants known or suspected to be present.

Action Levels

Site-specific action levels for site COCs in ambient air shall be established in the CAMP to protect the community from fugitive emissions generated during soil activities. In addition to setting the action levels, the CAMP must also specify corrective actions to be implemented or enhanced to abate emissions at specific levels; in some cases, work shut must be down. See Appendix E, "Site-Specific Action Levels."

DTSC's Human and Ecological Risk Office must be consulted when developing site-specific action levels for the CAMP based on the presence of COCs at the site.

Meteorological Action Levels

If sustained wind speeds exceed 20 miles per hour (mph), then all potential dust-producing activities shall cease until the sustained wind speed declines to 20 mph or lower. A wind speed "Stop Work" notification level must be set on a one-minute block average—the wind speed obtained by averaging the measured values over a one-minute period—using data from the on-site meteorological station. However, non-dust-producing activities (equipment maintenance, decontamination, etc.) may still be conducted.

Particulate Matter and Aerosols

Action levels for particulate matter and aerosols must be employed during demolition, the handling of waste or contaminated soil, or when work on the site may generate fugitive dust from exposed waste or contaminated soil.

Fugitive Dust Action Levels

Soil activities at the site must not cause PM10 levels to exceed 50 micrograms per cubic meter (50 µg/m^3) when determined by simultaneous air monitoring as the difference between upwind and downwind measurements. See Title 17 California Code of Regulations section 70200, Table of Standards, including Article 2 on Ambient Air Quality, and SCAQMD Rule 403, Fugitive Dust. At some response sites, an action level for atmospheric particulate matter with a diameter of 2.5 micrometers of less (PM2.5) may also be required.

In addition to PM10 measurements, local public nuisance ordinances that limit particulate matter from a construction site may specify a maximum allowable measurement of total suspended particulates (TSP); in those cases, the use of air monitoring equipment that measures TSP may be required.

Particulate Matter-Based Site-Specific Action Levels for COCs

Site-specific particulate matter and aerosol action levels will be based on the potential COCs present at the site and the immediate work area. Please refer to Appendix E, "Site-Specific Action Levels," for guidance on how to determine site-specific action levels for COC emissions (e.g., metals, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons) associated with particulate matter and aerosols.

In general, the site-specific particulate matter and aerosol action levels will be determined by three factors: the concentration of COCs in the contaminated soil, soil vapor, or groundwater; the location of site activities with respect to suspected contamination; and the compounds' corresponding distinctive characteristics of toxicity.

If site-specific particulate or aerosol action levels are required, then additional integrated sampling and chemical analysis of the dust may also be required to verify the accuracy of the initial SSAL model.

Visual Assessment

At no time shall the site operator allow visible dust to leave the site perimeter.

If visible dust is observed leaving the work site, then work must cease immediately; the source of the visible dust must be controlled, and site activities re-evaluated. Additionally, the observation of visible dust emissions exiting the site must be recorded and reported to DTSC (see Chapter 7).

Volatile Organic Compounds

Organic Vapors: Site-Specific Action Levels

Action levels for organic vapors must be based on the potential VOCs present at the site and the immediate work area. In general, the action levels will be determined by VOC concentrations in contaminated soil, soil vapor, or groundwater; the compound's vapor pressure; and the compound's corresponding toxicity characteristics.

Odors

Although odor may be used to determine the presence or release of a compound, at no time should odor be the only metric used to evaluate the potential concentration of COCs in fugitive emissions from soil or demolition activities at the site.

Major Vapor Emission Action Levels

The Major Vapor Emission Response Plan must be implemented when the measured VOC level is greater than the established VOC action level 200 feet downwind from the site perimeter or

half the distance to the nearest off-site residential or commercial structure — whichever is less. See Appendix F, "Major Vapor Emission Response Plan."

Reporting

Immediate Reporting of Values Greater Than the Action Limit

All CAMPs must contain provisions for immediate reporting of monitoring thresholds that exceed the applicable action limit.

The report must be sent by email to the DTSC project manager for the site. The report must list the monitoring threshold, as well as all 15-minute and hourly data collected during the period of elevated concentrations. The report should mention all routine and any unusual on-site and off-site activities occurring during the incident. It should also note any corrective actions taken to mitigate the release, as well as any future actions planned.

Baseline Report

A Baseline Air Monitoring Report must be submitted prior to, or as part of, the first Progress Report.

Documentation Reports

Documentation air monitoring reports must be prepared and submitted to the Department for review. These reports should include tables showing the results of using direct-reading instruments and laboratory results from air sampling with a statistical analysis of the correlation between these results. Documentation reports should include tables of sampling and direct reading results with statistical analysis of the correlation between these results.

Periodic Reports

With DTSC Project Manager approval, periodic summary reports of air monitoring (daily, weekly, monthly, e.g.), as well as meteorological summary reports (wind speed and direction, e.g.), must be submitted for DTSC review. These reports must include a summary of the 15-minute running average air monitoring results for each air monitoring location and instrument and the 15-minute block average meteorological data.

Reports must be completed and submitted to DTSC within two business days of the monitoring period being reported.

Project Summary Report

A project summary report of the data provided in all progress reports is generally due to DTSC 30 days after the end of project activities.

