California Environmental Protection Agency

Air Resources Board

Adaptive Management Plan for the Cap-and-Trade Regulation

October 10, 2011

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I. Executive Summary

This document describes the Air Resources Board's (ARB or Board) recommended adaptive management plan. The plan is focused on two specific areas: localized air quality impacts from the proposed cap-and-trade regulation (cap-and-trade regulation or Regulation) and forest impacts from the proposed Compliance Offset Protocol for U.S. Forest Projects (U.S. Forest Protocol) contained in the Regulation. The plan is being released for public comment, and will be presented to the Board for consideration at the October 20-21, 2011, Board meeting. If adopted, the plan will require ARB to take a range of actions in these two areas to monitor and respond as appropriate to address unanticipated adverse impacts that are caused by the Regulation or the U.S. Forest Protocol.

Adaptive management is a process of information gathering, review and analysis, and response that promotes flexible agency decision-making. It is particularly appropriate where complex systems are involved, where the effects of an agency's decisions and actions play out over an extended period of time, and where the agency must meet multiple objectives – as in the case of the proposed Regulation. Adaptive management is consistent with ARB's long-standing approach to program implementation which incorporates on-going evaluation of how programs and regulations are implemented on the ground, regular updates to the Board, and adjustments to program implementation and regulatory requirements, as necessary.

In this plan, ARB is focusing on the two aforementioned areas where, although not anticipated, unintended environmental impacts could occur. The adaptive management plan focuses on these two areas because they were identified in the environmental analysis accompanying the rulemaking as areas where the potential for unanticipated impacts could occur and because they were specifically identified as being of special concern in public comments. It is important to note, however, that this focused adaptive management plan should be viewed in the larger context of ARB's planned oversight of the proposed Regulation and the U.S. Forest Protocol, which includes comprehensive monitoring of auctions, reserve sales, allowance holdings, compliance offset credit generation and use, reported emissions, leakage, and other aspects of the Regulation. Additionally, the adaptive management plan should also be viewed in the context of ARB's larger air pollution control programs, which already incorporate systems to measure air quality and emissions in an effort to continuously improve air quality in California.

Plan Elements

The key elements of this adaptive management plan are: (1) data and data source identification (information gathering); (2) analysis to determine whether an adverse impact is caused by the cap-and-trade regulation (review and analysis); and (3) identifying potential actions ARB could take to address these impacts and committing to take appropriate action (response).

What Data Will ARB Gather for Evaluation?

ARB identified data sources for the evaluation of potential localized air quality impacts. These include cap-and-trade specific data such as greenhouse gas (GHG) emissions, and the holdings of allowances and compliance offset credits, as well as traditional criteria pollutant and air toxics information such as air pollution control district permits, air monitoring data, and emission inventories. If the Board approves the Regulation and this plan, ARB will work with local air districts and stakeholders to refine plan details concerning air quality data gathering prior to initiation of the first compliance period on January 1, 2013.

ARB has identified data sources for the evaluation of potential unanticipated forest impacts resulting from the U.S. Forest Protocol. These include information that must be reported under the protocol, as well as emission inventories, timber harvest plans, the Fire and Resource Assessment Program, and information from other states (should forest offset projects occur in other states). As part of the adaptive management plan, ARB intends to contract with an independent third-party to assist in determining the best ways to filter and analyze the data needed to evaluate potential unanticipated impacts in this sector. ARB will work with the appropriate agencies and stakeholders to refine plan details related to data filtering and analysis.

How Will ARB Review and Analyze the Data?

As part of this plan, ARB will analyze the collected data to determine whether an environmental change such as an increase in emissions has occurred, and whether the change is caused, directly or indirectly, by the cap-and-trade regulation or the U.S. Forest Protocol. If the analysis indicates a change has occurred as a result of the Regulation or U.S. Forest Protocol, ARB will evaluate whether such change had or is likely to have an adverse impact.

It is unlikely that ARB will be able to rely on any single analysis or data source. The complex interplay of possible economic drivers, as well as other regulatory drivers, will most likely require ARB to conduct multiple analyses. It may not be possible to identify a direct causal relationship between the environmental change and the Regulation or U.S. Forest Protocol. Therefore, ARB will evaluate the weight of available evidence to determine the reason for the change.

In conducting the analysis, it will be necessary to consider normal variations, existing trends, and other factors that may be responsible for changes in the data. For example, air quality data can vary significantly from year-to-year because of meteorology. Additionally, changes in economic activity can produce large impacts on air quality and emissions trends, and factors such as rainfall can have significant impacts on emissions as a result of California's utilization of hydroelectric power as a source of energy.

The following is an illustrative example of the stepwise approach ARB will take to analyze the data for determining a localized impact:

- Monitor facilities subject to the Regulation for the Mandatory Reporting of Greenhouse Gas Emissions (MRR) for GHG emissions increases. Increases in GHGs could indicate that an increase in other pollutants has occurred. If an increase is apparent, then;
- Review indicators to assess if the change was caused by the Regulation (e.g., the result of a compliance response to the Regulation) or some other factor (e.g., the result of increased production due to economic growth). If the change is determined to be caused by the Regulation, then;
- Work with the local air district to review co-pollutant emissions for appropriate sources and geographic areas to determine whether the change had or is likely to have adverse impacts on local air quality.

How Will ARB Respond?

In the event that an unanticipated adverse localized air quality or forest impact is identified and determined to have been caused by the Regulation or U.S. Forest Protocol, this plan requires ARB to take action to respond appropriately. While it is not feasible in this plan to identify all potential actions that could be pursued, ARB is committed to promptly developing and implementing appropriate responses through a public process, including consideration and approval by the Board as necessary.

ARB would consider a range of options to address localized adverse air quality impacts. These could include the adoption of additional regulatory requirements, using funds obtained from the sale of allowances to support local mitigation projects, coordination with other agencies to provide additional incentives for energy efficiency or other emission reduction activities within the community, or modifications to the Regulation.

For unanticipated impacts from the U.S. Forest Protocol, ARB could consider revising the types and/or geographic location of forest offset projects, or disallowing the use of certain types of U.S. Forest Protocol compliance offset credits. Other types of responses are also possible and would be considered and implemented as necessary.

Public Process for this Adaptive Management Plan

ARB is soliciting comments on this plan. The Board will consider this plan at its October 20-21, 2011, Board meeting. Interested members of the public may present comments orally or in writing at the meeting, and comments may be submitted by postal mail or electronic submittal before the meeting.

Postal Mail: Clerk of the Board, Air Resources Board
1001 I Street, Sacramento, California 95814

Electronic submittal: http://www.arb.ca.gov/lispub/comm/bclist.php

Upon Board approval, ARB will work with our local air district partners, departments of the Natural Resources Agency (resource agencies), and stakeholders to implement the plan based on the following schedule:

October 10, 2011	ARB releases Draft Adaptive Management Plan for comment.
October 20-21, 2011	Board considers Adaptive Management Plan for approval.
November 2011	Staff works with local air districts, resource agencies, and stakeholders to finalize specific details concerning data gathering under the Adaptive Management Plan.
Early 2012	ARB contracts for third-party forestry expertise.
Mid-2012	Staff updates Board on Adaptive Management Plan implementation.
December 2012	Staff releases Adaptive Management Implementation Report (prior to first compliance period).
December 2013	Staff updates Board on Adaptive Management implementation.
December 2014	Staff releases Adaptive Management Report for calendar year 2013.
December 2015	Staff releases Adaptive Management Report for calendar year 2014 and end of first compliance period.
Ongoing	Staff releases Adaptive Management Report annually.

II. Introduction

In December 2010, ARB considered the proposed cap-and-trade regulation. As part of the rulemaking, an environmental impacts analysis was prepared and included in Appendix O to the Staff Report: Initial Statement of Reasons and entitled Functional Equivalent Document (FED). The environmental analysis concluded that increases in localized air pollution or forest project related impacts caused by the Regulation or U.S. Forest Protocol are unlikely based on available data and current laws that control localized air pollution and regulate forest activities. However, ARB could not determine that increases would not ever occur. In addition, commenters raised concerns about the potential for localized air impacts and the potential for impacts to forest resources related to forest offset projects. ARB, therefore, committed to use an adaptive management approach as an integral part of the implementation of the cap-and-trade program in order to address unanticipated impacts that could result from the Regulation related to these two specific areas.

