AB 32 Information

Amendment to
Draft Supplemental EIR
SCH No. 1993101036

LANCASTER LANDFILL AND RECYCLING CENTER

CONDITIONAL USE PERMIT NO. 03-170

County of Los Angeles
Department of Regional Planning
320 West Temple Street
Los Angeles, CA 90012

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AB 32 INFORMATION

AMENDMENT TO
DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT
LANCASTER LANDFILL AND RECYCLING CENTER
SCH NO. 1993101036

CONDITIONAL USE PERMIT NO. 03-170

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AMENDMENT TO DRAFT SUPPLEMENTAL EIR LANCASTER LANDFILL AND RECYCLING CENTER CONDITIONAL USE PERMIT

TABLE OF CONTENTS

Page

4.0 ENVIRONMENTAL ANALYSIS

4.5 Greenhouse Gas Emissions and Global Warming 4.5-1
4.5.1 Existing Conditions 4.5-1
4.5.2 Significance Criteria 4.5-8
4.5.3 Potential Impacts 4.5-9
4.5.4 Mitigation Measures 4.5-15
4.5.5 Level of Significance After Mitigation 4.5-16

REFERENCES AND RESOURCES 4.5-18

List of Tables

4.5-1 Existing and Future Equipment and Personnel 4.5-10
4.5-2 Potential Greenhouse Gas Emissions Associated with the Project 4.5-11

APPENDICES

F. 2006 WM CCAR Reporting
G. Increased GHG from Lancaster Project (9/2008)
H. Fugitive Methane from Landfill Methodology

4.5 GREENHOUSE GAS EMISSIONS AND GLOBAL WARMING

Since circulation of the Draft SEIR in 2006, the issue of global climate change resulting from human activities has gained prominence and the scientific basis for measuring and predicting climate change has strengthened. The potential consequences for humanity and life on earth have become better understood, and efforts have increased to reverse climate change through reduction of greenhouse gas (GHG) emissions. This new and circulated section of the Draft SEIR considers the contribution of the proposed Project to greenhouse gas (GHG) emissions and global climate change, realizing, however, the nature of the project as being one that would accommodate the disposal of MSW that will continue to be generated within Los Angeles County, with or without the proposed project. Additional net regional air emissions, including GHG emissions would therefore occur from the transport and disposal of MSW.

In California, generally, observational trends from the last half-century show warmer winter and spring temperatures, decreased spring snow levels in lower- and mid-elevation mountains, snowpack melting up to one month earlier, and flowers blooming one to two weeks earlier than under historical conditions (Cayan et al 2006b). Research suggests that human activities, such as the burning of fossil fuels and clearing of forests, are resulting in more emissions of carbon dioxide (CO_2) and other heat trapping gases into the atmosphere

4.5.1 Environmental Setting

The Project site is located within the Antelope Valley Air Quality Management District (AVAQMD). Air quality within the AVAQMD, generally, has shown improvement. The region's 2007 ozone season, for example, turned out to be the cleanest in eight years. Between May and October 2007, only 14 days exceeded the federal 0 08 parts per million (ppm) ozone standard, compared to 16 days in 2006 and 31 days in 2005. The federal PM_{10} standard has not been exceeded since 1994 in the Antelope Valley. Global climate change due to GHG emissions continues to occur, however, as explained below.

Existing Air Quality and Greenhouse Gases

Various gases in the Earth's atmosphere, classified as atmospheric GHGs, play a critical role in determining the Earth's surface temperature. Solar radiation enters Earth's atmosphere from space, and a portion of the radiation is absorbed by the Earth's surface. The Earth emits this radiation back toward space but, in the process, the properties of the radiation change from high-frequency solar radiation to lower-frequency infrared radiation. Greenhouse gases, which are transparent to solar radiation, are effective in absorbing infrared radiation. As a result, the infrared radiation that otherwise would have escaped back into space is now retained in the Earth's atmosphere and results in a warming of the atmosphere. This phenomenon is known as the greenhouse effect.

GHGs are global pollutants, unlike criteria air pollutants and toxic air contaminants, which are pollutants of regional and local concern, respectively. California is the 12th to 16th largest emitter of CO_2 in the world and produced 391 million tons of carbon dioxide equivalents in 2004 (CEC2006a). Carbon dioxide equivalents is a unit of measurement used to account for the fact that different GHGs have different potential to retain infrared radiation in the atmosphere and contribute to the greenhouse effect. Among the prominent GHGs contributing to the greenhouse effect are carbon dioxide (CO_2), methane (CH_4), ozone (O_3), water vapor, nitrous oxide (N_2O), and chlorofluorocarbons (CFCs). This potential, known as the global warming potential of a GHG, is also dependent on the lifetime, or persistence, of the gas molecule in the atmosphere. For example, CH_4 is a much more potent GHG than CO_2. As described in the California Climate Action Registry (2006) one ton of CH_4 has the same contribution to the greenhouse effect as approximately 21 tons of CO_2. The California Air Resources Board also uses a Global Warming Potential (GWP) of 21 for methane in their most recent inventory of GHG emissions (http://www.arb.ca.gov/cc/inventory/opubs/reports/staff_report_1990_level.pdf). Expressing GHG emissions in carbon dioxide equivalents takes the contribution of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only CO_2 were being

emitted. At least one researcher has found that it is the human-caused emissions of these GHGs in excess of natural ambient concentrations that are responsible for enhancing the greenhouse effect (Ahrens 2003.) Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the industrial/manufacturing, utility, transportation, residential, and agricultural sectors of our economy (California Energy Commission 2006a).

Consumption of fossil fuels in the transportation sector was the single largest source of California's GHG emissions in 2004, accounting for 40.7percent of total GHG emissions in the state (California Energy Commission 2006a). This category was followed by the electric power sector (including both in-state and out-of-state sources) (22.2 percent) and the industrial sector (20.5 percent) (California Energy Commission 2006a). A byproduct of fossil fuel combustion is CO_2. Processes that absorb and accumulate CO_2, often called CO_2 "sinks," include uptake by vegetation and dissolution into the ocean. Methane, a highly potent GHG, results from off-gassing associated with agricultural practices and municipal solid waste landfills.

Feedback Mechanisms and Uncertainty

Many complex mechanisms interact to establish the average global temperature. For example, a change in ocean temperature would be expected to lead to changes in the circulation of ocean currents that, in turn would further alter ocean temperatures. There is uncertainty about how some factors could affect global climate change because they have the potential to both enhance and neutralize future climate warming. Examples of these conditions are described below.

Direct and Indirect Effects of Aerosols

Aerosols, including particulate matter (PM), reflect sunlight back into space. As particulate matter attainment designations are met, and fewer emissions of particulate matter occur, the cooling effect of anthropogenic aerosols would be reduced, and the greenhouse effect would be further enhanced. Similarly, aerosols act as cloud condensation nuclei, aiding in cloud formation and increasing cloud lifetime. Clouds also can efficiently reflect solar radiation back to space. As particulate matter emissions are reduced, the indirect effect of aerosols on clouds would be reduced, potentially further amplifying the greenhouse effect.

The Cloud Effect

As global temperatures rise, the ability of the air to hold moisture increases, which facilitates cloud formation. If an increase in cloud cover occurs at low or middle altitudes, resulting in clouds with greater liquid water content such as stratus or cumulus clouds, more radiation is reflected back to space, resulting in a negative feedback mechanism, and the side effect of more cloud cover resulting from global warming acts to balance further warming. However, if clouds form at higher altitudes in the form of cirrus clouds, these clouds actually allow more solar radiation to pass through than they reflect, and ultimately they act as a GHG themselves. This results in a feedback mechanism whereby the side effect of global warming acts to enhance the warming process. This feedback mechanism, known as the "cloud effect" contributes to uncertainties associated with projecting future global climate conditions.

Other Feedback Mechanisms

As global temperatures continue to rise, methane gas currently trapped in permafrost is released into the atmosphere when areas of permafrost thaw. Thawing of permafrost attributable to global warming would be expected to accelerate and enhance other global warming trends. Additionally, as the surface area of polar and sea ice continues to diminish, the Earth's reflectivity is also anticipated to decrease. As a result, more incoming solar radiation will likely be absorbed by the Earth rather than being reflected back to space, further enhancing the greenhouse effect.

Regulatory Setting

Recent state regulations specifically address greenhouse gas emissions and global climate change. At this time, however, there are no regulations setting ambient air quality emissions standards for greenhouse gases.