The project summary report should contain the following information in electronic format:

- A report narrative
- All air monitoring data, in electronic format, for the full project
- Calculated percentage data recovery for all parameters monitored
- A summary of exceedances over the action level and of the maximum and average daily values for each COC at each air monitoring location
- All meteorological data, in electronic format, for both 15-minute and one-hour intervals, for the full project
- A wind rose chart of wind speed and direction, by stability class, for the entire project

Report Review

DTSC will review each report submitted and send an email or letter with any comments and questions. After those are addressed, DTSC will approve, disapprove, or partially approve the report.

Quality Assurance/Quality Control Requirements

The responsible party must adequately supplement Quality Assurance/Quality Control Plans found in the work plans to include the following critical features:

- Periodic instrument calibration,
- Daily instrument performance checks,
- Operator training, and
- A recordkeeping plan.

Instrument Calibration

Instrument calibration must be performed in accordance with the manufacturer's instructions at the beginning of each workday. All instrument calibration and maintenance activities, as well as calibration results, should be documented in the field logs.

Training

All persons responsible for calibrating, handling, or interpreting the air monitoring meters, air samplers, or meter/sampling output data should have sufficient prior experience with such work.

Documentation and Recordkeeping

Documentation of community air monitoring information is required in order to provide a written record of the air monitoring results and response actions taken, and to allow for verification that the air monitoring and fugitive emission control program was followed in accordance with the CAMP.

References and Resources

Federal Law and Regulations

Code of Federal Regulations

- 40 CFR Part 50, "National Primary and Secondary Ambient Air Quality Standards" (Located at https://www.ecfr.gov/)
- 40 CFR Part 53, "Ambient Air Monitoring Reference and Equivalent Methods" (Located at https://www.ecfr.gov/)

State Law and Regulations

California Health and Safety Code

- Health & Safety Code § 39014, "Ambient Air Quality Standards" (Located at https://leginfo.legislature.ca.gov/)
- Health & Safety Code § 41700, "General Emission Limitations for Nonvehicular Air Pollution" (Located at https://leginfo.legislature.ca.gov/)

California Code of Regulations

- California Code of Regulations, Title 17, § 70200, "Table of [Ambient Air Quality] Standards" (Located at https://ww3.arb.ca.gov/regs/title17/70200.pdf)
- California Code of Regulations, Title 22, § 68400.5, "Toxicity Criteria for Human Health Risk Assessments, Screening Levels, and Remediation Goals" (Located at https://govt.westlaw.com/calregs/)
- California Code of Regulations, Title 22, §§ 69020-69022, "Toxicity Criteria for Human Health Risk Assessments, Screening Levels, and Remediation Goals" (Located at https://govt.westlaw.com/calregs/)

Selected Local Air District Rules

Butte County Air Quality Management District

- Butte County Air Quality Management District rule 237, "Soil Decontamination" (Located at https://ww2.arb.ca.gov/current-air-district-rules)

South Coast Air Quality Management District

- South Coast Air Quality Management District rule 403, "Fugitive Dust" (Located at http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-403.pdf)
- South Coast Air Quality Management District rule 1166, "Volatile Organic Compound Emissions from Decontamination of Soil" (Located at http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/rule-1166.pdf)
- South Coast Air Quality Management District rule 1466, "Control of Particulate Emissions from Soils with Toxic Air Contaminants" (Located at http://www.aqmd.gov/docs/default-source/rule-book/reg-xiv/rule-1466.pdf)

U.S. Environmental Protection Agency Guidance

"Ambient Air Sampling," SESDPROC-303-R5 (March 30, 2016) (Located at https://www.epa.gov/sites/production/files/2016-04/documents/ambient_air_sampling303_af.r5.pdf)

"Compendium of Methods for the Determination of Inorganic Compounds in Ambient Air," EPA/625/R-96/010a (June 1999) (Located at https://www3.epa.gov/ttnamti1/files/ambient/inorganic/iocompen.pdf)

"Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air—Second Edition," EPA/625/R-96/010b (January 1999) (Located at https://www3.epa.gov/ttn/amtic/files/ambient/airtox/tocomp99.pdf)

"Compliance Monitoring Strategy for the Resource Conservation and Recovery Act (RCRA) Subtitle C Program" (September 2015) (Located at https://www.epa.gov/sites/production/files/2013-11/documents/rcracms.pdf)

"Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures," EPA-450/2-92-004 (September 1992) (Located at https://www.nrc.gov/docs/ML1224/ML12241A395.pdf)

https://www3.epa.gov/ttn/amtic/criteria.html (Located at www.epa.gov/ttn/amtic/criteria.html)

"Meteorological Monitoring Guidance for Regulatory Modeling Applications," EPA-454/R-99-005 (February 2000) (Located at https://www3.epa.gov/scram001/guidance/met/mmgrma.pdf)

"A Preliminary Risk-based Screening Approach for Air Toxics Monitoring Data Sets (Version 2)," EPA-904-B-06-001 (October 2010) (Located at https://nepis.epa.gov/)

"Quality Assurance Handbook for Air Pollution Measure Systems, Volume I: A Field Guide to Quality Assurance," EPA-600/R-94/038a (April 1994) (Located at https://www3.epa.gov/ttn/amtic/files/ambient/qaqc/r94-038a.pdf)

"Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II: Ambient Air Quality Monitoring)" EPA-454/B-17-001 (January 2017) (Located at https://www3.epa.gov/ttnamti1/files/ambient/pm25/qa/Final%20Handbook%20Document%201_17.pdf)