The areas of focus in this adaptive management plan are localized air quality impacts and impacts from the U.S. Forest Protocol on special status species, sensitive habitats, and federally protected wetlands (hereafter referred to as forest impacts). It is important to note, however, that the elements of monitoring, review, and feedback contained in adaptive management will be more generally applied to the cap-and-trade regulation to ensure that all of its objectives, including GHG emissions reductions, are achieved. Accordingly, the focused adaptive management plan in this document must be viewed in the larger context of our planned oversight of the cap-and-trade regulation which includes comprehensive monitoring of auctions, reserve sales, allowance holdings, compliance offset credits generation and use, reported emissions, leakage, and other aspects of the program.

The plan includes a description of what is meant by adaptive management, ARB's objectives in implementing the plan, and a process for systematic data compilation, evaluation, and public review. The key elements of this adaptive management plan are: (1) data and data source identification (information gathering); (2) analysis to determine whether an adverse impact is caused by the cap-and-trade regulation (review and analysis); and (3) identifying potential actions ARB could take to address these impacts and committing to take appropriate action (response).

Staff anticipates that data gathering will be straightforward. The work of review and analysis, however, will be challenging because there could be many reasons for a change in localized air emissions or forest management practices. Examples are a change in laws unrelated to the Regulation; economic growth related to recovery from the economic downturn; adoption of a new technology within an industry; and increased consumer demand for a specific product.

Under the plan, ARB staff would work with the local air districts where facilities subject to the Regulation are located in an effort to refine a specific, systematic approach for efficiently compiling, interpreting, and evaluating the data. Because ARB is not expert

in forestry practices, ARB plans to contract with an independent third-party (ARB contractor) to assist it in determining the best ways to filter and analyze the data needed to evaluate potential, unanticipated impacts related to forestry.

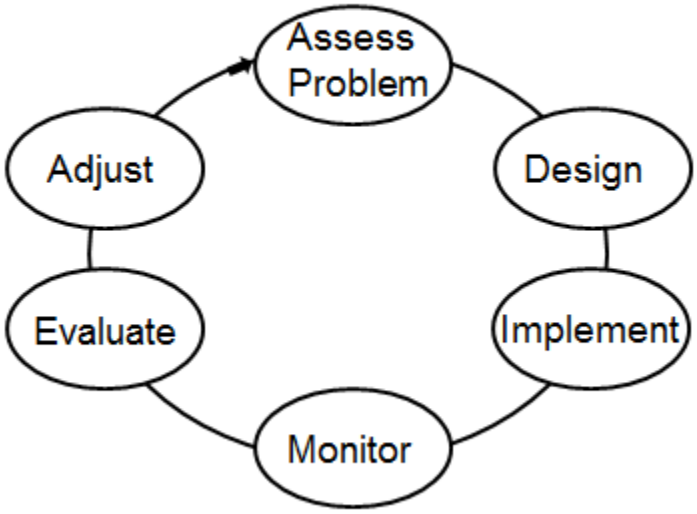
ARB will consider approval of this plan at the October 20-21, 2011, Board meeting. Upon Board approval, ARB will work with the local air districts, resource agencies, and stakeholders to implement the plan. The timeline for completion of this work is before the beginning of the first compliance period in January 2013. The first adaptive management report is planned for December 2012, and will focus on the first phase of implementation. Annually thereafter, staff will provide reports to the public and the Board on the implementation of the adaptive management plan. The annual adaptive management plan reports will, among other things, outline the data collected and the trends observed, and discuss any recommended responses.

III. Adaptive Management

Adaptive management is a process of information gathering, review and analysis, and response that promotes flexible agency decision-making. It is particularly appropriate where complex systems are involved, where the effects of an agency's decisions and actions play out over an extended period of time, and where the agency must meet multiple objectives – as in the case of the proposed Regulation. Adaptive management is consistent with ARB's long-standing approach to program implementation which incorporates on-going evaluation of how programs and regulations are implemented on the ground, regular updates to the Board, and adjustments to program implementation and regulatory requirements, as necessary.

Figure 1, representing the adaptive management process, illustrates how new information is used to refine and adjust agency action to continually meet its defined objective[1].

Figure 1: Adaptive Management Process



Implementation of the cap-and-trade regulation is expected to begin in January of 2012 (assuming it is approved by the Board). Using the adaptive management approach, ARB will assess whether there are unanticipated, adverse localized air quality or forestry impacts from the Regulation or U.S. Forest Protocol and evaluate the data discussed in this plan for indicators of unintended adverse impacts. If adverse impacts in these areas are found and demonstrated to be the result of the Regulation or U.S. Forest Protocol, ARB is committed to taking appropriate action and adjusting the operation of the program to minimize the effect or occurrence of the action that caused the impact.

A. Objectives of ARB's Adaptive Management Plan

The objectives of ARB's adaptive management plan include:

- Identify potential localized emission increases and forest impacts caused by the cap-and-trade regulation.
- Establish a process to address unanticipated adverse local air quality and forest impacts.
- Keep the public and Board informed of impacts attributed to the cap-and-trade regulation.

[1] United State Department of the Interior: http://www.doi.gov/initiatives/AdaptiveManagement/whatis.html

The strategies that ARB will employ to achieve these objectives include:

- Identify data sources.
- Use data to assess if there has been or is anticipated to be an increase in localized emissions or change in forest ecology.
- Assess if the change is caused directly, or indirectly, by the cap-and-trade regulation.
- Use data to assess if there has been or is anticipated to be an adverse impact.
- Share data and reports with the Board and public annually.
- Report to the Board as needed but, at a minimum, annually in conjunction with the issuance of the annual adaptive management plan report.
- Take appropriate action to address any adverse impacts related to localized emissions or forestry caused by the Regulation.

B. Questions that Frame Review and Analysis Under the Adaptive Management Plan

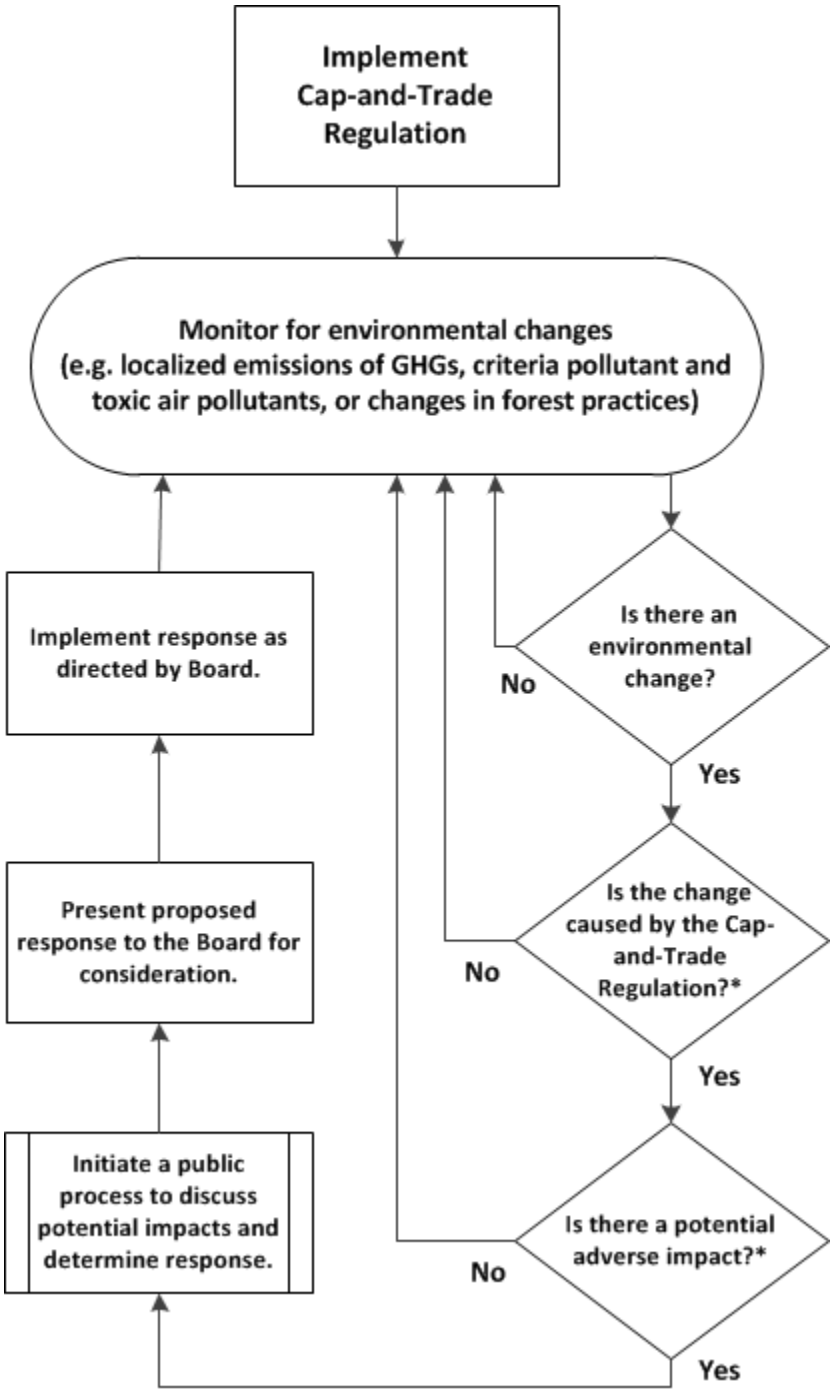
The key questions that must be answered on an on-going basis by the adaptive management plan are:

- Has an environmental change (e.g., increase in emissions or transition in forest practices used) occurred?
- Is the environmental change caused, directly or indirectly, by the cap-and-trade regulation or U.S. Forest Protocol?
- Has the environmental change had an adverse localized air quality or forest impact?
- What action could ARB take to address an adverse impact linked to the cap-and-trade program or U.S. Forest Protocol?

The key elements of this adaptive management plan are: (1) data and data source identification (information gathering); (2) analysis to determine whether an adverse impact is caused by the cap-and-trade regulation (review and analysis); and (3) identifying potential actions ARB could take to address these impacts and committing to take appropriate action (response).

Figure 2, representing the flow of ARB's adaptive management plan, illustrates how ARB will implement adaptive management, monitor and evaluate data, and make adjustments to the Regulation, if necessary.

Figure 2: ARB Adaptive Management Plan Flow Chart



* These questions will be addressed based on the evaluation of a range of data sets and will involve technical judgment and other available tools and methods.

IV. Information Gathering

In this section, ARB discusses the information to be gathered for review and evaluation. Because this section discusses at various places why staff is gathering certain data – that is, why it is relevant – this section also necessarily previews the next section on analysis and review.

A. Localized Air Quality Data

ARB identified data sources for the evaluation of potential localized air quality impacts. These include GHG inventories, traditional criteria pollutants and air toxics emissions data, local air district or state agency permit information, air monitoring data, special monitoring studies, and other sources of data including new cap-and-trade program specific data such as GHG emissions, and the use of allowances and compliance offset credits to comply with the Regulation. If the Board approves this plan, ARB will work with local air districts and stakeholders to finalize specific details concerning data gathering, including the best means to transmit, filter, and analyze the data for localized air quality impacts, and complete the details before initiation of the first compliance period in January 2013.

It is important to remember that many factors can cause changes at facilities, and that once an increase has been detected, additional sources of data must be used to assess if the increase is the result of the cap-and-trade regulation. Below are a number of sources of information that ARB will consider in determining if an adverse impact resulting from the cap-and-trade regulation has occurred or will occur. As ARB implements the adaptive management plan, it may find additional sources of data to include or it may find that some sources of data are not useful to continue to monitor.

1. Greenhouse Gas Mandatory Reporting Regulation (MRR)

Reporting of annual GHG emissions by major sources is required by AB 32. ARB approved the MRR in December 2007, and it became effective in January 2009. Revisions to the regulation were considered by the Board at its December 2010, Board hearing, and ARB staff is proposing additional modifications based on Board direction and stakeholder comments, prior to finalizing the regulation for 2012 reporting. More on the MRR can be found at:

http://arb.ca.gov/cc/reporting/ghg-rep/ghg-rep.htm

The current MRR requires reporting emissions of six GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), and sulfur hexafluoride (SF_6). It is applicable to: facilities in California that generate 25,000 metric tons of CO_2 per year ($MTCO_2$/year) or greater; electrical generating facilities that produce 1 megawatt (MW) or greater, or that generate 2,500 $MTCO_2e$ or greater per year; and retail providers and marketers of electrical power. Facilities report directly to ARB, and are required to use the methodologies in the MRR,

providing consistency across the State. The first reporting year was in 2009 (for 2008 data, which was not third-party verified). Beginning in 2010 (for 2009 data), the reported data were subject to third-party verification by ARB-accredited verifiers, which requires that data are reported within ninety-five percent accuracy. For 2010 (2009 data), about ninety-five percent of all reporting facilities were able to report their data with less than five percent error. The verification deadline is currently December 1.

The pending, proposed amendments to the MRR cover three GHGs: CO_2, CH_4, and N_2O. The other gases that were previously covered are proposed to be covered in various new regulations (e.g., high global warming potential gases and SF_6 regulations). The proposed amendments are applicable to: facilities in California that generate between 10,000-25,000 $MTCO_2e$/year (no verification) and 25,000 $MTCO_2e$/year or more (verification required); fuel and CO_2 suppliers; and electric power entities. The first reporting year is in 2012 which will include 2011 emissions data that are third-party party verified. The verification deadline will be September 1 starting in 2012 and continuing in future years.
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The GHG MRR database involves the collection of total annual combustion emissions for a facility by fuel types and includes specific chemical process emissions. Device-level emissions are limited in most cases. Thus, MRR GHG data are summarized at a higher level than the criteria pollutant California Emission Inventory Development and Reporting System (CEIDARS) inventory, which is available at the device and process level. However, the GHG data are reported annually and available approximately nine months after the end of the inventory year making it the most current data source in any year. Due to differences in the level of detail in data collected from these two sources, it may be difficult to evaluate consistency in emissions trends.

The MRR data could be used to track increases in GHG emissions, or equipment changes at facilities covered under the proposed Regulation, identify fuel type changes, and help point to potential impacts resulting from co-pollutants.

2. Compliance Instrument Tracking System

The Compliance Instrument Tracking System will contain the records of compliance instrument ownership for the Regulation. It will contain information related to accounts, record compliance instrument transfers, facilitate compliance verification, and support market oversight. Reviewing the number of compliance offset credits and allowances held by facilities covered by the proposed Regulation could provide information on potential plans to increase emissions at a facility. It is important to note that holdings in these accounts are confidential data, and therefore, this information will not be publicly available, but can be monitored by ARB staff.

3. Local Air District Permits for Covered Entities

Local air districts permit stationary sources that are sources of air pollutants. These permits are required prior to construction of new facilities or modification at existing

facilities subject to local air district regulations. Additionally, the facility must maintain its permit and continue to abide by the restrictions contained therein to continue to operate.

Local Air District Existing Permits

The permitted level of emissions is typically based on the maximum expected throughput or maximum rated capacity of a piece of equipment or process. It is possible that emissions increases could occur at a facility and the facility would still meet the legal requirements of their operating permit. Because of this, permit activity will not show increases that may have occurred within the conditions legally authorized by the existing permit(s). However, information from these permits could still provide valuable insight into whether a facility covered under the proposed Regulation has, or could, increase emissions by understanding emissions trends for existing facilities.

Local Air District Permits to Modify Facilities Covered by Cap-and-Trade Program

When construction of a new facility, or modification to an existing facility, is proposed, the facility operator must apply with the local air district for permission to construct most equipment that will emit criteria or toxic pollutants. This permission is known as a permit to construct or authority to construct. Not all proposed facilities that are issued a permit or authority to construct are constructed.

A local air district conducts an engineering evaluation on the equipment and processes in the permit application to determine the potential emissions. The proposed construction is evaluated for emissions of criteria pollutants and local impacts of emissions of toxic air pollutants, if applicable. The project is typically subject to requirements under its permit conditions that reduce emissions (known as controlled emissions), depending on factors such as the attainment status of the local air district or the local impact of toxic air pollutant emissions from the project. Additionally, most projects that require a permit to construct generally are subject to the California Environmental Quality Act (CEQA). Projects that will have a significant effect on the environment must undertake feasible mitigation. It is important to note that the local air district may, or may not, be the lead agency in the CEQA assessment.

As part of this permitting process, local air districts' rules to meet federal and State requirements for new source review (NSR) programs may be applicable, especially to large sources covered under the Regulation. These rules are intended to improve or maintain a region's air quality by assuring that new emissions from new and modified facilities do not slow progress toward cleaner air or worsen air quality in regions that attain air quality standards. The best available control technology (BACT) provisions of NSR provide assurance that emissions from any large new or modified industrial source will be stringently controlled. Additionally, if new construction or modification results in the facility exceeding a district's NSR offset thresholds, then the facility must either reduce emissions elsewhere at the facility or obtain emission reduction credits (ERCs) in amounts greater than the direct emissions increase. These ERCs must be obtained from within the region or from areas close by, thus mitigating the increase in emissions at the facility in terms of regional air quality.