Senate Bill 1771

Senate Bill (SB) 1771 (Sher), chaptered in September of 2000, required the Secretary of the Resources Agency to establish a nonprofit public benefit corporation, to be known as the "California Climate Action Registry," (CCAR) for the purpose of administering a voluntary greenhouse gas (GHG) emissions registry to record and register voluntary greenhouse gas reductions that have been achieved since 1990. The bill requires the Energy Commission to qualify third-party organizations to provide assistance for purposes of monitoring and reducing GHG emissions. In addition, the Energy Commission is required to develop metrics for use by the Registry and to update the State's inventory of GHG emissions by January 1, 2002. The law also requires the adoption of standards to verify emissions reductions and requires the establishment of greenhouse gas emissions reductions goals along with efficiency improvement plans.

The California Climate Action Registry

As noted above, the California Registry provides leadership on climate change by developing and promoting credible, accurate, and consistent GHG reporting standards and tools for organizations to measure, monitor and reduce their GHG emissions consistently across industry sectors and geographical borders, and subject to third party verification. (www.climateregistry.org)

Waste Management, Inc voluntarily joined the registry in 2006 and reported emissions from 2006 and anticipates completing its estimate of 2007 GHG emissions by late 2008. Waste Management was recently awarded the status of *Climate Action Leader* by the registry. To view Waste Management's reporting of GHG emission to CCAR, go to: https://www.climateregistry.org/CARROT/public/reports.aspx and scroll to "Waste Management" under entity name.

Members, such as Waste Management, calculate greenhouse gas emissions from all California operations, have them verified and report them to the registry. The registry makes the data available to the public. According to the registry, such firms are, "leaders in their respective industry sectors, and are actively participating in solving the challenge of climate change." Waste Management's reporting was completed approximately five years prior to the first reporting requirements outlined in AB 32.

Assembly Bill 1493

In 2002, then-Governor Gray Davis signed Assembly Bill (AB) 1493 (Pavley 2002). AB 1493 required the California Air Resources Board (CARB) to develop and adopt, by January 1, 2005, regulations that achieve "the maximum feasible reduction of greenhouse gases emitted by passenger vehicles and light-duty truck and other vehicles determined by CARB to be vehicles whose primary use is noncommercial personal transportation in the state." CARB adopted regulations in 2004 and applied to the USEPA for a waiver under the federal Clean Air Act to implement the regulation. The Pavley regulations incorporate both performance standards and market based compliance mechanisms. In addition to delivering GHG reductions, the standards will benefit California drivers by ultimately saving them an estimated $30 each month in avoided fuel costs. (CARB Draft Scoping Plan, p. 20 (June 2008).)

In December 2007, USEPA denied California's waiver request. California, among other states, is challenging that denial in federal court. AB 32, discussed below, states that if the Pavley regulations do not remain in effect, CARB shall implement alternative regulations to control mobile sources to achieve equivalent or greater GHG reductions. (Health & Safety Code, § 38590.)

Executive Order S-3-05

In 2005, Governor Arnold Schwarzenegger signed Executive Order (EO) S-3-05, which proclaims that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the snow pack of the Sierra Nevada Mountains, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To combat those concerns, EO S-3-05 established total GHG emission targets. Specifically, emissions are to be reduced to the 2000 level by 2010, the 1990 level by 2020, and to 80 percent below the 1990 level by 2050.

Executive Order S-3-05 directs the Secretary of the California Environmental Protection Agency (CalEPA) to coordinate a multi-agency effort to reduce GHG emissions to the above target levels and to submit biannual reports to the governor and state legislature. The reports are to describe: (1) progress made toward reaching the emission targets; (2) impacts of global warming on California's resources; and (3) mitigation and adaptation plans to combat these impacts.

To comply with EO S-3-05, the Secretary of CalEPA created a Climate Action Team (CAT) made up of members from various state agencies and commissions. The CAT released its first report in March 2006. The report proposed to achieve the targets by building on voluntary actions of California businesses, local government and community actions, and state incentive and regulatory programs. In April 2007 the CAT released a draft report entitled "Proposed Early Actions to Mitigate Climate Change in California."

Assembly Bill 32

In September 2006, Governor Schwarzenegger signed AB 32, the California Climate Solutions Act of 2006. (Health & Safety Code, § 38500 et seq.). AB 32 requires statewide GHG emissions to be reduced to 1990 levels by the year 2020 (representing a 25 percent reduction). This reduction will be accomplished through an enforceable statewide cap on GHG emissions that will be phased-in beginning in 2012. To effectively implement the cap, AB 32 directs CARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources. AB 32 specifies that regulations adopted in response to AB 1493 should be used to address GHG emissions from vehicles. However, AB 32 also states that, if the AB 1493 regulations cannot be implemented, then CARB should develop new regulations to control vehicular GHG emissions under authorization of AB 32.

AB 32 requires CARB to: adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrived at the cap; institute a schedule to meet the emissions cap; and develop tracking, reporting, and enforcement mechanisms to ensure that the state achieves reductions in GHG emissions necessary to meet the cap. AB 32 also includes guidance to institute emissions reductions in an economically efficient manner, as well as conditions to ensure that businesses and consumers are not unfairly affected by the reductions.

AB 32 established the following schedule for CARB to complete each of these responsibilities, as follows:

- By June 30, 2007, publish a list of discrete "Early Action" GHG emissions reduction measures. At its June 2007 hearing the CARB approved three discrete early action items, one of which included improving landfill methane capture rates. The Final Early Action Report was published in October 2007
- By January 1, 2008, adopt regulations to require the reporting and verification of the GHGs and to monitor and enforce compliance with AB 32 program.
- By January 1, 2009, prepare and approve scoping plan for achieving the maximum technologically feasible and cost-effective reductions of GHGs from sources or categories of sources of GHGs.

- By January 1, 2010, adopt regulations to implement measures identified as part of the "Early Action" process.
- By January 1, 2011, adopt GHG emission limits and emission-reduction measures by regulation, and establish a system of market-based declining annual emission limits for GHG sources or categories of sources.
- By January 1, 2012, implementation and enforcement of GHG emission limits and emission-reduction measures.

The schedule presents an orderly progression of actions, beginning with an initial listing of GHG emission-reduction measures by July 1, 2007, and ending with an operative (i.e., enforcement) date for GHG emission limits and emission-reduction measures by January 1, 2012.

On June 21, 2007, CARB published its Proposed Early Actions to Mitigate Climate Change in California, which describes recommendations for discrete early action measures to reduced GHG emissions. (CARB 2007.) These measures will become part of California's strategy for achieving GHG reductions under AB 32. One of the sources for the potential measures includes the CAT Report. Three new regulations have been adopted as "discrete early action greenhouse gas reduction measures," which include the following: a low carbon fuel standard; reduction of HFC-143a emissions from non-professional servicing of motor vehicle air conditioning systems; and improved landfill methane capture. (CARB 2007.) The discrete early action measures must be implemented by January 1, 2010. CARB estimates that by 2020, the reductions from those three measures would be approximately 13-26 million metric tons of carbon dioxide equivalent. WM has been working with State agencies charged with developing the early action measures for controlling landfill gas emissions. Although measures have not yet been formalized and adopted, WM currently employs many practices, such as enhanced gas well field design and vacuum optimization procedures, at their landfills, including LLRC, which are aimed at reducing landfill gas emissions. To that end, WM has hired a gas operations manager (GOM) who has the responsibility of ensuring that the gas collection system and well heads at the LLRC are operating efficiently in order to minimize landfill gas emissions.

The California Integrated Waste Management Board (CIWMB) recently published a guidance document on reducing GHG emissions from landfills.[1] This report from the CIWMB is designed primarily as a guidance document for landfill operators and regulators. It provides recommended technologies and management practices for reducing landfill gas (LFG) emissions through improved landfill design, construction, operation, and closure. The report evaluates the effects that changes in landfill practices may have in reducing LFG emissions. It includes discussions on each technology and management options for applicability, cost, and overall effectiveness in reducing greenhouse gas emissions. Waste Management endeavors to employ the practices outlined in this report at LLRC to minimize GHG emissions.

In June 2008 CARB released a "Climate Change Draft Scoping Plan, A Framework for Change" to lower the state's GHG emissions to meet the 2020 limit.[2]

The Draft Scoping Plan proposes a comprehensive set of actions designed to reduce overall carbon emissions in California. CARB will revise the Draft Plan based on continuing analysis and public input and will release a proposed Scoping Plan in October. It will take the Plan to CARB Board in November 2008. The measures in the Scoping Plan adopted by the Board will be developed over the next three years and be in place by 2012. The Plan will be updated every 5 years to keep pace with the rapidly evolving climate science and solutions.