"Reference Guide to Odor Thresholds for Hazardous Air Pollutants Listed in the Clean Air Act Amendments of 1990," EPA-600/R-92/047 (March 1992) (Located at https://nepis.epa.gov/)

"Regional Screening Levels (RSLs)" (Located at https://www.epa.gov/risk/regional-screening-levels-rsls/)

"Superfund Program Representative Sampling Guidance: Volume 2—Air (short-term monitoring)," EPA-540/R-95/140 (December 1995) (Located at https://nepis.epa.gov/)

State Guidance

California Air Resources Board, "Fugitive Dust Control Self-Inspection Handbook" (2007) (Located at http://media.metro.net/projects_studies/sustainability/images/3_Fugitive_Dust_Handbook_from_CARB.pdf)

California Department of Toxic Substances Control, "Human Health Risk Assessment Note 3—DTSC-Modified Screening Levels (DTSC-SLs)" (Located at https://dtsc.ca.gov/human-health-risk-hero/)

Selected Local Air District Guidance

Bay Area Air Quality Management District, "Manual of Procedures, Volume VI: Air Monitoring Procedures" (July 20, 1994) (Located at http://www.baaqmd.gov/~/media/files/records/mop/vol-6/vol6.pdf)

Bay Area Air Quality Management District, "Meteorological Monitoring Guidance for Manual of Procedures, Volume VI: Air Monitoring Procedures—Appendix" (May 8, 1996) (Located at http://www.baaqmd.gov/~/media/files/records/mop/vol-6/vol6_appendix.pdf)

South Coast Air Quality Management District, "Overview—Fugitive Dust Mitigation Measures Tables" (Rev. April 2007) (Located at http://www.aqmd.gov/docs/default-

source/ceqa/handbook/mitigation-measures-and-control-efficiencies/fugitive-dust/fugitive-dust-overview.pdf)

Other Guidance

Colorado Air Pollution Control Division, "Ambient Air Pollution and Meteorological Monitoring Guidance" (October 2012) (Located at https://www.colorado.gov/airquality/documents/Air_Pollution_and_Met_Monitoring_Guidance_Oct_2012.pdf)

NewYork State Department of Health, "Technical Guidance for Site Investigation and Remediation" (May 2010); Appendix 1A: NYSDOH Generic Community Air Monitoring Plan" and "Appendix 1B: Fugitive Dust and Particulate Monitoring," pp. 204-206, 207-208 (Located at https://www.dec.ny.gov/docs/remediation_hudson_pdf/der10.pdf)

Appendix A: Best Management Practices for Dust and Odor Control

Apply dust suppression measures (as needed): It may be a one-time occurrence, or the schedule may need adjusting to more frequent application intervals based on site conditions and activities.

- Stop specific dust-generating activities until wind directions and/or wind speeds are more conducive to reduced dust levels.

Odor control measures: Deploy controls such as vapor suppressant foams where significant odors are encountered during excavation or other soil activities.

- Use trench plugs where utility trenches extend beyond sites with volatile or other contaminants that can migrate along the trench, especially in granular bedding materials.

Tenting or similar covers: Covers should be installed at sites where logistics may not allow normal dust and odor control, or where they are not effective.

Minimize the surface area disturbed: The less ground you disturb, the less likely dust will be generated as the work is performed, and the less cleanup will be required when the work is done.

Clean up those dusty spills immediately: Don't wait for the next scheduled housekeeping; the mess will just get bigger and take longer to clean up.

Excavation best management practices:

- Excavation size, number of excavations, and volume of material handled should be kept to the lowest extent feasible.
- Apply water on excavator buckets during excavation and dumping.
- Wet equipment and excavation surfaces.
- Keep the drop height low to reduce dust and keep the ground at the base of the pile clear of spills.

Keep stockpiles covered when not in use, either with a physical cover or with a dust suppressant spray. Limit the working surface of the stockpile to the downwind side.

- Most emissions come from loading the pile, loadout from the pile, and truck and loader traffic in the immediate area if the pile is batch loaded.

Deploy wind breaks in the upwind direction when working in windy areas both during work and nonwork hours to prevent dust migration.

Water and/or sweep often enough to ensure that vehicle traffic is not picking up dust from wind action and carryout.

- Adjacent public roads should be swept of mud or soil track-out using wet power vacuum street sweepers: dry power sweeping should not be used.
- Fewer treatments are necessary in cool, wet weather.
- Reasonable dust control measures are required by some local fugitive dust rules, as are an adequate water supply; keeping dust control equipment in good working order; and the application of asphalt, oil, water, or suitable chemicals on dirt roads, materials stockpiles, and other surfaces which can give rise to airborne dusts.
- When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions and could generate runoff.
- Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing fugitive dust.

Reduce speed limits on unpaved surfaces to 10 miles per hour for well-traveled areas and heavy vehicles, never to exceed 15 mph for any vehicle on any unpaved surface.

Minimize trips by carpooling and grouping jobs and errands.

- Keep exposed areas adjacent to roads undisturbed by posting, fencing, installing gates or otherwise limiting access to vehicle traffic.

Provide and locate well-maintained rumble strips so that all exiting vehicles pass over and dislodge soil from tires and wheels.