Working with local air districts, ARB will implement a process to track permit applications for modifications to facilities subject to the Regulation, or for construction of new facilities that would be subject to the Regulation.

4. California Energy Commission (CEC) Power Plant Permitting

The CEC permits thermal power plants that have the capacity to generate fifty megawatts (MW) or greater. Local municipalities permit those with less than a fifty MW generating capacity. Local air districts also permit power plants that are combustion sources. However, CEC and local municipality permits may provide greater advanced notice of proposed facilities. Additionally, the CEC tracks announced projects with generating capacity of 50 MW or greater that have not yet filed for review. Not all facilities that are issued a permit are constructed. ARB currently works with CEC to track permit applications for construction of new power plant facilities or modification of existing power plant facilities.

5. Economic Forecast Data

A variety of economic forecast data are available from local, State, and federal agencies. Including forecast data in the analysis will be useful for evaluating the proportion of emission changes related to economic factors. Examples of specific forecasts from agencies that could be used include economic and energy forecasts based on the estimates adopted by the CEC published in Integrated Energy Policy Reports. Examples of academic economic forecasts that could be used include the California and Metro forecast published by the Business Forecasting Center at the University of the Pacific and the UCLA Anderson Forecast published by the Anderson School of Management at the University of California, Los Angeles. ARB will use these types of economic forecasts for comparison with emissions trends to determine if emissions are consistent with changes in the economy, or in specific economic sectors. If emissions are substantially different than changes in the economy, then the data could suggest that changes in emissions are related to factors other than economic change.

6. Air Quality Monitoring Data

In California, ambient air quality is routinely measured for gaseous, toxics, and particulate air pollutants. The extensive network is designed to cover the diverse range of topography, meteorology, emissions, and air quality in California, while adequately representing a large population. In general, the network tends to be denser in areas with more severe air quality problems and in areas with larger populations. The monitoring stations are operated by ARB, local air districts, the National Park Service, and private contractors.

The data collected by the monitoring network are used to track air quality progress, evaluate emissions inventory and air quality models, analyze neighborhood or regional source attribution, and evaluate the success of emission control programs. The

measured data form a backbone for air quality management programs, provide the public with information on current conditions and progress in improving air quality, and are used by health researchers, business interests, environmental groups, air quality planners, and others.

The ambient air quality monitoring network captures data representative of a broad range of sources and regions throughout the State. Monitors are designed to represent pollutant levels on different spatial scales, ranging from near-source localized impacts up to broad regional-scale conditions. Although a few monitors are located so they will represent small areas dominated by specific local sources, most monitors are designed to represent the combined impact of multiple, distributed sources over the scale of a neighborhood or city or more. Thus, detecting the impact of changes at an individual facility can be difficult.

Monitors are also designed to represent different periods of time. A number of pollutants, including gaseous pollutants such as ozone (O_3), oxides of nitrogen (NO_x), and carbon monoxide (CO) are reported hourly. Many other pollutants, such as particulate matter (PM), hydrocarbons, and toxics are typically measured as 24-hour averages on a less-than-daily schedule. Hourly values can sometimes be used to represent a significant source by selecting hours when the monitor was downwind of that source. Daily values, however, usually represent a varying mix of wind directions, so the impact of a specific source is harder to detect.

Levels of air pollutants fluctuate from year-to-year for various reasons, including changes in human activity and differences in weather conditions. A longer term record of measurements at a monitor helps establish the expected level of variability. Special studies in which monitors operate for a few years often lack the track record needed to assess this variability and thus may have less utility in tracking the impacts of emission changes.

ARB reviews data collected as part of the routine network and evaluates air quality trends on an ongoing basis. ARB will use this data to assess, within the context of normal air quality variability, whether any unusual trends are being observed. Staff will also work with local air districts to review and evaluate data from localized monitoring networks and special studies.

The following sections describe the various types of air quality monitoring networks that are currently operating in California, data from which will be considered under the adaptive management plan.

Statewide Criteria Pollutant Monitoring Network: The statewide criteria pollutant monitoring network consists of more than 250 monitoring locations with over 700 monitors that measure O_3, PM, NO_x, sulfur dioxide (SO_x), CO, hydrogen sulfide (H_2S) and lead. Each site in the monitoring network includes a combination of one or more monitors that collect either continuous or non-continuous air quality data. As mentioned above, gaseous monitoring data for O_3, NO_x, SO_x, CO, and H_2S, are collected hourly.

Lead monitoring data and most particulate monitoring data reflects a 24-hour average which is collected on schedules ranging from daily, up to once every sixth day. A subset of particulate monitoring sites also collect hourly data. Data for pollutants that are directly emitted, such as PM, SO_x, and CO, tend to represent concentrations over a smaller area, such as a neighborhood. In contrast, data for pollutants that are formed in the atmosphere, such as O_3, generally represents larger scale regions such as a city or county.

Statewide Toxics Monitoring Network: The statewide toxics monitoring network includes 17 sites that collect 24-hour samples two or three times each month. This network collects data for cancer-causing compounds, such as benzene, 1,3 butadiene, and formaldehyde. Data for toxic metals such as arsenic, cadmium, and chromium are also collected. The toxics monitoring network is focused on major urban areas of the state and the sites are generally co-located with other criteria pollutant monitoring. As such, the toxics network represents the combined emissions of widespread and distributed sources, rather than localized emission impacts from individual sources.

Additional toxics monitoring has been conducted by some local air districts for special purposes, some short-term, and some for ongoing interests. The South Coast Air Quality Management District and the Bay Area Air Quality Management District have been especially active in this respect. These data can assist in evaluating trends in ambient air toxics as a comparison to changes observed at covered facilities.

Localized Monitoring Networks: In addition to ARB's long-term statewide ambient monitoring network, there are several source-oriented monitoring networks that are operated by local air districts. These networks are intended to manage air quality improvement efforts and to discern near source, localized air quality impacts (from refineries, ports, and industries within communities). This data can assist in evaluating trends in ambient air quality as a comparison to changes observed at covered facilities. Some selected examples of the near-source programs are:

Bay Area Refinery Monitoring Program: The Bay Area Air Quality Management District (BAAQMD) Regulation 9 requires monitoring of SO_2 and H_2S near potential major sources of either pollutant. Each of the five oil refineries as well as an associated carbon plant within the BAAQMD jurisdiction is subject to Regulation 9 as a condition of their BAAQMD operating permit. Covered facilities are required to operate a minimum of three Ground Level Monitoring (GLM) sites with instruments capable of recording pollutant concentrations in the ambient air outside of the property line of their facility.

There are twenty GLM monitoring sites surrounding the covered facilities in the Bay Area. Five of the facilities covered are located in northwest Contra Costa County and one is located in southwest Solano County. Of the twenty GLM sites, thirteen have instruments that monitor both SO_2 and H_2S, five measure H_2S only, and two measure SO_2 only. This network has been operational for the last ten to

fifteen years, though location and site conditions may have changed over this time period.

South Coast Ports Monitoring: This monitoring network, operated by the Ports of Long Beach and Los Angeles, measures air quality at the ports and nearby communities to better manage local air quality improvement efforts. Monitoring was initiated at both ports in 2006. O_3, CO, NO_x, SO_x, and PM are collected on a real-time basis. The Port of Long Beach operates two monitoring stations: one in the Inner Port area, near West Long Beach, and the second in the Outer Port area, near the breakwater. The Port of Los Angeles operates four monitoring stations, located in the Outer Harbor area at Berth 47, at the Terminal Island Treatment Plant, in the community of San Pedro, and in the community of Wilmington. The six-monitor network was developed under the Green Port Policy.

South Coast Lead Monitoring: The South Coast Air Quality Management District has collected lead data for a number of years at five sampling sites located near lead-related facilities that were established as part of the District's Rule 1420 (Emissions Standard for Lead). The purpose of Rule 1420 is to reduce lead emissions from non-vehicular sources. It applies to all facilities that use or process materials containing lead, including primary or secondary lead smelters, foundries, lead-acid battery manufacturers or recyclers, as well as facilities that produce lead-oxide, brass, and bronze. The samplers are located at or beyond the property line of the facility and comply with United State Environmental Protection Agency (U.S. EPA) siting and operating criteria. Lead samples are generally collected on a 1-in-6 day schedule, although samples are collected more frequently at sites with the highest concentrations.