[1] http://www.ciwmb.ca.gov/Publications/default.asp?pubid=1268

[2] www.arb.ca.gov/cc/scopingplan/document/draftscopingplan.htm

According to the Draft Plan, reducing greenhouse gas emissions to 1990 levels means cutting approximately 30 percent from business-as-usual emission levels projected for 2020, or about 10 percent from today's levels. Among other things, the Draft Scoping Plan includes the following preliminary recommendations: (1) adopt regulations requiring retrofits to improve the fuel efficiency of heavy-duty trucks by incorporating devices that reduce aerodynamic drag and rolling resistance, involve advanced combustion strategies, friction reduction, waste heat recovery, electrification of accessories or hybridization of medium-and heavy-duty vehicles; and (2) adopt measures to reduce methane emissions from landfills and increase waste diversion of recyclable materials. The Draft Plan also considers imposing carbon fees on carbon-intensive fuels in the range of $10 to $50 per metric ton CO_2E.

The Draft Plan recognizes that to most effectively address climate change, we must encourage collaborations between academia and the private sector. "Industry is well positioned to quickly attack problems. Combining the understanding and knowledge of universities with the innovation, acumen and speed of business can unleash a powerful collaborative force to tackle the problems associated with climate change." (Draft Scoping Plan, p. 75.)

Senate Bill 1368

Senate Bill (SB) 1368 is the companion bill of AB 32, also signed by Governor Schwarzenegger in September 2006. SB 1368 requires the California Public Utilities Commission (CPUC) to establish a GHG emission performance standard for baseload generation from investor-owned utilities by February 1, 2007. The California Energy Commission (CEC) must establish a similar standard for local publicly owned utilities by June 30, 2007, which it has done. These standards cannot exceed the GHG emission rate from a baseload combined-cycle natural gas-fired plant. The legislation further requires that all electricity provided to California, including imported electricity, must be generated from plants that meet the standards set by the CPUC and CEC.

Executive Order S-01-07

Executive Order S-1-07, the Low Carbon Fuel Standard (LCFS) (issued on January 18, 2007), calls for a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020. It instructed the California Environmental Protection Agency to coordinate activities between the University of California, the California Energy Commission and other state agencies to develop and propose a draft compliance schedule to meet the 2020 target. Furthermore, it directed CARB to consider initiating regulatory proceedings to establish and implement the LCFS. In response, as discussed above, CARB identified the LCFS as an early action item with a regulation to be adopted and implemented by 2010.

Senate Bill 97

Governor Schwarzenegger signed Senate Bill (SB) 97 (Sutton), a CEQA and greenhouse gas emission bill, into law on August 24, 2007. SB 97 requires the Governor's Office of Planning and Research ("OPR") to prepare CEQA Guidelines to provide regulatory guidance on the analysis and mitigation of GHG emissions in CEQA documents, including, but not limited to, effects associated with transportation or energy consumption. OPR must prepare the new CEQA Guidelines and transmit them to the Resources Agency by July 1, 2009. The Resources Agency must then certify and adopt the guidelines by January 1, 2010. OPR and the Resources Agency are required to periodically review the guidelines to incorporate new information or criteria adopted by CARB pursuant to the Global Warming Solutions Act, scheduled for 2012.

In the interim, OPR recently offered informal guidance, in the form of a Technical Advisory entitled "CEQA and Climate Change: Addressing Climate Change Through California Environmental Quality Act (CEQA) Review" (June 19, 2008) (www.opr.ca.gov.) The Technical Advisory includes recommendations on the steps lead agencies should take to address climate change in their CEQA documents. OPR recommends that each public agency develop its own approach to performing climate change analysis for project that generates GHG emissions, applying the best available information at the time. Specifically, OPR

recommends that lead agencies: (1) identify and quantify the GHG emissions; (2) assess the significance of the impact on climate change; and (3) if the impact is found to be significant, identify alternatives and/or mitigation measures that will reduce the impact below significance.

As part of this process, OPR has asked the California Air Resources Board technical staff to recommend a method for setting thresholds of significance for GHG emissions. To this end, the CARB held a preliminary workshop to discuss possible approaches to establishing such thresholds on October 27, 2008. The Preliminary Draft Staff Proposal (October 24, 2008) prepared by CARB, suggests that different GHG thresholds of significance may apply to projects in different sectors because: (1) some sectors contribute more substantially to the problem (e.g., industrial versus residential and/or commercial), and therefore, should have a greater obligation for emissions reductions, and (2) looking forward, there are differing levels of emissions reductions expected from different sectors in order to meet California's climate objectives. CARB also indicated that different types of thresholds, (e.g., quantitative, qualitative, and performance-based) can apply to different sectors under the premise that the sectors can and must be treated separately given the state of the science and data (CARB, October 24, 2008).

For industrial projects, the goal is to provide for the mitigation of GHG emissions on a state-wide level. It is unclear, at this time, whether waste management projects will be considered part of the industrial project category, or whether distinct thresholds will be recommended for such projects. At this time, CARB staff is proposing that CARB consider recommending the use of a quantitative significance threshold as part of the thresholds of significance considered by lead agencies until OPR issues recommended thresholds of significance or until performance standards (such as AB 32 regulatory requirements) are adopted. For residential and commercial projects, CARB's objective is to develop recommended thresholds, which reflect consideration of a proposed project's effects, including: energy use, transportation, water use, waste, and construction. CARB has requested public comments on the draft recommended approaches that it has identified and intends to make its final recommendations on thresholds in early 2009, in order to meet OPR's timeline for issuing draft CEQA guidelines (i.e., June 1, 2009) addressing GHG emissions and to provide the guidance needed by lead agencies.

In the absence of regulatory standards for GHG emissions or other scientific data to clearly define what constitutes a "significant impact," OPR recommends that individual lead agencies undertake a project-by-project analysis consistent with available guidance and current CEQA practice. OPR also notes that although climate change is ultimately a cumulative impact, not every individual project that emits GHGs must necessarily be found to contribute to a significant cumulative impact on the environment. (Technical Advisory, p. 6.)

This new Draft Supplemental EIR section therefore contains GHG calculations of the proposed project and an analysis of the potentially significant adverse environmental effects of the Project to climate change on both a project specific and cumulative basis. Specific aspects of the project are addressed below.

Landfill Gas

As organic material decomposes in a landfill, it is initially digested by aerobic bacteria, which live in the presence of oxygen. Aerobic bacteria consume oxygen and produce carbon dioxide (CO_2), a greenhouse gas. Inventories of GHG emissions consider CO_2 from decomposition of organic material to be "biogenic" – a component of the natural cycling of carbon in the biosphere and the atmosphere – and therefore these emissions are not "counted." As oxygen in a landfill is depleted, however, anaerobic bacteria take over the task of decomposing the waste. Through a series of biochemical processes, anaerobic decomposition results in the production of methane gas (CH_4), which, according to the Intergovernmental Panel on Climate Change's (IPCC) Fourth Assessment Report, has a global warming potential 21 times that of CO_2 (Forster et al, 2007). While anaerobic decomposition is a natural process, such emissions are included in local, state, national, and global GHG inventories

Landfill gas emissions are roughly half methane and half CO_2, with a small fraction consisting of so-called "non-methane organic compounds" or NMOCs. Of greater concern than the overall rate of methane generation from landfilled waste is the amount of methane that escapes to the atmosphere as so-called "fugitive" emissions. At Lancaster, which has a landfill gas collection system, fugitive methane emissions come from two sources: gases that are not captured by the collection system, and gases that are captured but that are not destroyed by the landfill's flare system. 2006 was determined to be the appropriate baseline year, in part, because the Draft SEIR was released in 2006 for the proposed project. A summary of the estimated 2006 baseline, as voluntarily reported to the California Climate Action Registry by WMI for Lancaster using the SWICS protocol, is shown in Appendix F to this section. As shown, it was estimated that in 2006 Lancaster Landfill had an overall fugitive methane collection/destruction efficiency of 95.15% (i.e. a collection efficiency of 92.8% with a 32.03% oxidation in cover and cap materials, which are composed of soil with a geosynthetic component. In the future, it is anticipated that an evapotranspiration (ET) cover, composed of four feet of soil overlying one foot of intermediate cover, would be implemented at the LLRC. The overall fugitive methane collection/destruction efficiency at LLRC in 2007 was estimated to be approximately 87 percent with a 34.6 percent oxidation in the cover and cap. Although it would appear that the collection/destruction efficiency decreased in 2007 when compared to 2006, the decrease is attributed to changes and refinements in the calculation procedure for estimating these efficiencies, resulting in lower percentages; however, it is anticipated that the efficiencies are similar to 2006 as a result of the same operational procedures that are implemented at LLRC. Figures are not available for 2008. In 2006, total methane emissions were estimated to be 854 metric tons of carbon dioxide equivalent (CO_2E) including fugitive and flare emissions (California Climate Action Registry).

The anticipated levels of emissions of greenhouse gases resulting from the increased refuse activities at the Lancaster Landfill are shown in Table 4.5-2 below.