- Consider a secondary tire/wheel wash area depending on soil types at the site and conditions encountered during soil activities.

Prevent transport of dusty material off site by rinsing vehicles before they leave the property and tightly covering loaded trucks.

Track-out should not extend 25 feet or more in cumulative length from the point of origin from an active operation.

- All track-out from an active operation should be removed at the conclusion of each workday or evening shift.

All equipment should be maintained and properly tuned in accordance with manufacturer specifications.

Maximum equipment idling times should be limited to five minutes as required by the California airborne toxics control measures in Section 2485 of Title 13 of California Code of Regulations.

Appendix B:
Locating Air Monitoring and Sampling Equipment

Please refer to 40 CFR Part 58, Appendix E, for specific criteria about siting air monitoring locations. Local air districts may also have pertinent siting guidelines found in their manual of procedures or equivalent documentation.

Final approval of the location of air monitoring locations and the meteorological instrumentation shall rest with DTSC. However, all other regulatory requirements such as asbestos monitoring, sampling and analysis in areas of naturally occurring asbestos should be met.

Air Monitoring Instruments and Sampling Equipment

Positioning of all instruments shall be determined in consultation with DTSC and the local air district, where applicable. The goal of the air monitoring siting program is to ensure the collection of compatible and comparable air quality data.

In each CAMP, documentation of air monitoring and sampling stations will be established, at a minimum, at two downwind site perimeter locations (based on prevailing wind data and discussions with DTSC concerning station locations) and one upwind site perimeter location.

The monitoring locations will be established each day that soil activities are to be performed, and monitors will be placed at or near the property line for each location.

The site operator will utilize National Weather Service forecasts and review current conditions and recent trends from the on-site meteorological station to position the monitors each morning prior to the start of any demolition, excavation, or grading activities. Daily air monitor location information will then be determined by GPS and recorded.

In addition to wind direction and the location of work activities, air monitoring locations should also consider the size of the work area, the presence of obstacles, and the availability of electrical power.

Furthermore, the location of off-site receptors may require placing a monitoring station at the site perimeter near the receptor to document that site contaminants did not migrate off site.

Moreover, if the site has variable wind direction, then additional monitoring locations would be required.

Meteorological Instruments

The wind measuring site (or sites) shall be located within the general area encompassed by the source and the ground level monitors.

In any case, the siting of meteorological instruments must comply with the latest edition of the local air district's Meteorological Monitoring Guidance, where available.

If such guidance is not available from the local air district then the Bay Area Air Quality Management District's Meteorological Monitoring Guidance, or its equivalent, should be used.

The U.S. EPA's "Meteorological Monitoring Guidance for Regulatory Modeling Applications" (U.S. EPA 2000) is another resource for site operators to utilize to determine the proper spacing requirements for meteorological instruments.

References

40 CFR Part 58, Appendix E, "Probe and Monitoring Path Siting Criteria for Ambient Air Quality Monitoring" (Amended Jan. 15, 2013).

Bay Area Air Quality Management District, Manual of Procedures, Volume VI, "Air Monitoring Procedures" (July 20, 1994).

Graening, G. J., "Perimeter Air Monitoring for Soil Remediation," Remediation (Autumn 2007) (DOI: 10.1002/rem.20142) pp. 48-49.

US EPA, "Meteorological Monitoring Guidance for Regulatory Modeling Applications," EPA-454/R-99-005 (2000).

US EPA, "Superfund Program Representative Sampling Guidance—Volume 2: Air (Short-Term Monitoring," EPA 540/R-95/140 (December 1995).

Appendix C:
Weather Station and Meteorological Monitoring

A portable meteorological station shall be used to record wind speed, peak wind gust, direction, temperature, relative humidity, barometric pressure and precipitation. The meteorological station should be mounted at a safe and easily accessible location away from and above site features or other obstructions that may affect ambient air flow patterns. Wind speed and direction measurements should be checked at least once per hour. The meteorological station should be relocated if a significant and sustained shift in wind direction is observed. Weather station parameters will be verified on a routine basis throughout the workday.

The wind direction data will be integrated with the air monitoring system to provide "Stop Work" level notifications to both field and management personnel on a real-time basis as well as provide real-time access to the current wind direction.

The Community Air Monitoring Plan must fully describe all meteorological monitoring. Special considerations may include:

- All meteorological parameters monitored must be listed in tables that detail how the data acquisition system is scanning, processing, and recording data.
    - The tables must show the significant figures for the data (e.g., delta temperature is reported to the nearest 0.1 degree Celsius).
- Meteorological data must be reported for both 15-minute and one-hour averaging periods.
- Wind gust data should also be archived. Wind gusts should be reported as a "three-second peak" for each 15-minute period.
- Examples of the calculations for certain parameters, such as vector wind direction, should be given.
- Meteorological data must be reported in an electronic format, such as a spreadsheet or comma-separated, columnar format.
    - This may be any format typically used by the organization.
    - An associated file that explains the format should be included.
- Meteorological equipment must be calibrated at least two times per year, or more frequently if required by the equipment manufacturer.
- Meteorological equipment must be calibrated by an independent third party at least twice per year.

- The plan should include standard operating procedures for installing, maintaining, and calibrating meteorological equipment and recording data.
- The plan should describe the placement of the monitoring equipment, how instrument readings/data gathering may be affected by construction practices such as dust or odor control spraying (water or other chemicals), and when the equipment should be relocated to maintain the integrity of the collected data.