Special Studies: A subset of monitoring is special studies conducted by ARB or local air districts. The information obtained from these types of studies may be helpful in establishing "initial conditions. If additional follow-up studies are undertaken (i.e., MATES III was a follow-up to MATES II), then the data collected may provide a useful input in establishing changes in conditions (depending upon the design and location of follow up studies). The following describes two of these special studies conducted by local air districts. In addition, ARB special studies, including those using mobile monitors, may provide additional sources of data.

Multiple Air Toxics Exposure Study III (MATES III): The Multiple Air Toxics Exposure Study III (MATES III) was a monitoring and evaluation study conducted in the South Coast Air Basin (Basin). The study is a follow on to previous air toxics studies in the Basin and is part of the South Coast Air Quality Management District Governing Board's Environmental Justice Initiative. The study consists of several elements, including a monitoring program, an updated emissions inventory of toxic air contaminants, and a modeling effort to characterize risk across the Basin. It focuses on the carcinogenic risk from exposure to air toxics.

A network of ten fixed sites was used to monitor toxic air contaminants once every three days for two years. The location of the sites was the same as in the previous MATES II Study to provide comparisons over time. The one exception was the addition of the West Long Beach site. In addition to the fixed sites, five additional locations were monitored for periods of several months using moveable monitoring platforms. These micro-scale sites were chosen to determine if there were gradients between communities that would not be picked up by the fixed locations. Over 30 gaseous and particulate air toxics were measured.

Community Air Risk Evaluation (CARE) Program: The CARE program was initiated in 2004 by the Bay Area Air Quality Management District to evaluate and reduce health risks associated with exposures to outdoor toxic air contaminants in the Bay Area. The program is being carried out in three phases.

The goal of Phase I was to develop an emissions inventory for year 2000 and compile demographics and health statistics in order to identify high sites and locations of sensitive populations. In Phase 1, an annual emissions inventory was developed for diesel PM, benzene, formaldehyde and other toxic air contaminants (TACs) for localized areas. Additional studies conducted to verify TAC emissions estimates and improve the Bay Area toxic inventory include a telephone survey of residential wood burning, a carbon-14 analysis to determine new versus old carbon fractions in the ambient air, a chemical mass balance (CMB) study to estimate the source contributions to various ambient PM compounds, and a CMB analysis of organic PM compounds.

The goal of Phase II was to improve the TAC inventory and begin preliminary regional (Bay Area) and local (priority communities) scale modeling to estimate significant sources of diesel PM and TACs. Using regional modeling, the CARE program identified areas within the Bay Area, where high TAC exposures of sensitive populations–youth and seniors—intersect areas with high TAC emissions and areas with high poverty levels. This analysis identified six impacted communities where special studies, grant funding, emission reduction efforts, and enforcement actions have been focused TAC emissions reduction measures are in place throughout the Bay Area but, through the Bay Area Air Quality Management District's *Mitigation Action Plan*, special attention has been given to promoting and tracking progress in the impacted areas.

The goal of Phase III is to conduct an extensive exposure assessment to identify and rank the communities as to their potential TAC exposures, and determine the types of activities that place them at highest risk. The District will also pursue additional mitigation measures and provide a metric to assess their effectiveness in reducing overall exposure.

7. Continuous Emissions Monitors (CEMs)

Many large industrial facilities have continuous emissions monitors (CEMs) installed on equipment that are sources of air pollutants. As the name implies, CEMs units continuously monitor the concentrations of pollutants in the exhaust stream of the emission source. Typically, these monitors are required by the local air district's permit to operate, or rule provisions, to ensure that the equipment does not violate the permit conditions.

Local air districts receive data from CEMs units that are in place to satisfy permit or rule requirements. ARB will work with the local air districts to determine whether CEMs data would be useful for identifying overall facility emissions and, if so, ARB will include it in the adaptive management process.

8. Criteria Pollutant and Toxic Contaminant Emissions Inventory Databases

In addition to the GHG inventories discussed above, ARB and local air districts develop inventories of criteria pollutant and toxic contaminants. These emission inventories are used in a multitude of air quality programs to understand the relative contribution of sources, to develop control strategies for State Implementation Plans, track regional progress towards air quality goals, conduct risk assessments, and support regulatory development. Inventories are calculated estimates of emissions that are released from sources into the air where they disperse. When used in combination with other sources of data, such as economic activity and trends, ambient air quality, facility permit data and more specialized air quality data or studies, inventories can be helpful in understanding potential changes and impacts on the air quality of regions and sub-regions.

As part of the State's comprehensive inventory development process, local air districts collect emission information directly from the facilities and businesses that are required to obtain an air pollution operating permit. That data includes information about the nature of the facility's processes, the location of the facility, the type of pollutants emitted and the mass of the pollutants emitted. Facilities work with their respective local air districts to determine the best methodology to estimate their emissions, and the methodologies for estimating criteria pollutant emissions may vary across districts. Local air districts report the criteria pollutant data to ARB annually. Emission inventories of toxic pollutants are developed in a similar way and are collected through the Air Toxics "Hot Spots" Program. Local air districts collect toxic inventory data and report it to ARB every four years as defined by California statute.

It is important to note that inventories in general represent calculated estimates of emissions, except where facilities are required to use CEMs to measure emissions from stacks. For the most part, facilities (and broader source categories) rely on average emission factors and estimates of activity to determine the total estimated emissions. For these reasons, inventories are most useful for understanding relative contributions

and long term trends, inventories are not generally designed to detect day-by-day or even month-by-month changes.

In addition, many external factors can influence the variability in emissions, and it is essential to take these factors into account when looking at emission trends. For example, a facility's emissions can vary because of changes in facility-specific product demand, fuel cost or availability, cost or availability of electric power, economic conditions; labor availability; production material availability; routine maintenance; or unusual events such as power outages or breakdowns. In recent years, the economic downturn has had a dramatic impact on activity resulting in lower emissions. As the economy recovers, a commensurate increase in emissions should be expected. Another factor that has to be considered when comparing inventories is the improvement in methods used for estimating emissions. Over time, our understanding of emission rates and activity from sources has improved substantially. With new methods, the resulting emission estimate may be different. Therefore, a change in emissions at a facility from year-to-year may be the result of a better characterization of emissions rather than a real world increase or decrease. The following sections describe some of the available emission inventory data and databases maintained by ARB. Local air districts also maintain data on their facilities; two of these are also described.

a. California Emission Inventory Development and Reporting System (CEIDARS)

The federal Clean Air Act requires states to compile emission inventories of criteria pollutants. California's statewide emissions inventory is maintained by ARB, and is populated with data submitted by the local air districts, as well as that collected by ARB. The criteria pollutant emission inventory includes information on the emissions of reactive organic gases (ROG), NO_x, SO_x, CO, and PM. Data are gathered on an ongoing basis and stored in CEIDARS. A summary of the criteria pollutant inventory is published in ARB's Air Quality and Emissions Almanac. More information on CEIDARS and the Almanac can be found at:

http://www.arb.ca.gov/ei/general.htm

http://www.arb.ca.gov/aqd/almanac/almanac.htm

CEIDARS contains California's comprehensive inventory and includes information on approximately 13,000 individual facilities such as electric power plants and refineries. There are also about 135 aggregated point source categories. Aggregated point sources are not inventoried as individual facilities but are estimated as a group and reported as a single source category (e.g., gas stations and dry cleaners). In addition to individual facilities, CEIDARS includes approximately 80 source categories made up of sources of pollution, such as architectural coatings and consumer products, spread across a region and mobile sources - all on-road vehicles such as automobiles and trucks; plus off-road vehicles such as trains, ships, aircraft; and farm equipment.

Emission estimates within CEIDARS are based on a snap-shot of a variety of dynamic and variable processes. The data in CEIDARS represent annual average estimates for a specific calendar year. Annual average emissions are stored for each county, air basin, and district. There is also a Facility Search Tool that provides direct access to the year-by-year emissions reported for individual facilities, both criteria and toxics:

http://www.arb.ca.gov/app/emsinv/facinfo/facinfo.php

CEIDARS data can be used to look at trends in emissions as a comparison to observed changes at covered sources.

b. California Toxic Inventory (CTI)

ARB collects toxic emissions from thousands of facilities in California. The CTI provides annual average estimates of toxic emissions and is updated every four years. CTI data is stored in CEIDARS (described above).