The complete table (showing calculations for each source of the landfill's emissions) is included as Appendix G. CARB recently updated the statewide GHG inventory, including the 1990 baseline and current years. Based on CARB's 2007 inventory, California landfills were estimated to emit 5.62 million metric tons of carbon dioxide equivalent ($MMCO_2E$) emissions in 2004, the last year of the inventory, which comprises approximately 1.2 percent of the statewide inventory. For the baseline year of 1990 under AB32, landfills were estimated to emit 6.26 $MMCO_2E$. Thus, landfills are one of the only source categories of GHG emissions that are already below their 1990 baseline. (SCS 2008.) The Draft California Greenhouse Gas Inventory prepared by CARB in November 2007 indicated that landfill emissions decreased by approximately 10 to 20 percent.

Actual emission reductions from landfills, however, may be greater than indicated by the CARB Inventory. In determining emissions from landfills, CARB assumed only 75 percent of methane generated by landfills with gas collection systems was captured and destroyed. This is based on data that is over 15 years old that was collected by the US EPA and used by that agency as a nationwide default assumption for landfill emissions. While this may be true for the early 1990's, there is evidence that landfill gas collection rates have increased due to federal New Source Performance Standards (NSPS) and increased California landfill gas control regulations that are among the most stringent in the United States. California's drier than average climate results in lower landfill methane generation rates than other areas of the country, moreover. Some California landfill operators report 95 percent or higher landfill methane collection and destruction efficiencies. (See SWICS 2008.) If these higher collection rates were used by CARB in their inventory, the landfill methane emissions would be lower than currently reported in the inventory.

4.5.2 Significance Criteria

Currently, there are no formally adopted CEQA criteria for determining the significance of impacts resulting from GHG emissions. To remedy this absence, the Legislature has directed the OPR to develop CEQA Guidelines pertaining to GHG emissions by July 1, 2009 and to adopt the guidelines by January 1, 2010, as discussed above. Furthermore, for a project's potential contribution to global climate change to

be analyzed, meaningful thresholds of significance can only be developed once CARB adopts source-specific GHGs emission limits and reduction requirements.

Although the state has identified achieving 1990 emission levels as a goal through the adoption of AB 32, no standards have been adopted quantifying 1990 emissions targets and how they can be achieved. It is recognized that for most projects, there is currently no simple metric available to determine if a single project would help or hinder meeting the AB 32 emission goals.

Emitting CO_2 into the atmosphere is not itself an adverse environmental effect. It is the increased concentration of CO_2 in the atmosphere that results in global climate change, and it is the associated consequences of climate change that result in adverse environmental effects (e.g., sea level rise, loss of snowpack, severe weather events). Although it is possible to generally estimate a project's incremental contribution of CO_2 into the atmosphere, it is not possible to determine whether or how a specific project's relatively small incremental contribution might translate into physical effects on the environment. Given the complex interactions between various global and regional physical, chemical, atmospheric, terrestrial, and aquatic systems that result in the physical expressions of global climate change, it is difficult to quantify the contribution of this project or any single project on a worldwide scale in a meaningful way or to discern whether the presence or absence of CO_2 emitted by a specific project would result in any altered conditions.

Given the challenges associated with determining a project-specific significance criterion for GHG emissions when the issue must be viewed on a global scale, quantitative significance criteria are not proposed for the proposed Project. Accordingly, the following is a qualitative analysis of GHG emissions associated with the proposed Project.

For purposes of this analysis, the incremental contribution of the proposed Project to global climate change would be considered significant if it would:

- Result in a substantial Project-specific increase in GHG emissions relative to existing conditions;
- Conflict with or obstruct implementation of the goals or strategies of Executive Order S-3-05 or the California Global Warming Solutions Act of 2006;
- Result in increased exposure to one or more of the potential adverse effects of global warming identified in the California Global Warming Solutions Act of 2006 (Health & Safety Code, § 38501, subd. (a)); or
- Trigger CARB's proposed mandatory reporting threshold of 25,000 metric tons of CO_2E per year or the Market Advisory Committee reporting threshold of 10,000 metric tons of CO_2E per year.

4.5.3 Potential Impacts

As discussed above, the primary environmental impact of the emissions of GHGs is not local, but global in nature. Although no specific language in AB 32 refers to CEQA compliance, it is understood that legislating a new environmental issue (i.e., GHG/global warming) into the California Health & Safety Code will result in the addition of that issue to the other environmental issues discussed in CEQA documents. (See also, Pub. Resources Code, § 21097 (exempting transportation and flood control projects from having to adequately consider the effects of greenhouse gas emissions)

In addition, in comment letters provided by the California Attorney General's Office on other EIRs, the Attorney General and the Attorney General's Office are urging CEQA lead agencies and other agencies

to consider global warming impacts as cumulative and potentially significant under CEQA, and, accordingly, to include an assessment of GHG emissions as a part of the environmental review process.

Basis of Analysis

Estimated Greenhouse Gas Emissions

This project will produce carbon dioxide, methane, and nitrous oxide, which are classified as GHGs. GHG emissions associated with the proposed Project were estimated using CO_2 emissions as a proxy for all GHG emissions, known as carbon dioxide equivalents (CO_2E). This is consistent with the current reporting protocol of the California Climate Action Registry (CCAR). Calculations of GHG emissions typically focus on CO_2 because it is the most commonly produced GHG in terms of both volume and number of sources, and because it is among the easiest GHG to measure. However, it is noted that other GHGs have a higher global warming potential than CO_2. For example, 1 pound of methane has the same global warming potential as 21 pounds of CO_2 and approximately 320 pounds of N_2O. (California Climate Action Registry 2008). GHG emissions from landfills in general, and specifically from the proposed Project, consist of GHGs from the combustion of diesel fuel in onsite landfill equipment and in trucks transporting municipal solid waste to the landfill. In addition, at municipal solid waste landfills GHGs result from the generation of landfill gas (which is comprised of approximately 50 percent methane and 50 percent CO_2), which is a by-product of the decomposition of organic wastes (e.g., food waste, green waste, paper and cardboard).

The CCAR methodology for calculating GHG emissions is designed to be applied to a single or limited number of entities or operations where detailed information on emissions sources is available (e.g., usage of electricity and natural gas, numbers and types of vehicles and equipment in a fleet, type and usage of heating and cooling systems, emissions from manufacturing processes).

For the proposed Project, the number of truck round-trips to transport waste to LLRC, and the number and types of equipment associated with landfill operations at the LLRC are known (see Section 4.1 - Traffic and Section 4.2 - Air Quality). Table 4.5-1 summarizes new equipment and personnel required for this Project.

Table 4.5-1

Existing and Future Equipment and Personnel
Lancaster Landfill and Recycling Center

Equipment		Personnel	
Existing (1,700 tons/day)	**Future (3,000 tons/day)**	**Existing (1,700 tons/day)**	**Future (3,000 tons/day)**
2 Dozers + Spare	2 Dozers + Spare	3 Operators	5 Operators
1 Compactor + Spare	2 Compactors + Spare	1 Mechanic	1 Mechanic
2 Scrapers	2 Scrapers	4 Laborers	5 Laborers
2 Loaders	2 Loaders	2 Scale House	2 Scale House
1 Grader	1 Grader	1 Site Manager	1 Site Manager
2 Water Trucks	2 Water Trucks		1 Mechanic/Fueler
1 Grinder	1 Grinder (extra usage)	N/A	N/A
Existing Daily Truck Haul Trips (1,700 tons/day)		**Future Daily Truck Haul Trips (3,000 tons/day)**	
322		419 (+97)	

The CCAR methodology for calculating GHG emissions was used for purposes of this analysis and is appropriate for the proposed Project. Based on that methodology, the proposed project would result in a total of 15.13 metric tons/day of CO_2E as indicated in Table 4.5-2.

Table 4.5-2

Potential Greenhouse Gas Emissions Associated with the Project (Metric Tons/Day)[1]
Lancaster Landfill and Recycling Center

Proposed Project Scenario	CO_2E Metric Tons/Day (MT/Day)[2]
1 new Compactor	1.05
Additional Grinder Usage	0.49
4 New Employees x 50 miles/day	0.09
97 Haul Trucks x 80 miles/day	13.2
Flare Emissions	0.3
Office Utilities (Not Needed)	0.0
Fugitive Landfill Losses	818.5
Landfill Carbon Sequestration (Not emitted)	(219,000)
Daily Total	**15.13 MT/day**

NOTE: This table summarizes increases in GHG emissions from the project (i.e., the increased receipt of refuse). Carbon sequestration occurs from the previous amount of refuse deposited in the past. Carbon sequestration (emissions savings) offsets the new, incremental emission increases from this project.

[1]Assumes fugitives to be offset by landfill carbon sequestration savings.
[2]Figures include methane emissions from decomposition of the increased MSW.