Data Recording System

The plan should state which data logging system is being used and provide a specification sheet for the system in the equipment specification sheet appendix. The data downloading, backup and storage must also be described, including personnel with access and downloading responsibility and authority. Any remote queries or downloading of data should also be discussed.

The data should include the date and time of monitoring, name of operator, instrument type, general weather conditions (wind speed and direction, temperature, precipitation, cloud cover), instrument location, and a summary of construction activities during the recording period, and should be compiled daily in a columnar format and retained with the project field logs. In addition, instrument maintenance activities should be documented on the field logs.

References

Graening, G. J., “Perimeter Air Monitoring for Soil Remediation” Remediation (Autumn 2007) (DOI: 10.1002.rem), pp. 47-48

National Oceanic and Atmospheric Association, “Cup and Vane Wind Data Processing Within ASOS” (2003)

U.S. EPA, “Meteorological Monitoring Guidance for Regulatory Modeling Applications,” EPA-454/R-99-005 (2000)

Appendix D:
Air Monitoring and Sampling Equipment

Air monitoring should use approved DTSC or U.S. EPA methodologies. Many of these methods can be found in two U.S. EPA documents:

- "Compounds in Ambient Air," EPA/625/R-96/010a (June 1999).
- "Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air—Second Edition," EPA/625/R-96/010b (January 1999).

Volatile Organic Compounds

Direct Reading

The Community Air Monitoring Plan must fully describe all monitoring. Special considerations for gaseous monitoring include:

- All gaseous parameters monitored must be listed in tables that detail how the data acquisition system is scanning, processing, and recording data.
    - The tables must show the significant figures for the data (e.g., ozone is reported to the nearest part per billion).
- Organic vapor monitoring will be performed using a photoionization detector or organic vapor analyzer capable of measuring the specific volatile organic compounds (VOCs) of potential concern at the site.
    - The device will be calibrated and adjusted for a relative response factor suitable to the VOCs of potential concern.
- Gaseous data must be reported for one-hour averaging periods.
    - It is acceptable to also include 15-minute periods.
- Gaseous data must be reported in an electronic format, such as an Excel spreadsheet or comma-separated, columnar format.
    - There should be an associated file that explains the format.
- Gaseous equipment must be calibrated per factory recommendations.

The plan should describe the placement of the monitoring equipment, how instrument readings/data gathering may be affected by construction practices such as dust or odor control spraying (of water or other chemicals), and when the equipment should be relocated to maintain the integrity of the collected data.

The plan should include standard operating procedures for installing, maintaining, and calibrating monitors and recording data.

Sampling

VOCs in the air at the site perimeter can be collected by drawing them through and trapping them with a sorbent, but the most common method is by collecting a whole air sample. The filter- and sorbent-based methods are techniques that concentrate contaminants on a temporary medium (e.g., quartz fiber, polyurethane foam tubes, or activated carbon) and allow the host medium (i.e., ambient air) to pass through.

A whole air sample is obtained by collecting a small volume of ambient air in a container such that the target contaminants are captured with their host medium. The whole air container recommended for highly defensible data is a Summa canister.

Particulate Matter/Aerosols Monitoring

Direct Reading

The plan must fully describe all monitoring. Particulate levels will be monitored upwind and, at minimum, at two locations immediately downwind at the working site and integrated over a period not to exceed 15 minutes. Direct-reading instrument may not be available for semivolatile organic compounds (SVOCs) or metals.

Special considerations for continuous monitoring of particulate matter 2.5 microns or less in diameter (PM2.5) and particulate matter 10 microns or less in diameter (PM10) include:

- All continuous particulate parameters monitored must be listed in tables that detail how the data acquisition system is scanning, processing, and recording data.
    - The tables must show the significant figures for the data (e.g., PM10 concentrations are reported to the nearest 0.1 µg/m3).
- Continuous particulate matter data must be reported for one hour and 24-hour averaging periods.
    - It is acceptable to also include 15-minute periods, to be compared with the 15-minute meteorological data.
- Continuous particulate matter data must be reported in an electronic format, such as an Excel spreadsheet or comma-separated, columnar format.
    - There should be an associated file that explains the format.
- This instrument output file must also be provided in an electronic format, such as an Excel spreadsheet or comma-separated, columnar format.
    - For continuous particulate monitors, the electronic format must include all parameters tracked by the instrument.

    - For example, the Beta Attenuation Monitor tracks the status of various data invalidation flags each hour.
- All particulate monitoring equipment must be calibrated at least once per quarter.
    - Particulate monitoring equipment must undergo an independent audit every quarter.
- The plan should describe how National Institute of Standards and Technology traceability is maintained for each important parameter tracked by the continuous particulate monitoring instrument. For example, the plan should detail traceability for instrument flow rate, temperature, and pressure.
- The plan should indicate whether the instrument is reporting data based on flow rates corrected to "actual" or "standard" temperature and pressure conditions.
    - PM10 should be reported in standard temperature and pressure conditions, while PM2.5 is reported through calculation at actual temperature and pressure conditions.
- The plan should describe how flow rates are checked (in many cases, a monthly instrument flow check is required by U.S. EPA).
    - The plan should describe required maintenance checks for these instruments.
- The plan should describe the placement of the monitoring equipment, how instrument readings/data gathering may be affected by construction practices such as dust or odor control spraying (of water or other chemicals), and when the equipment should be relocated to maintain the integrity of the collected data.
- The plan should include standard operating procedures for installing, maintaining, and calibrating monitors and recording data.