Toxic pollutant emissions from stationary sources include point source data provided by local air districts pursuant to the Air Toxics “Hot Spots” Program (AB 2588). The Air Toxics "Hot Spots" Information and Assessment Act (AB 2588, 1987, Connelly) was enacted in 1987, and requires stationary sources to report the types and quantities of certain substances routinely released into the air. The goals of the Air Toxics "Hot Spots" Act are to collect emission data, to identify facilities having localized impacts, to ascertain health risks, to notify nearby residents of significant risks, and to reduce those significant risks to acceptable levels.

For sources without AB 2588 data, the CTI is developed by dis-aggregating (also known as “speciating”) CEIDARS-based estimates of total organic gas (TOG) and PM for area, mobile, and natural sources using the most recent speciation profiles. Speciation profiles provide species-specific mass ratios (i.e., chemical-species-to-total TOG or PM) and are based on source tests from representative emission sources. The “speciated” emissions for each source category are then reconciled with reported stationary point source toxics data to establish a complete inventory. More information on the CTI can be found at:

http://www.arb.ca.gov/toxics/cti/cti.htm

CTI data can be used to evaluate trends in emissions of air toxics as a comparison to observed changes at covered sources.

c. Data for Non-vehicular Source, Consumer Products and Architectural Coatings Fees

The Health and Safety Code authorizes ARB to impose additional fees on non-vehicular sources (facilities) that emit 250 tons or more per year of any nonattainment pollutant or its precursors. While the data used for the fee program

initially comes from ARB CEIDARS database, ARB provides the facilities and the local air districts an opportunity to update and correct emission estimates. These updates are more current than the annual criteria pollutant submittals. The fee program includes approximately 60 facilities. These fees are used by ARB to mitigate or reduce air pollution created by non-vehicular sources in the State.

http://www.arb.ca.gov/ei/nscpac_fees/nscpac_fees.htm

This data provides another source of emission data that can be compared to observed changes at covered emission sources.

d. South Coast AQMD Annual Emission Reporting (AER) Program

The South Coast Air Quality Management District's Annual Emission Reporting (AER) program was developed to track emissions of air contaminants from permitted facilities. The data collected by AER is used to update the comprehensive emissions inventory for the District, which includes Orange County, the non-desert portions of Los Angeles and San Bernardino counties, and the Riverside county areas west of the Palo Verde Valley. Fees for emissions of air contaminants are assessed based on the reported data. These fees help to cover the costs of evaluating, planning, inspecting, and monitoring air quality efforts. Under this program, those who emit more, pay more toward air pollution control efforts – and at the same time are given an incentive to reduce emissions. On January 1, 2008, the South Coast Air Quality Management District moved AER from a fiscal year basis (July 1 through June 30 of the following year) to a calendar year basis (January 1 through December 31 of each year). The compiled inventory is published in each update of the Air Quality Management Plan. More on the AER can be found at:

http://www.aqmd.gov/aer/aer.html

e. South Coast AQMD RECLAIM Program

The REgional CLean Air Incentives Market (RECLAIM) program is a cap-and-trade program operated by the South Coast Air Quality Management District. It encompasses most of the Basin's largest NO_x and SO_x stationary sources. It was developed to make significant progress in cleaning up the worst air in the nation. It is a multi-industry program with each facility having annual allocations and declining balances. Developed in the early 1990s, RECLAIM was seen as an innovation compared to previous command-and-control programs. Benefits included lower costs and greater flexibility for industry participants, and secured emission reductions with better emissions monitoring for environmental and community interests. More information on RECLAIM can be found at:

http://www.aqmd.gov/reclaim/index.htm

Nearly 80 percent of emissions under RECLAIM are from major sources, which are monitored by CEMs. Therefore, the accuracy of these emission data is of utmost importance in determining if RECLAIM is achieving its emission goals. In order to assure the highest accuracy, several checks are imposed on CEMs – initial certification and re-certification when modified, daily calibration checks, routine quality assurance and quality checks (QA/QC), and a semi-annual relative accuracy test audit (RATA).

B. Forest Data

ARB identified data sources for the evaluation of potential forest impacts caused by the U.S. Forest Protocol. Some of the data sources described below are readily available and some are expected to be available at a later date. ARB expects that it will be able to review and analyze some of the data sets without expert assistance. Other data sets require ARB to work with other State agencies and academia, as well as out-of-state resource agencies to interpret the data, and to conduct further analysis using the data.

In 2012, ARB plans to hire a contractor to develop a process to track data to detect environmental changes resulting from the U.S. Forest Protocol. ARB will also coordinate with and utilize the forestry expertise of the resource agencies during the implementation of this adaptive management plan. By working with these forestry experts and stakeholders, ARB can best ensure that the robustness of the adaptive management approach for the U.S. Forest Protocol is equal to that of the adaptive management approach for local air quality. Details as to how the data will be used will be developed through the work of the ARB contractor and the expertise of the resource agencies. That process is further described in the Review and Analysis section of this plan.

1. U.S. Forest Protocol Project Data

The proposed Regulation requires reporting of information on the performance of the forest offset projects prior to the issuance of compliance offset credits. Data reported under the U.S. Forest Protocol includes summarized forest project monitoring data, an annual update of the project's forest carbon inventory that calculates the amount of GHG reductions and carbon sequestration. This information will be in the offset project data annual report.

ARB will collect U.S. Forest Protocol data for each individual forest project. This information will be submitted annually by the project developer to ARB through the annual report. Forest project developers will assemble the annual report, and then submit it for verification to ARB or an accredited registry, and it must be verified by an ARB-accredited third party offset project verifier. ARB will not obtain this forest project level data until the first annual report is submitted during the first reporting cycle in 2013.

Based on the project type, the annual report will contain the following forest project information where applicable:

- Forest project name, location, type of project and project operator.
- Reporting period.
- Ownership, including any changes in ownership.
- Statement of compliance with all applicable laws and regulations.
- Estimated carbon stocks in all required carbon pools.
- Explanation of any decrease over a 10-year consecutive period in the standing live carbon pool.
- Description of how the project meets the definition of natural forest management.
- Projections of baseline and actual harvesting volumes from the forest project area over a 100 year period.
- Estimate of harvest volumes and associated carbon in harvested wood products.
- Estimate of mill efficiency.
- Baseline carbon estimates for all carbon pools.
- Uncertainty discount for avoided conversion projects.
- Forest carbon inventory (updated annually) following all required protocol calculation methodologies and models.
- Calculation of carbon sequestration and GHG reductions.
- Calculation of GHG removal enhancements.
- Description and explanation of the unintentional "reversal."[2]
- Reversal risk rating.
- Calculation of Forest Buffer Account contribution.

This information will be useful to get a better understanding of each forest project. Each forest project is unique and may not have the same ecosystem characteristics to make comparisons amongst forest projects. Using the annual report data, ARB will work with the ARB contractor to implement a specific process to review the data sources and track data to assess potential forest impacts.

2. Forest Buffer Account Information

Due to the possibility that forest projects could unintentionally "reverse" their carbon storage because of wildfire, pest infestation, or disease, negating the benefits of those projects, ARB will create and maintain a Forest Buffer Account holding a percentage of ARB-issued compliance offset credits from forest offset projects. ARB will annually monitor the number of compliance offset credits in the Forest Buffer Account as it relates to the number of reported reversals.

The Forest Buffer Account is a mechanism to replace offset credits in the event of an unintentional reversal, thereby insuring that GHG reductions reflected in offset credits

[2] "Reversal" refers to an event that abruptly releases stored carbon, such as a high intensity wildfire.

are permanent. A portion of the offset credits issued to forest projects must be placed into the Forest Buffer Account to cover unintentional reversals.

3. Greenhouse Gas Mandatory Reporting Regulation (MRR)

In addition to the reporting of GHG emissions from fossil fuel combustion, the MRR also requires reporting of CO_2 emissions from biomass derived fuels, including forest biomass. As part of the recent proposed modifications to the MRR, ARB addressed stakeholder concerns related to potential increased use of forest-derived wood and wood waste. In the MRR, end users of solid biomass fuels would report the mass of fuel consumed by fuel type, and end users of forest biomass would also report location of forest biomass used.

4. ARB's Updated GHG Statewide Inventory for Forests

ARB is responsible for developing and maintaining California's statewide GHG emission inventory, which includes a sector on GHG emissions and atmospheric sequestration of CO_2 from forests and rangelands. ARB is working with U.C. Berkeley to develop a next-generation GHG inventory system for forests, rangeland, and other wildlands statewide. The contractor will develop procedures to use in combination with ground-based biometric data from the U.S. Department of Agriculture - Forest Service Forest Inventory and Analysis plots, satellite remote sensing data, and other data on disturbance processes (fire, harvest, land use conversion, etc.). This data will be used to develop estimates of CO_2 uptake and GHG emissions across the landscape statewide (at appropriate spatial and temporal scales).