SOURCE: Environmental Compliance Solutions, Inc., June 2008

Increased Truck Trips

The traffic analysis provides data that can be used to estimate CO_2 emissions from Project-related vehicle trips. The proposed Project will result in an increase of up to a maximum average of 97 truck round-trips per day with an average roundtrip distance of 80 miles to transport municipal solid waste for disposal. Therefore, the proposed increased transportation of municipal solid waste as part of the proposed Project would generate an average of 7,760 vehicle miles traveled (VMT) per day, or approximately 2,421,120 VMT annually.

Assuming an emissions factor for CO_2 from vehicles of approximately 22.33 pounds of CO_2 per gallon of diesel combustion (California Climate Action Registry Guidelines 2008, Table C.4, page 94.), approximately 4,530 tons of CO_2 per year, or 13.29 metric tons of CO_2E per day, would be generated by Project-generated transport and personnel vehicle trips. This is a future CO_2 emissions factor as defined by CARB (California Air Resources 2002) that assumes certain reductions in vehicle emissions due to future vehicle models operating more efficiently. However, it does not take into account additional vehicle emission reductions that might take place in response to AB 1493.

Additional Employees

In addition, the Project would include four additional employees. It is assumed that the employee travels an average roundtrip distance of 50 miles generating an average 200 VMT per day. Emissions from these four new employees are included in Table 4.5-2.

Additional Off-Road Equipment

In addition, project operations will result in GHG emissions from heavy-duty off-road diesel equipment. The Project will require one additional compactor and additional usage of the currently permitted greenwaste grinder that would emit approximately 1.54 metric tons of CO_2E per day or 533 tons per year of CO_2E.

Landfill Flare

LLRC controls methane (CH_4) and carbon dioxide (CO_2), the GHGs produced by the decomposition of land filled refuse, through the existing landfill gas (LFG) collection system, as required by federal and state regulations, which collects and incinerates methane gas. The gas recovery system is designed to provide continuous removal of landfill gas in active areas of the landfill and consists of gas extraction wells, gas collection piping, vacuum collection skid, and enclosed flare. Gas wells are installed at appropriate spacing to efficiently collect gas generated by the waste. The wells are connected to a pipe network that transmits gas to a high efficiency flare for destruction. A vacuum is applied to the gas well field by a blower system that is located adjacent to the flare.

LLRC's LFG system is consistent with State and AVAQMD requirements for the capture, destruction, and reuse of methane gas from landfills. LLRC's existing practice is also largely consistent with CARB's early action measures to reduce GHG emissions, as referenced above, including the directive for improved landfill methane capture. For landfills such as LLRC that already operate methane capture systems, additional actions may nevertheless be required to comply with CARB's early action measures. One such action, the CARB directive to install more landfill gas to energy systems at landfills, would not be feasible at LLRC, in part, because an insufficient amount of infrastructure and LFG exists at the site to render a landfill gas-to-energy (LFGTE) project feasible

The Draft Scoping Plan identifies several measures to reduce greenhouse gas emissions, including waste diversion, which is identified in MM 4.5-1b. Another measure identified in the Draft Scoping Plan includes vehicle efficiency measures, such as checking tire pressure, tire tread, and using low friction engine oil in the landfill vehicles. WM currently implements a monitoring program to ensure that vehicles are operating efficiently and would continue to be implemented with the proposed project. Finally, as previously indicated, WM currently has hired a gas operations manager who has the responsibility of ensuring that the gas collection system and well heads at the LLRC are operating efficiently in order to minimize landfill gas emissions.

In LFG to energy systems, captured methane is piped to gas-to-energy plants to fuel engine or turbine driven generators of electricity. LFG to energy systems, however, require such facilities to be proximal to the landfill, and there are currently none near LLRC. Furthermore, the limited amount of LFG generated at LLRC would not produce sufficient energy to make implementation of a LFG to energy system economically or technically feasible. The April 2008 operating report for the Lancaster Landfill revealed that the gas flow at the flare was approximately 430 scfm. In order for Waste Management Renewable Energy (WMRE) to be feasible, a minimum gas flow capable of sustaining of four (4) Caterpillar ICE engines, which translates to a gas flow of approximately 1200 scfm would be required.

While the flaring process is over 99.8 percent efficient, some residual methane is emitted after flaring. Residual methane emissions from the Lancaster flare are approximately 0.69 pounds per day, the equivalent of 3 tons per day. (See "Annual Emission Compliance Test on a Landfill Gas Flare located at Lancaster Landfill and Recycling Center" submitted to AVAQMD. That document, dated March 25, 2008, is available for review at the Los Angeles County Planning Department, Impact Analysis Section.

Fugitive Landfill Emissions

There is potential for fugitive methane emissions to escape from the surface of the landfill since not all gas is recovered by the LFG collection system. Total CH_4 emissions were estimated in 2006 to be 854 $MTCO_2E$ including fugitive and flares. These calculations are explained in Appendix H. Recovery of 100 percent of the gas generated is generally considered infeasible due to the permeability of the waste and the inefficiencies of installation of the recovery system. Detailed engineering calculations recently completed for the Lancaster landfill and used, in part, as the basis of the California Climate Action Registry reported emissions, shows total capture of approximately 95.15 percent of fugitive landfill emissions (e.g., methane collection/destruction efficiency).

Using 2006 (i.e., baseline) as an example, the remaining approximately 4.8 percent of LFG not recovered by the flare(s) would pass through the landfill cover, intermediate cover soils or alternative cover materials before being released to the environment. This presents a potential that microbes in the soil or cover material (methanothrophs) may oxidize some of the methane gas that reduces the amount of methane released to the environment. The USEPA recommends a "conservative approach," default factor of 10 percent by volume in determining methane oxidation for landfills. Based on recent literature, however, the industry position is that methane oxidation value in cover soils is much greater - 22.70 percent for daily cover, 32.08 percent for intermediate cover, 35.63 percent for final cover, and 55.33 percent for biocover. (SCS 2007a; see also SWICS 2008.) After carbon sequestration, estimated to be 219,000 $MTCO_2E$ in 2006, no additional fugitive greenhouse gas emissions are expected to occur at Lancaster due to this proposed Project. Carbon sequestration should continue to offset future increases in disposal rates.

In total, the proposed Project will produce approximately 15 metric tonnes of CO_2 equivalent per day, or approximately 5,061.45 tons of CO_2E per year. This is an approximately 23 percent increase in CO_2E over the 2006 baseline conditions as estimated by SCS Engineers for Lancaster Landfill using the SWICS protocol. This is considered a significant impact prior to mitigation. This estimate is a general estimate that provides an indication of the order of magnitude of CO_2 emissions. The emissions calculations described above also do not take into account reductions in GHG emissions resulting from implementation of AB 32. The extent of these reductions has not yet been quantified by CARB. In future years, overall CO_2 emissions attributable to the proposed Project could be less than current emissions assumptions might indicate. Similarly, if GHG emissions reductions for vehicles were enacted, through the requirements of either AB 1493, AB 32, or a federal regulation, CO_2 emissions from the proposed Project would be reduced. If regulations proposed to comply with AB 1493 survive current legal challenges, future CO_2 emissions from some vehicles associated with the Project could be 20 percent to 30 percent less than under current conditions. If AB 1493 is repealed, it is unclear what vehicle emissions limits might be adopted as part of AB 32.

Emissions reduction requirements associated with AB 1493, AB 32, SB 1368, and EO S-3-5 would apply throughout California. Therefore, beyond the fact that their effect on the proposed Project is unclear, their effect on the overall cumulative context relative to other GHG emissions in California also is unknown.

Impact Analysis

The proposed project is not considered to have an individually significant impact on global climate change after the implementation of mitigation measures prescribed in Section 4.5.4. Such a conclusion is supported by a finding that none of the thresholds described above will be triggered. The project will not:

- Result in a substantial Project-specific increase in GHG emissions relative to existing conditions;
- Conflict with or obstruct implementation of the goals or strategies of Executive Order S-3-05 or the California Global Warming Solutions Act of 2006;

- Result in increased exposure to one or more of the potential adverse effects of global warming identified in the California Global Warming Solutions Act of 2006, Health & Safety Code, section 38501, subdivision (a); or

- Trigger CARB's proposed mandatory reporting threshold of 25,000 metric tons of CO_2E per year or the Market Advisory Committee reporting threshold of 10,000 metric tons of CO_2E per year.