Sampling

Particulate Matter

Sampling particulate matter and aerosols suspended in air at the site perimeter are typically monitored by collecting them with a high-volume air sampler. Continuous particulate air samplers are capable of continuous operation and can provide PM10 measurement on a near real-time basis.

Please Note: *Continuous, active airflow through a sampler is usually required to obtain a representative outdoor sample.*

Outdoor air (i.e., ambient) is not as homogenous as the air in an indoor workplace and can have variations in composition due to atmospheric conditions and site activities.

Traditional monitoring methods are based on weight-to-volume measurements, where a sample of dust particles is collected on a filter and subsequently weighed. However, due to the small size of the particles of interest, the results of this type of sampling could lag behind active soil/demolition activities allowing unacceptable exposures to occur not immediately be realized.

Consideration should be given to the use of dust monitors utilizing a light-scattering technique with size-selective features combined with traditional filter sampling capability to overcome the shortcomings of traditional monitoring methods.

Semivolatile Organic Compounds

SVOCs require a special sorbent train to trap compounds that would normally pass through a filter. One or more sorbents may be found within a tube to select for a specific SVOC or a combination of SVOCs.

The sorbent tubes are plumbed to an air sampling pump with a flow rate determined by DTSC-approved sampling, and an analytical method to be employed for the SVOCs that are to be monitored at the site.

Metals

Metals suspended in air at the site perimeter are typically monitored by collecting them on a filter via a sampler equipped with a vacuum (i.e., using the suction side of a blower motor). Thus, the equipment for monitoring metals has already been discussed in the section on particulate matter.

Any of the PM10 samplers discussed can be equipped with a filter that will capture not only metals suspended in the air, but also metals adsorbed to suspended particles.

> **Please Note:** *A significant fraction of metal-containing particles are too large to be captured by the PM10 samplers; however, smaller metal-containing particles that can reach the lower regions of the respiratory tract are likely to cause adverse health effects.*

In addition to the adverse effects that can be caused by chemicals adsorbed to the dust particles, the particles themselves can pose a risk.

The filter is subsequently sent to a laboratory for elemental analysis of the deposited metals.

References

40 CFR Part 58, Appendix E, "Probe and Monitoring Path Siting Criteria for Ambient Air Quality Monitoring" (Amended Jan. 15, 2013).

Bay Area Air Quality Management District, Manual of Procedures, Volume VI, "Air Monitoring Procedures" (July 20, 1994).

Graening, G.J., "Perimeter Air Monitoring for Soil Remediation," Remediation (Autumn 2007) (DOI: 10.1002/rem.20142) pp. 48-49.

U.S. EPA, "Meteorological Monitoring Guidance for Regulatory Modeling Applications," EPA-454/R-99-005 (2000).

Colorado Department of Public Health and Environment, "Ambient Air Pollution and Meteorological Monitoring Guidance" (October 2012).

New York State Department of Health, "Technical Guidance for Site Investigation and Site Remediation: Appendix 1A—Generic Community Air Monitoring Plan" (May 2010).

Appendix E:
Site-Specific Action Limits

(From DTSC's Human and Ecological Risk Office)

To ensure the protection of off-site residential and worker populations from airborne dust and volatile emissions generated by remedial activities at the site, site-specific action limits (SSALs) for compounds of concern (COCs) in ambient air shall be established in the CAMP. The SSALs represent a conservative estimate of the COC concentrations in air that off-site populations, including children, can be safely exposed to over the duration of onsite work activities.

Additionally, real-time measurements of dust and vapors may be readily available using a handheld instrument and, thus, may be used to determine whether COCs are potentially present in ambient air at levels above the SSALs. This appendix describes development of both SSALs for COCs and site-specific dust and vapor action levels for real-time measurements.

SSALs for COCs

SSALs for COCs in ambient air are developed herein using standard U.S. EPA and California EPA (Cal/EPA) risk-assessment methodology, toxicological data, and exposure assumptions. Potential nearby off-site receptors may include adult commercial/industrial workers, and adult and child residents. Standard exposure assumptions can be found in the DTSC Human Health Risk Assessment (HHRA) Note Number 1, if site-specific information is not available.

Cancer and noncancer health effects should be considered separately for carcinogens and noncarcinogens, respectively. The SSAL for each COC is "back-calculated" from a target cancer risk or noncancer hazard, as described below. For a COC that has both cancer and noncancer endpoints, the lower (more stringent) of the two values should be used as the SSAL for the COC.