5. California Forest Practices Act as Administered by CalFire

The California Forest Practices Act provides a CEQA functional equivalent process for reviewing and permitting timber harvests. This process evaluates project-level and cumulative impacts (usually at a planning watershed scale) to ensure that all impacts are mitigated to a level less than significant. Impacts to State and federally listed and non-listed species and their habitats, and water resources (e.g., watercourses, lakes, marshes, meadows and wet areas; water supply; watersheds; riparian areas) are considered, as well as soils, archaeological resources, and hazards from wildfire, insects and disease. The California Department of Forestry and Fire Protection (CalFire) inspects projects to evaluate compliance with prescribed mitigations and timber restocking, and corrective action is taken if necessary to ensure satisfactory project completion. Large landowners must develop long-term landscape-level management plans and provide regular reporting to CalFire on compliance with projected levels of timber harvesting. Some landowners also conduct ongoing surveys or monitoring of habitat or water quality at the request of other state agencies.

6. Timber Yield Tax and Harvest Values Schedules

The California State Board of Equalization has a Timber Yield Tax program that sets harvest values of timber and collects an in lieu tax when it is harvested. This data is aggregated by county and provides forest land ownership and timber harvest volumes.

7. Fire and Resource Assessment Program (FRAP)

CalFire implements the FRAP program that conducts periodic assessments of California's forests and rangelands. The forest and range assessment report includes a detailed assessment of ecosystem characteristics within California's forests.

For the 2010 assessment, FRAP's analytical framework is based on defining assets and threats specific to each subtheme. Geographic information systems (GIS) technology is used to combine or "overlay" assets and threats, to determine areas of both high value and high threat. These priority landscapes rank areas for where action is needed in terms of applying various tools that can result in the desired future landscape condition. The 2010 Assessment will also take into consideration various existing planning efforts, ranging from statewide plans (i.e., California's Wildlife Action Plan) to Community Wildfire Protection Plans. The final Assessment product will combine qualitative, quantitative, and geospatial data.

8. Geographic Information System (GIS) and Geodatabases

Several GIS databases are available that report activities and processes occurring on federal, State, and private forest lands in California. These include activities such as timber operations (i.e., road building, thinning, harvest, replanting) and non-timber related activities (i.e., prescribed burning, salvage logging in areas hit by wildfire, replanting, and treatment for disease/pest infestations). Fires of all categories are also carefully mapped using GIS.

<u>CalFire - Forest Practice GIS</u>
CalFire's Forest Practice GIS captures current and historic timber harvesting activities for over 4 million acres of California timberland. These data layers include silviculture, yarding, new road construction, watercourse classifications, and timberland conversions, which are tracked through GIS. Once in GIS, this information can be graphically represented on maps and is available for the analyses of local and regional cumulative impact assessments, and to meet the requirements of California's Forest Practice Rules.

Available geodatabases and GIS data layers include: Timber Harvesting Plans from 2000 to 2010; non-industrial timber management plans from 1991 to 2010; and notice of timber operations from 1991 to 2009.

U.S. Forest Service, Region 5 - GIS Clearinghouse
The U.S. Forest Service clearinghouse developed a geodatabase that maps activities (i.e. harvest, thinning, vegetation fuels management, reforestation) accomplished on national forest lands in California for the approximate period of October 2003 to December 2010.

9. Special Monitoring Projects (CalFire, Department of Fish and Game, Regional Water Quality Control Boards)

CalFire conducts a statewide monitoring program that analyzes the effectiveness of timber harvest rules and best management practices to protect water quality and also participates in cooperative instream monitoring programs in various parts of the State. Other studies are conducted by responsible State and federal agencies, including the Department of Fish and Game, Department of Conservation's California Geological Survey (previously known as the Division of Mines and Geology), and the Regional Water Quality Control Boards, the U.S. Fish and Wildlife Service and the National Marine Fisheries Service.

V. Review and Analysis

ARB will take a stepwise approach to evaluating the data gathered as part of the adaptive management plan. In doing this, ARB will first evaluate data that will provide a forward look at potential emissions increases or forest impacts and is readily available to identify potential impacts at the earliest opportunity. The indicators that ARB investigates will be prioritized, or "tiered" based on the order in which they will be used to assess if unanticipated adverse impacts have occurred as a result of the Regulation or U.S. Forest Protocol. First tier indicators would indicate a potential environmental change. Second tier indicators would indicate if an environmental change was caused by the Regulation or U.S. Forest Protocol. Third tier indicators would indicate if an environmental change caused by the Regulation or U.S. Forest Protocol caused an adverse impact.

If the weight of evidence indicates that the answer to any of the following questions is "yes", then the evaluation moves to the next tier, ultimately culminating in the appropriate response to the adverse impact if all questions are answered in the affirmative. Staff will prioritize the order of investigations to answer the following questions:

1. Has an environmental change taken place?
   If yes, then;
2. Is the environmental change caused by the Regulation or U.S. Forest Protocol?
   If yes, then;
3. Has a change that is determined to be caused by the Regulation or U.S. Forest Protocol caused an adverse impact?
   If yes, then;
4. Identify the options for responding and take appropriate action.

Different indicators will be used to assess the answer to these questions. The weight of evidence available from this approach will guide ARB's conclusions on whether or not the cap-and-trade regulation was the cause of a potential adverse impact.

A. Local Air Quality Impacts

Tier 1 Indicators:
Tier 1 indicators will be used to assess if a change in operation or project development has taken place that could be caused by the Regulation (determined in the Tier 2 analysis) and could result in adverse localized air quality impacts (determined in the Tier 3 analysis). If there is a positive result in screening Tier 1 indicators, ARB will initiate the next step to investigate whether the change was caused by the Regulation. Tier 1 indicators do not rely on monitoring of criteria pollutants or toxic air pollutants but do show changes in operation or project development that could result in increases in criteria pollutants or air toxics that ARB will analyze further in Tier 2 and Tier 3 (discussed below).

Indicators

- Covered facility annual GHG emissions.
- Fuel volume, or new fuel used.
- New local air district or CEC application for permit to construct or modify submitted by a facility covered by the Regulation.
- Holdings of compliance instruments.

Example Analyses

The types of analyses that draw on Tier 1 indicators may include:

- Identify covered facilities reporting an increase in annual GHG emissions through MRR.
- Identify covered facilities reporting increased fuel volume used or a new fuel used as reported through the MRR (e.g., biomass or tires).
- Identify covered facilities reporting new equipment through the MRR; investigate use of equipment and if emissions increased due to new equipment.
- Identify covered facilities that have applied for new permits for construction or modification; investigate if the project is likely to increase localized emissions and the primary driver for the new facility or modifications (cap-and-trade regulation, efficiency, etc.).
- Identify covered facilities that are holding compliance offset credits above the amount they are expected to need for compliance.
- Identify facilities or geographic regions that show GHG emissions increases greater than expected from average economic growth.
- Identify regions in the State where facilities are located and areas where multiple facility emissions could contribute to localized air quality impacts.

No single Tier 1 indicator alone would necessarily reflect that an impact caused by the Regulation has occurred. They would only reflect that there has been, or potentially could be, an environmental change. Additional investigation would be necessary if significant change is observed in one indicator or if a variety of Tier 1 indicators reflect environmental changes.

Tier 2 Indicators:

If the analysis of Tier 1 indicators indicates that there has been an environmental change, then ARB will investigate the Tier 2 indicators to assess if the environmental change was caused by the Regulation. A positive result in screening will cause initiation of the next step.

It is likely that determining the cause of a change will require the use of multiple Tier 2 indicators. Additionally, it is highly probable that most changes will have multiple causes (e.g., growing economies, changes in world-wide manufacturing trends, etc.). Potential causes identified at this time are:

- Economic growth related to recovery from the recent recession.
- Global manufacturing trends and availability of new technology.
- Changes in a company's business model.
- Dry rainfall year leading to decrease in hydroelectric power production.
- Impacts of other regulatory programs (i.e., Renewable Portfolio Standard, reduction of once-through-cooling practices for electricity generation, federal or local regulations, etc.).
- Changes in emission factors or other methodologies used to report or calculate emissions.
- Cap-and-trade regulation.