The estimated per day of CO_2E to be emitted from the project is not considered to be a significant net increase in GHG emissions with mitigation. Because MSW will continue to be generated within the County of Los Angeles, net regional air emissions, including GHGs, would continue to be generated within the air basin with or without the Project. The LLRC currently permitted level of daily acceptance, 1,700 tons of waste a day, is less than adequate to meet the growing daily needs of the communities served by the facility. On occasion, trucks are turned away because the permitted daily limit has been reached and the waste must be diverted to landfills in other counties such as Orange and Riverside. By increasing disposal capacity at LLRC, the Project will provide for additional waste disposal at the local level. As a result, the number of regional vehicle miles traveled to dispose of waste from the County of Los Angeles waste stream will be reduced compared to what would otherwise continue to occur without the Project. Thus, the Project has the potential to decrease GHG emissions that would occur without the Project and, at worst, the Project would merely shift GHG emissions from one area of the air basin to another.

Furthermore, the continued implementation of WM's programs to convert its fleet to alternative fuels (e.g., liquefied natural gas), and use of state-mandated ultra low sulfur diesel, combined with PM filter traps, will further reduce emissions from refuse and transfer trucks.[3] Lancaster Hauling's trucks comply with CARB's Refuse Truck Regulation. Requirements of CARB's Proposed Regulation to Reduce Emissions of Diesel Particulate Matter and Other Pollutants from In-Use Heavy-Duty Diesel-Fueled Vehicles are currently being reviewed. This rule is currently scheduled for adoption by CARB in December 2008.

CARB also mandated the use of ultra-low sulfur diesel ("ULSD or S15") fuel in on-road and off-road vehicles by September 2006. (CDFA.) ULSD is defined by the U.S. Environmental Protection Agency ("EPA") as U.S. diesel fuel with a sulfur content not to exceed 15 ppm (parts per million). The use of diesel engines generally reduces GHG emissions such as CO_2 and methane because of their higher fuel efficiency ratio that results in lowering the CO_2 emissions that contribute to the greenhouse effect. (Chandler 2003.) In 2001, King County Metro Transit in Washington began testing ULSD and particulate filters in buses and began regular use in 2002. The tests showed that the combination of ULSD and particulate filters could provide up to a 90 percent reduction in emissions, including GHG carbon dioxide. (KCEPP 2002.) Similar reductions would be achieved under the Project through use of ULSD and PM filter traps in the collection and transfer trucks.

Currently, approximately 16 percent of the trucks at Lancaster are fueled by LNG. The rest are powered by ultra low sulfur diesel fuel. Approximately six trucks are equipped with diesel oxidation catalysts and 10 more have PM filter traps. Many of the older trucks have also been retired and replaced with newer trucks in accordance with CARB requirements to meet Best Available Control Technology (BACT) emission rates. Implementation of Mitigation Measures 4.5-1a thru 4.5-1c, as set forth below, will reduce the adverse direct effects of the proposed project to a less than significant level by, for example, requiring a 10 percent reduction in 2006 GHG emissions by 2020 consistent with the preliminary recommendations contained within CARB's Draft Scoping Plan and OPR's Technical Advisory.

[3]The CARB refuse truck law also requires that all solid waste collection vehicles manufactured from 1988-2002 be retrofitted with Best Available Control Technology ("BACT") by the end of 2007 (or 2009 for "early implementation" fleets) and trucks manufactured from 1960-1987 must be retrofitted by the end of 2009 (or 2010 for "early implementation" fleets). BACT is defined as diesel engines with PM10 emissions of less than 0.01 g/bhp-hour or an emission reduction of at least 85 percent. Pursuant to California Code of Regulations, Title 13, Section 2700, et seq., trucks must also utilize CARB Level 3 verified diesel retrofits. (CARB 2006.)

4.5.4 Mitigation Measures

The following mitigation measures will be implemented to address the direct and cumulative air quality impacts of the Project. These mitigation measures will also reduce the proposed Project's GHG emissions to the degree feasible:

Impact 4.5-1 ***Project implementation would result in potentially significant project-related and cumulative greenhouse gas emissions that could adversely affect global warming if not reduced through the incorporation of mitigation measures.***

MM 4.5-1a The Project shall include the following set of measures that, working together, will reduce operational greenhouse gas emissions of the Project and the effects of global warming:

- Hauling trucks shall be powered by liquefied natural gas (LNG) or ultra-low sulfur diesel fuel.
- Idling of heavy-duty hauling trucks in excess of five minutes, and idling of off-road mobile sources of any type in excess of ten minutes, shall be prohibited.
- When new landfill equipment is purchased by LLRC, new commercially available equipment shall be purchased that meets or exceeds California's emission standards in effect at the time of purchase.
- Onsite vehicles and equipment shall be properly maintained by being serviced at least every 90 days and once annually in compliance with Department of Transportation (DOT) requirements.
- Operation equipment used for the proposed Project shall use clean alternative (i.e., non-diesel/biodiesel) fuels, or use equipment that has been retro-fitted with diesel particulate reduction traps or equivalent control technology, using equipment certified by CARB. Such equipment is now subject to CARB's new regulation to control PM emissions from off-road diesel engines. The rule requires the first emission reductions from such equipment to occur by March 2010.
- For the purchase of primary heavy duty, diesel powered landfill equipment at LLRC (dozers and compactors), if equipment meeting California's 2014 emission standards for off-highway, heavy duty diesel equipment is commercially available before 2014, WMI shall purchase such equipment at the LLRC as older equipment is replaced.

MM 4.5-1b Within three years of project approval, the applicant shall develop a Greenhouse Gas Reduction plan that demonstrates how the LLRC will achieve by 2020 a reduction in annual GHG emissions such that emissions are no greater than 10 percent below 2006 levels and will meet or exceed all regulatory requirements related to GHG control. The Reduction Plan shall include one or more of the following measures, or combination thereof:

- Use of B-5 or B-20 Biodiesel in on-site equipment and in heavy duty truck fleets (and as a condition of future contract approvals if third-party haulers are used);
- Use of hybrid hauling trucks;

- Use Best Available Control Technology and BMPs when designing new waste disposal cells (e.g., by designing any additional gas collectors in bottom liner systems) and to increase gas combustion capacity/improve flare destruction efficiency;
- Reconsider the feasibility of gas-to-energy production capacity in the future for use in fueling vehicles, operating equipment or energy conversion;
- Increased diversion of organic material from landfill disposal and use as landfill cover material;
- Increased recycling and carbon offsets.
- The plan shall include cost estimates for GHG reduction measures and identify funding sources, including but not limited to tip fee increases. The plan shall include an implementation schedule that demonstrates substantial GHG emission reductions prior to the 2020 deadline, including implementation of "early action" measures that may be implemented within three years of plan approval. The plan shall include an updated inventory of projected GHG emissions and an updated estimate of GHG emissions in 1990. The plan shall be subject to review and approval by AVAQMD.
- Increase waste diversion of recyclable materials.

MM 4.5-1c Following closure of the landfill, the applicant shall continue to operate, maintain, and monitor the landfill gas collection and treatment system as long as the landfill continues to produce landfill gas, or until it is determined by the AVAQMD that emissions no longer constitute a considerable contribution to greenhouse gas emissions, whichever comes first.

4.5.5 Significance After Mitigation

For purposes of this Draft SEIR and considering the nature of the project being one of MSW disposal which must be disposed of somewhere by law, the proposed Project is considered to result in *less than significant* Project-specific GHG emissions after the implementation of the above mitigation measures.

The challenge in assessing the significance of an individual project's contribution to global GHG emissions and associated global climate change is to determine whether a project's GHG emissions, which are arguably at a micro scale relative to global emissions, result in a cumulatively considerable incremental contribution to a significant macro-scale impact. Attempting to quantify the cumulative contribution of a proposed project to global GHG emissions is therefore largely speculative. (See CEQA Guidelines, § 15145; *Laurel Heights Improvement Assoc. v. Regents of the University of California* (1993) 6 Cal.4th 1112.)

As described above, the ongoing increase in GHG concentrations in the atmosphere has resulted in and will continue to result in increases in average global temperature and associated shifts in climatic and environmental conditions. In 2003, global emissions of carbon (i.e., only the carbon atoms within CO_2 molecules) solely from fossil fuel burning totaled an estimated 7,303 million metric tons (Marlands et al. 2006). This translates to approximately 29,400 million tons of CO_2. This is only a portion of global CO_2 emissions because it addresses only fossil fuel burning and does not address other CO_2 sources such as burning of vegetation.

The Project, as mitigated above through implementation of MM 4.5-1a through MM 4.5-1c, would reduce total estimated 2006 CO_2E emission levels by a minimum 10 percent by 2020. A 10 percent reduction from 2006 emissions levels is consistent with the recommendations included in the Draft Scoping Plan. Using 2006 emission levels, rather than 1990, is also more stringent of a requirement because of the improvements in landfill gas collection and control systems and vehicle fuel efficiency and emission standards.