Cancer-Based SSAL

A cancer-based SSAL is calculated for each carcinogenic COC in accordance with U.S. EPA and CalEPA inhalation risk assessment methodology using the following equation:

$$SSAL_C = TR \times \frac{1}{IUR} \times \frac{AT_C}{ET \times EF \times ED}$$

Where,

- $SSAL_C$ = cancer-based action limit for COC in air ($\mu g/m^3$)

- TR = target inhalation cancer risk (unitless)
- IUR = inhalation unit risk (per µg/m^3)
- AT_C = averaging time for carcinogenic effects (hours)
- ET = exposure time (hours/day)
- EF = exposure frequency (days/year)
- ED = exposure duration (year)

A target excess risk level of one in a million (1×10^{-6}) is recommended as the point of departure for developing the $SSAL_C$. A summary of potentially applicable IUR values for COCs in air should be provided, including the range of potentially applicable IURs, and the basis and source for individual IUR values. Common sources of IUR values include the following:

- U.S. EPA Integrated Risk Information System (IRIS)
- California Office of Environmental Health Hazard Assessment (OEHHA) Chemical Database
- DTSC Human Health Risk Assessment, Note Number 3

The presence of a carcinogenic contaminant in air at concentrations below the $SSAL_C$ can be assumed to pose no significant health risk to nearby off-site populations.

Noncancer-Based SSAL

A noncancer-based SSAL is calculated for each noncarcinogenic COC in accordance with U.S. EPA and Cal/EPA inhalation risk assessment methodology using the following equation:

$$SSAL_{NC} = THQ \times REL \times \frac{AT_{NC}}{ET \times EF \times ED}$$

Where,

- $SSAL_{NC}$ = noncancer-based action limit of COC in air (µg/m^3)
- THQ = target inhalation noncancer hazard quotient (unitless)
- REL = inhalation reference exposure level (µg/m^3)
- AT_{NC} = averaging time for non-carcinogenic effects (hours)

A target noncancer hazard quotient of 1 is used to develop the $SSAL_{NC}$. The inhalation noncancer toxicity of a chemical is typically described by its Reference Exposure Level (REL), an estimate of the chemical concentration in air that a human population (including sensitive subgroups) may be continuously exposed to without appreciable adverse health effects. A summary of potentially applicable REL values for COCs in air should be provided, including the

range of potentially applicable RELs and the basis and source for individual REL values. Common sources for REL values include the following:

- U.S. EPA IRIS, Inhalation Reference Concentrations
- California OEHHA, Inhalation Reference Exposure Levels
- DTSC HHRA Note Number 3, Reference Concentrations
- Agency for Toxic Substances and Disease Registry (ATSDR), Inhalation Minimum Risk Levels

Most noncancer toxicity values are developed for continuous or chronic exposure. Some of the sources also publish toxicity values for shorter (i.e., acute and intermediate) exposure periods.

Please Note: *ATSDR uses an acute exposure time of one to 14 days; OEHHA uses an exposure averaging time of one hour.*

Please Note: *ATSDR uses an intermediate exposure duration of 15 to 364 days; U.S. EPA considers a subchronic exposure duration between two weeks and seven years.*

Because the duration of onsite intrusive activities is typically on the order of weeks or months for most environmental projects, it may be appropriate to use nonchronic toxicity values for the $SSAL_{NC}$ calculation. Please consult with the DTSC toxicologist for such applications.

The presence of a COC in air at concentrations below the corresponding $SSAL_{NC}$ indicates that the exposure is unlikely to result in adverse noncancer health effects.

It should be noted that most intrusive site activities for environmental projects do not extend over a long period, so the predicted cancer risk from short-term exposure may be less significant than potential noncancer health effects: i.e., the $SSAL_{NC}$ value is lower than the $SSAL_C$ value in these cases.

Real-Time Action Levels

The use of real-time measurements and corresponding action levels as a surrogate approach should be verified by collection of air samples for direct analysis of COCs and comparison with the SSALs, especially for large-scale operations.

Dust Action Level

Derivation of a health-based dust concentration limit (DCL) assumes that the concentration of COCs in dust is proportional to COC concentration detected in soil. The equation that describes the calculation of the health-based DCL is provided below:

$$DCL = \frac{SSAL_{COC}}{(C_{COC} \times CF)}$$

Where,

- DCL = health-based dust concentration limit (µg/m^3)
- $SSAL_{COC}$ = site-specific action limit for COC in air (µg/m^3)
- C_{COC} = maximum concentration of COC in soil (mg/kg)
- CF = unit conversion factor (1x 10^{-6} kg soil/mg soil)

The health-based DCL represents the allowable maximum concentration of dust in air during on-site activities, while ensuring protection of off-site populations from inhalation of COCs present in the dust. The calculated DCL should be considered very conservative, as it is typically derived using the maximum or high-end COC concentration detected in soil—e.g., 95 percent Upper Confidence Limit on the mean.

However, this approach assumes the COC content of the dust remains constant. Therefore, the validity of this approach would be accepted only for the preliminary characterization of the site work, and should be followed by a detailed evaluation, such as appropriate air monitoring with direct sampling for the COCs.

A real-time dust action level for the site should then be established using the lower (more protective) of either the health-based DCL or an ambient air quality standard/limit published by the state or the local air district.

For example, if the health-based DCL is higher than the 25 µg/m^3 PM10 concentration limit described in South Coast Air Quality Management District Rule 1466 (Control of Particulate Emissions from Soils with Toxic Air Contaminants), then the lower value of 25 µg/m^3 will represent the dust action level during the soil activities. In this scenario, Rule 1466 requirements will generally be adhered to in the interest of enhancing community and worker protection.

Organic Vapor Action Level

Besides the SSALs for individual volatile organic chemicals (VOCs), real-time action levels for organic vapors may be established for fence line monitoring of VOCs in air. Accordingly, chemical-specific SSALs may be used to develop an action level for total organic vapors.