Indicators

- Forecasted economic growth.
- Facility-specific product demand.
- Consumer demand.
- Meteorological conditions (e.g., rainfall or ambient temperature).

Example Analyses

The types of analyses that draw on Tier 2 indicator data may include:

- Assess if changes in emissions are comparable to changes in the economy or consumer demand.
- Assess if manufacturing trends or changes in common business models have occurred that may result in activities that increase emissions.
- Assess if hydroelectric power production has decreased and if fossil fuel energy production increased as a result.

- Assess if there have been any regulatory or policy changes that impacted emissions.
- Monitor industry-specific trade data to assist in determining whether/where potential changes may occur.
- Assess methodology changes in how emissions are reported or calculated.

Tier 3 Indicators:
If an environmental change is attributed to the Regulation, ARB will review Tier 3 indicators to assess if the change has had an adverse impact. An increase in NO_x at a facility with a 100 foot tall exhaust stack may have no discernable impact on the local community if the design allows emissions to disperse. However, increased toxic air pollutant emissions monitored at a facility's fence line may indicate an adverse impact. As with Tier 2 indicators, it is likely that investigation of multiple indicators will be required to assess if an adverse impact to localized air quality has occurred.

Indicators

- Criteria and toxic pollutant emissions.
- Changes in ambient air quality monitoring data:
  - Criteria pollutants;
  - Toxic air pollutants; and
  - Localized monitoring networks.
- Emissions measured in facility CEMs data.
- Emissions determined in California Clean Air Act Fee Program data.

Example Analyses

The types of analyses that draw on Tier 3 indicators data may include:

- Identify covered facilities reporting an increase in facility annual emissions (criteria pollutants or toxic air pollutants) through review of local air district emission surveys, special purpose monitoring, or CEMs data; investigate reason for emissions increase.
- Identify criteria pollutant or toxic air pollutant monitoring network data indicating increased ambient concentrations; investigate reason that monitored ambient concentrations increased.
- Compare activity reported through the criteria pollutant inventory or specialized inventories supporting programs such as RECLAIM.

B. Forest Impacts

The environmental impacts analysis in the FED concluded that increased forest project related impacts attributable to the Regulation, or the U.S. Forest Protocol are unlikely based on available data and current laws that regulate forest activities. However, ARB could not determine that increases would not ever occur. ARB, therefore, committed to use an adaptive management approach as an integral part of the cap-and-trade

program to evaluate data for potential unanticipated impacts that could be caused by the Regulation, or the U.S. Forest Protocol.

ARB will use the same approach to evaluate forest impacts as is being used for local air quality impacts. Under this proposed adaptive management plan, in 2012, ARB will hire a contractor to develop and implement a specific process to track data to detect environmental changes resulting from the U.S. Forest Protocol. ARB will also coordinate with and utilize the forestry expertise of the resource agencies during the implementation of this adaptive management plan. By working with these forestry experts, ARB can best ensure that the robustness of the adaptive management approach for the U.S. Forest Protocol is equal to that of the adaptive management approach for local air quality. Details as to how the data will be used will be developed through the work of the ARB contractor and the expertise of the resource agencies.

The ARB contractor will develop Tier 1, Tier 2, and Tier 3 indicators and analyses. The ARB contractor will conduct the review and analysis under ARB's direction and the results will be incorporated into the annual adaptive management reports. Additionally, the ARB contractor will be called upon to review the usefulness of the data sources, including screening forest offset project annual report data. ARB will work with the ARB contractor to assess if any relevant data sets are missing from the list set forth in the previous section, as well as investigate the effectiveness of the existing data sources. Additionally, the ARB contractor will educate staff in general forest practices, indicators of potential forest impacts, and forest assessments and analyses.

C. Causation

In conducting the analysis, it will be necessary to consider normal variations, existing trends, and other factors that may be responsible for changes in the data. For example, air quality data can vary significantly from year-to-year because of meteorology. Additionally, changes in economic activity can produce large impacts on air quality and emissions trends, and factors such as rainfall can have significant impacts on emissions as a result of California's utilization of hydroelectric power as a source of energy.

ARB recognizes that the results of the data review are unlikely to point absolutely to the cap-and-trade regulation or U.S. Forest Protocol as the cause of a potential adverse impact, and that a judgment will need to be made based on the weight of evidence available. It is likely that it will be necessary for ARB to use several sources of data in combination to conclude that an adverse impact is attributable to the Regulation or U.S. Forest Protocol.

1. Localized Air Quality

If initial screening and analysis of the data point to a potential impact, then ARB will take steps to assess why the change occurred. An example scenario that would indicate a change to be further investigated is as follows: a new application is received by a local air district for a permit to construct or modify a cogeneration unit at a facility. For this

case, ARB would work with the local air district to obtain the details of the project and the environmental analysis. If the project is likely to increase emissions, then ARB would consult with the local air district on the impact of the new unit on overall facility emissions. If the weight of the evidence were to indicate that the cogeneration facility is 1) being proposed as a result, directly or indirectly, of the cap-and-trade regulation; and 2) would increase localized emissions and result in an adverse impact to public health, then the adaptive management plan would require ARB to move to the next step – devising and implementing a response.

2. Forest Impacts

As with potential local air quality impacts, if initial screening and analysis of the data point to a potential impact then ARB will take steps to assess the cause of the change. ARB will work with forestry experts to refine the details of the screening and analysis process to ensure that the robustness of the adaptive management approach for the U.S. Forest Protocol is equal to that of the adaptive management approach for local air quality. The areas to refine are: (1) data and data source identification (information gathering) and (2) analysis to determine whether an adverse impact is caused by the U.S. Forest Protocol (review and analysis).

VI. Response

If the process described above confirms that there has been an adverse impact to local air quality or a forest impact caused by the cap-and-trade regulation or U.S. Forest Protocol, under the adaptive management plan, ARB is committed to developing and implementing appropriate responses through a public process, including consideration and approval by the Board as necessary. ARB would work to ensure that the level of response is commensurate with the level of the impact.

ARB would consider a range of options to address localized adverse air quality impacts. These could include the adoption of additional regulatory requirements, using funds obtained from the sale of allowances to support local mitigation projects, coordination with other agencies to provide additional incentives for energy efficiency or other emission reduction activities within the community, or modifications to the Regulation.

For unanticipated impacts from the U.S. Forest Protocol, ARB could consider revising the types and/or geographic location of forest offset projects, or disallowing the use of certain types of U.S. Forest Protocol compliance offset credits. Other types of responses are also possible and would be considered and implemented as necessary.

The examples are illustrative and not intended to be an exhaustive list of appropriate responses. What responses may be appropriate depends on what impacts are identified, the specific causes of those impacts, and the responses available at some future point in time (which may be different than the responses available today). These considerations support the use of adaptive management, which will allow ARB to devise the most appropriate response should unintended consequences occur. While it is not

feasible in this plan to identify all possible future responses, it is clear that ARB has many tools available to it should unanticipated consequences occur.
This plan requires that where adverse impacts related to localized air quality or to forestry occur, ARB must take appropriate action. In most cases, this will require staff to identify potential responses and promptly take a recommended response to the Board for approval.

VII. Public Process for this Adaptive Management Plan

As mentioned earlier, the Board will consider this plan at the October 20-21, 2011, Board meeting. Upon Board approval, ARB will work with stakeholders, local air districts, and resource agencies to finalize specific details of data gathering.

An important part of the public process is reporting. The first adaptive management report is planned for December 2012, and will focus on the first phase of implementation. Annually thereafter, staff will provide reports to the public and the Board on the implementation of the adaptive management plan. The annual adaptive management plan reports will, among other things, outline the data collected and the trends observed, and discuss any recommended responses.

The plan would be implemented based on the following schedule:

October 10, 2011	ARB releases Draft Adaptive Management Plan for comment.
October 20-21, 2011	Board considers Adaptive Management Plan for approval.
November 2011	Staff works with local air districts, resource agencies, and stakeholders to finalize specific details concerning data gathering under the Adaptive Management Plan.
Early 2012	ARB contracts for third-party forestry expertise.
Mid-2012	Staff updates Board on Adaptive Management Plan implementation.
December 2012	Staff releases Adaptive Management Implementation Report (prior to first compliance period).
December 2013	Staff updates Board on Adaptive Management implementation.
December 2014	Staff releases Adaptive Management Report for calendar year 2013.

December 2015	Staff releases Adaptive Management Report for calendar year 2014 and end of first compliance period.
Ongoing	Staff releases Adaptive Management Report annually.

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