With the adoption of the above mitigation measures (MM 4.5-1a through 4.5-1c), the proposed Project is anticipated to result in little additional GHG emissions. Where a proposed project would add no, or very little, incremental contribution whatever to a significant cumulative impact, the increment cannot be cumulatively considerable. (See CEQA Guidelines, § 15130, subd (a)(1).) The cumulative contribution of the proposed Project to global climate change is therefore considered less than cumulatively considerable and therefore less than cumulatively significant.

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Appendix F

2006 Waste Management CCAR Reporting

Waste Management – 2006 Optional GHG Reporting to CCAR
Landfills

Landfill Gas Collection and Combustion Emissions

Waste Management's landfills are equipped with gas collection systems that extract landfill gas that contains methane. At some landfills, flares are used to combust the methane in the landfill gas and produce carbon dioxide, which has a lower impact on climate change because its "global warming potential" is 21 times less that of methane.

At some landfills, the methane-containing landfill gas is used as a fuel to power engines and turbines that generate electricity. These engines and turbines also change the methane into carbon dioxide through the combustion process.

The following table summarizes the carbon dioxide and methane emissions produced by flares and landfill gas-to- energy projects at Waste Management's landfills in California.

Control Device	**Pass-through Biogenic CO_2** (metric tons CO2e)	**Biogenic CO_2 from Combustion** (metric tons CO2e)	**Pass-through CH_4** (metric tons CH_4)	**Total GHG Emissions from Landfill Control Devices** (metric tons CO2e)
Flares	160,946	196,630	71	359,071
Engines	70,773	87,604	228	163,167
Total	231,719	284,234	299	522,238

Landfill Fugitive Emissions

Even in landfills with a gas collection system, carbon dioxide and methane, which are produced as the waste anaerobically biodegrades, sometimes escape through the landfill cap to the atmosphere.

The following table summarizes the carbon dioxide and methane fugitive emissions estimated at Waste Management's landfills in California. These fugitive emissions were estimated using procedures developed by Waste Management consistent with the technical document, "Current MSW Industry Position and State-of-the-Practice on LFG Collection Efficiency, Methane Oxidation, and Carbon Sequestration in Landfills," prepared for the Solid Waste Industry for Climate Solutions (SWICS).

	Fugitive Biogenic CO2 (metric tons CO2e)	**Fugitive CH4** (metric tons CH_4)	**Total Fugitive GHG Emissions from Landfills** (metric tons CO2e)
Landfill fugitive emissions	34,326	7,244	186,448

Landfill Sequestration

Materials placed into landfills sometimes include wood products and other substances that contain biogenic carbon (e.g., food wastes, landscaping waste, paper, lumber, etc.). Some of these materials do not decompose in the anaerobic landfill environment and therefore sequester the carbon they contain instead of releasing it back to the atmosphere as methane or carbon dioxide. These values do not include fossil fuel derived carbon containing materials such as plastics. It is assumed that landfills do not additionally contribute to the carbon storage of fossil fuel derived materials.

The following table summarizes carbon sequestration estimated at Waste Management's landfills in California according to material Carbon Storage Factors identified in *USEPA, 2004. Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks* as well as the technical document, "Current MSW Industry Position and State-of-the-Practice on LFG Collection Efficiency, Methane Oxidation, and Carbon Sequestration in Landfills," prepared for the Solid Waste Industry for Climate Solutions (SWICS).

	In terms of C (metric tons C)	**In terms of CO2e** (metric tons CO2e)
Landfill Sequestration	1,210,676	4,439,147

Landfill Energy Generation

Because the methane from landfills results from a biological process, the biogenic carbon dioxide produced from its combustion is considered part of the natural carbon cycle and therefore does not add to atmospheric carbon dioxide concentrations. Using landfill gas to generate electricity avoids emissions of anthropogenic carbon dioxide from the combustion of fossil fuels.

The following table summarizes the electricity generated at Waste Management's landfills in California and the fossil fuel emissions that were avoided because of this generation.

	Energy Generation (MWh)	**Avoided fossil fuel emissions** MWh x California grid emission factor* (metric tons CO2e)
Landfill gas energy generation	101,074	36,885

**WECC California eGRID Subregion, EPA eGRID Carbon Dioxide Electricity Emission Factors by Subregion (Year 2000)*

Appendix G

Increased GHG from Lancaster Project (9/2008)

WM - Lancaster Landfill

GHG Calculations Associated with Increased Waste Receipts

CO2

Equipment	Gallons Fuel/Day	Gallons Fuel/Year	Emission Factor Lbs/Gal	Max Lbs CO2/Day	Max Tons CO2/Day	Max Lbs CO2/Year	Max Tons CO2/Year	CO2e	TOTAL CO2e	Max lbs/day	Mtonnes/ day
Diesel Trash Trucks	1293.3	403520.0	22.33000	28880.13	14.44	9010601.60	4505.30	28880.13	**29052.0**	Trucks	13.20545
Employee Vehicles	10.0	2600.0	19.38000	193.80	0.10	50388.00	25.19	193.8	**201.1**	Employees	0.091401
Compactor	102.0	31824.0	22.68000	2313.36	1.16	721768.32	360.88	2313.36	**2326.9**	Compactor	1.057688
Grinder	48.0	15000.0	22.68000	1088.64	0.54	340200.00	170.10	1088.64	**1095.0**	Grinder	0.497736
Flare								0	**701.6**	Flare	0.318895
Fugitive Emissions								0	**818.0**	Fugitives	0.371818
Office Utilities				0.00	0.00	0.00	0.00	0	**0.0**	Office Utilities	0
		Total CO2 Emissions:		**32,475.93**	**16.24**	**10,122,957.92**	**5,061.48**	32475.93	**-219,000**	Carbon Sequ.	

CH4 (Methane)

Equipment	Gallons Fuel/Day	Gallons Fuel/Year	Emission Factor	Max Lbs CH4/Day	Max Tons CH4/Day	Max Lbs CH4/Year	Max Tons CH4/Year	CO2E
Diesel Trash Trucks	1293.3	403520.0	0.00308	3.98	0.00	1242.84	0.62	83.6528
Employee Vehicles	10.0	2600.0	0.00220	0.02	0.00	5.72	0.00	0.462
Compactor	102.0	31824.0	0.00308	0.31	0.00	98.02	0.05	6.59736
Grinder	48.0	15000.0	0.00308	0.15	0.00	46.20	0.02	3.10464
Flare				33.41	0.02	12193.92	6.10	701.568
Fugitive Emissions								0
Office Utilities				0.00	0.00	0.00	0.00	0
		Total CH4 Emissions:		**37.88**	**0.02**	**13,586.70**	**6.79**	795.3848

15.54 metric tons/day CO2e

4,849.4 MT/year CO2e

N20

Equipment	Gallons Fuel/Day	Gallons Fuel/Year	Emission Factor	Max Lbs N2O/Day	Max Tons N2O/Day	Max Lbs N2O/Year	Max Tons N20/Year	CO2e
Diesel Trash Trucks	1293.3	403520.0	0.00022	0.28	0.00	88.77	0.04	88.20533
Employee Vehicles	10.0	2600.0	0.00220	0.02	0.00	5.72	0.00	6.82
Compactor	102.0	31824.0	0.00022	0.02	0.00	7.00	0.00	6.9564
Grinder	48.0	15000.0	0.00022	0.01	0.00	3.30	0.00	3.2736
Flare								0
Fugitive Emissions								0
Office Utilities				0.00	0.00	0.00	0.00	0
		Total N2O Emissions:		**0.34**	**0.00**	**104.80**	**0.05**	105.2553

Assumptions: Four new employees, 820 HP grinder running 6 addl hours per day
One new 85 HP compactor, 97 additional trash trucks running 80 miles/day
No new Office Utilities assumed to be needed
Lancaster Source test used -3/2008
Fugitives from 2006 California Climate Action Registry Report (39.7 MT Methane + 192 MT CO2 from Landfill + 51.5 MT CO2 from oxidation in Cover = 243.5 MT/year x 0.76 (increased refuse) = 818 MT CO2e/year
Carbon Sequestration from 2006 California Climate Action Registry Report

Appendix H

Fugitive Methane from Landfill Methodology

LANDFILL FLOW AND COMPOSITION INFORMATION

Flare 1	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
													Avg. %	Total (mmscf)
CH_4%	26.28%	27.55%	28.02%	27.70%	28.33%	29.18%	37.77%	27.97%	32.30%	33.13%	33.98%	37.85%	31%	--
CO_2%	34.28%	36.85%	37.52%	37.87%	37.47%	38.33%	30.83%	37.07%	38.15%	37.38%	38.26%	39.20%	37%	--
LFG Flared (scf)*	7093683	12246995	13894899	13253332	13341340	12735501	12288844	12618250	9631254	8310557	7568416	6977347	--	129.96

Data Source(s): SCS Field Services

Device 2	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
													Avg. %	Total (mmscf)
CH_4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	--
CO_2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	--
LFG Flared (scf)*													--	