The VOC SSAL should be compared with an ambient air quality standard, if one is available, and the more protective level should be used. This evaluation is often conducted in order to provide

timely feedback to site personnel regarding the need for additional VOC control measures during site activities while waiting for results of VOC sampling and laboratory analysis.

Real-time monitoring of VOCs is typically conducted using either a handheld organic vapor analyzer or a photoionization detector (PID) utilizing a 10.6 electron volt lamp as calibrated with isobutylene.

To allow an "apple" to "apple" comparison of the SSALs for COCs to the measurements of the PID, it is necessary to convert the chemical-specific SSALs to the SSAL for the PID reading expressed as the calibration gas according to the manufacturer's instructions. For example, RAE Systems PIDs use the following equation:

$$SSAL_{PID} = \frac{SSAL_{COC}}{CF}$$

Where,

- $SSAL_{PID}$ = Site-Specific Action Level for organic vapor measured by PID
- $SSAL_{COC}$ = Site-Specific Action Limit for a COC
- CF = correction factor to convert a PID concentration (expressed as isobutylene) to a PID concentration expressed as the COC

In order to evaluate conformance of the PID readings with the SSALs, chemical-specific $SSAL_{PID}$ should be calculated for each VOC by conservatively assuming that the PID reading is comprised entirely of a single VOC. If real-time monitoring indicates an exceedance of the $SSAL_{PID}$, appropriate response actions should be considered to reduce emissions.

It should be noted that the monitoring of total organic vapors and development of $SSAL_{PID}$ is not intended to evaluate potential health effects associated with the off-site population. Exceedance of $SSAL_{PID}$ is not indicative of unacceptable health risks, as these action levels are highly conservative and do not account for the dispersion that would occur as chemicals migrate downwind to the locations of actual off-site receptors. However, this real-time approach allows for timely feedback regarding control measures on VOC emissions in order to ensure that the VOC concentrations are below the health-based SSALs.

References

ASTDR, "Minimal Risk Levels (MRLs) for Hazardous Substances: MRLs List" (December 2019) (Located at https://www.atsdr.cdc.gov/mrls/mrllist.asp)

CalEPA, OEHHA, Air Toxics Hot Spots Program, "Risk Assessment Guidelines: Guidance Manual for Preparation of Health Risk Assessments" (February 2015)

CalEPA, OEHHA, "Chemicals" (Located at https://oehha.ca.gov/chemicals)

CalEPA OEHHA, "OEHHA Acute, 8-hour and Chronic Reference Exposure Level (REL) Summary" (Nov. 4, 2019) (Located at https://oehha.ca.gov/air/general-info/oehha-acute-8-hour-and-chronic-reference-exposure-level-rel-summary)

DTSC Office of Human and Ecological Risk (HERO), "Human Health Risk Assessment (HHRA) Note Number 1: Recommended DTSC Default Exposure Factors for Use in Risk Assessment at California Hazardous Waste Sites and Permitted Facilities" (April 9, 2019) (Located at https://dtsc.ca.gov/human-health-risk-hero/)

DTSC HERO, "HHRA Note Number 3: DTSC-modified Screening Levels (DTSC-SLs)" (Located at https://dtsc.ca.gov/human-health-risk-hero/)

Honeywell, Rae Systems, "A Guideline for PID Instrument Response," Technical Note TN-106 (November 2018)

U.S. EPA, Integrated Risk Information System (Located at https://www.epa.gov/iris)

U.S. EPA, "Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment)," EPA-540-R-070-002 (January 2009)

Appendix F:
Major Vapor Emission Response Plan

Minimum Requirements

Upon activation of a Major Vapor Emission Response Plan, the following activities shall be undertaken:

- All Emergency Response Contacts as listed below and in the Site-Specific Health and Safety Plan will be contacted.
- The local police authorities will immediately be contacted by the Site Safety and Health Supervisor (or Official) and advised of the situation.
- Frequent air monitoring will be conducted at 30-minute intervals within 20 feet of the perimeter of the nearest off-site receptor (the 20-foot zone).
    - If two successive readings below action levels are measured, air monitoring may be halted or modified by the Site Safety and Health Supervisor (or Official).
- The Site Safety and Health Supervisor (or Official) will determine if site workers can safely undertake source abatement measures.
    - Abatement measures may include covering the source area with clean fill, chemical foams or plastic sheeting, or consolidating contaminated materials to minimize surface area.
- The Site Safety and Health Supervisor (or Official) will adjust worker personal protective equipment as necessary to protect workers from over-exposure to organic vapors.

The following personnel are to be notified immediately by the Site Safety and Health Supervisor (or Official) in the listed sequence if the Major Vapor Emission Response Plan is activated:

Emergency Response Contact	Phone
Police/Fire Department	911
California Office of Emergency Services	(800) 852-7550 (946) 845-8911
Department of Toxic Substances Control	(###) ###-####
California Air Resources Board	(###) ###-####
California Department of Public Health	(###) ###-####
Certified Unified Program Agency	(###) ###-####

(Where phone numbers are not given, the contacts will vary from project to project. Those details should be confirmed and recorded in each Major Vapor Emission Response Plan.)

In addition, the Site Safety and Health Supervisor (or Official) will provide these authorities with a description of the apparent source of the contamination and abatement measures being taken by the contractor, if any.