Data Source(s):

Device 3	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
													Avg. %	Total (mmscf)
CH_4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	--
CO_2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	--
LFG Flared (scf)*													--	

Data Source(s):

Device 4	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
													Avg. %	Total (mmscf)
CH_4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	--
CO_2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	--
LFG Flared (scf)*													--	

Data Source(s):

Device 5	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
													Avg. %	Total (mmscf)
CH_4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	--
CO_2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	--
LFG Flared (scf)*													--	

Data Source(s):

Device 6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
													Avg. %	Total (mmscf)
CH_4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	--
CO_2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	--
LFG Flared (scf)*													--	

Data Source(s):

Site Specific Input

Total Refuse Area		485617.507	m^2	100.00%
Daily Cover Area		2787.07	m^2	0.57%
	Non-Subtitle D		m^2	
	Subtitle D Lined	2787.07	m^2	
Intermediate Cover Area		482830.44	m^2	99.43%
	Non-Subtitle D	404685.64	m^2	
	Subtitle D Lined	78144.80	m^2	
Final Cover Area Only		0	m^2	0.00%
	Non-Subtitle D		m^2	
	Subtitle D Lined		m^2	
Biocover Area Only		0	m^2	0.00%

LFG Flow to devices	Device Type	mmscf/yr	CH_4%	CO_2%	Destruction Efficincy (from Source Test)
Device 1	N/A	129.96	31%	37%	99.88%
Device 2	N/A	0.00	0%	0%	
Device 3	N/A	0.00	0%	0%	
Device 4	N/A	0.00	0%	0%	
Device 5	N/A	0.00	0%	0%	
Device 6	N/A	-	0%	0%	
Total		129.96			

Total Waste Accepted in 2006: 387800 short tons

Waste Composition (if waste characterization study completed)

a) Grass	%
b) Leaves	%
c) Branches	%
d) Food	%
e) Coated Paper	%
f) Old Newsprint	%
g) Old Corrugated Containers	%
h) Office Paper	%
i) Magazines/3rd class mail	%
j) Municipal Soild Waste	%

Landfill Collection Efficiency Calculations

Total Refuse Area	provided	485617 51	
	calculated	485617 51	100.00%

A) Daily Cover Area		
Non-RCRA	0	0.00%
RCRA	2787.07	0.57%
B) Intermediate Cover Area		
Non-RCRA	404685.64	83.33%
RCRA	78144.80	16.09%
C) Final Cover Area (includes Biocover)		
Non-RCRA	0.00	0.00%
RCRA	0.00	0.00%

Weighted collection efficiency calculation:

		Fraction	Coll. Eff.	% contribution
Daily	non-RCRA	0.00% mid-range	68.00%	0.00%
	RCRA	0.57% mid-range	97.00%	0.56%
Intermediate	non-RCRA	83.33% mid-range	92.00%	76.67%
	RCRA	16.09% mid-range	97.00%	15.61%
Final	non-RCRA	0.00% mid-range	92.00%	0.00%
	RCRA	0.00% mid-range	97.00%	0.00%

92.83% Weighted Collection Efficiency

incomplete = LFG system in this area does not provide complete coverage or LFG system is not adequately collecting LFG
low = NSPS compliance is NOT the primary purpose of the LFG system, significant SEM violations, or limited coverage in the area
mid-range = Detailed information is unknown (DEFAULT)
high = NSPS (or similar) system, designed to comply with air regulations, not a lot of SEM violations

Methane Oxidation Calculations

	CH_4 Oxidation Factor	% of Landfill Cover Type (from Inputs)	Weighted Average
Daily	22.70%	0.57%	0.13%
Intermediate	32.08%	99.43%	31.90%
Final	35.63%	0.00%	0.00%
Biocover	55.33%	0.00%	0.00%
		100.00%	**32.03% TOTAL**

32.03% Methane Oxidation Factor

Carbon Sequestration (Not included in CCAR inventory - reported as optional in CARROT)

Amount of waste received (in short tons) per the reporting year

TOTAL WASTE.	387800	short tons

If the waste has been characterized, report the amount of each type of waste stored:

		State Defaults
a) Grass	0%	4.20%
b) Leaves	0%	
c) Branches	0%	0.30%
d) Food	0%	14.60%
e) Coated Paper	0%	0.80%
f) Old Newsprint	0%	2.20%
g) Old Corrugated Containers	0%	5.70%
h) Office Paper	0%	1.30%
i) Magazines/3rd class mail	0%	0.20%
j) Municipal Soild Waste	0%	70.70%

Weighted average computed carbon sequesteration factors (CSF) for the landfill

a) Grass	8,143.80	short tons	*	0.08	MTCE/Wet Short Ton Refuse	=	651.504	MTCE
b) Leaves	8,143.80	short tons	*	0.19	MTCE/Wet Short Ton Refuse	=	1547.322	MTCE
c) Branches	1,163.40	short tons	*	0.31	MTCE/Wet Short Ton Refuse	=	360.654	MTCE
d) Food	56,618.80	short tons	*	0.02	MTCE/Wet Short Ton Refuse	=	1132.376	MTCE
e) Coated Paper***	3,102.40	short tons	*	0.30	MTCE/Wet Short Ton Refuse	=	930.72	MTCE
f) Old Newsprint	8,531.60	short tons	*	0.36	MTCE/Wet Short Ton Refuse	=	3071.376	MTCE
g) Old Corrugated Contain	22,104.60	short tons	*	0.22	MTCE/Wet Short Ton Refuse	=	4863.012	MTCE
h) Office Paper	5,041.40	short tons	*	0.04	MTCE/Wet Short Ton Refuse	=	201.656	MTCE
i) Magazines/3rd class mai	775.60	short tons	*	0.22	MTCE/Wet Short Ton Refuse	=	170.632	MTCE
j) Municipal Soild Waste	274,174.60	short tons	*	0.17	MTCE/Wet Short Ton Refuse	=	46609.682	MTCE
TOTAL	387,800.00	short tons			TOTAL	=	59538.934	MTCE

Total amount of Sequestered Carbon using weighted average for the CSF

59538.93 MTCE	*	3.67 MTCO2E/MTCE*	=	2.19E+05 MTCO2E

NOTES:

* Converstion factor for sequestered carbon equilivants to sequestered carbon dioxide equivalants by using relative molecular weight ratio of carbon dioxide to carbon (44/12 = 3.67 MTCO2E)/MTCE.

** Carbon sequestration factors from Current MSW Industry Position and State-of-the-Practice on LFG Collection Efficiency, Methane Oxidation, and Carbon Sequestration in Landfills (SCS Engineers, 2007)

*** Coated Paper value of 0.34 kg C/dry kg Refuse was converted to wet weight using an assumed moisture content of 20%.

0.34 kg C/dry kg refuse = 0.34 MTC/dry MT refuse / 0.9071847 (MT per short tons) * 0.8 (1- 20% moisture content)

Methane Emissions Calculations

Methane recovered during the reporting year.

	LFG flow	CH_4%	CH_4 flow
Device 1	129.9604	30.84%	40.08
Device 2	0	0.00%	0.00
Device 3	0	0.00%	0.00
Device 4	0	0.00%	0.00
Device 5	0	0.00%	0.00
Device 6	0	0.00%	0.00

40.08 mmscf/yr CH_4

7.57E+02 metric tons/yr CH_4

	Default DE
Flare	99.96%
Engine	98.34%
Turbine	99.97%

Control Devices

			Source Test Values		Device Type	Proposed DE (Default, to be used if source test not available)	Uncontrolled CH_4 emitted from Devices
Methane sent to Device 1:	40.08	DE	99.88%	OR	N/A	99.88%	0.05
Methane sent to Device 2:	0.00	DE	0.00%	OR	N/A	0.00%	0.00
Methane sent to Device 3:	0.00	DE	0.00%	OR	N/A	0.00%	0.00
Methane sent to Device 4:	0.00	DE	0.00%	OR	N/A	0.00%	0.00
Methane sent to Device 5:	0.00	DE	0.00%	OR	N/A	0.00%	0.00
Methane sent to Device 6:	0	DE	0.00%	OR	N/A	0.00%	0.00

0.048092502 mmscf/yr

9.09E-01 metric tons/yr

Converstion Factors:

1 gram	=	1.000E-06 metric tons
1 mmscf	=	1000000 scf
1 mol CH_4	=	16.04 g
1 m^3	=	35.31 scf
1 m^3	=	1000 L
1 mol CH_4	=	24.04 L (@20C by ideal gas law)

* Methane destruction rates from Current MSW Industry Position and State of the Practice on LFG Destruction Efficency in Flares, Turbines, and Engines (SCS Engineers, 2007)
* Collection efficiencies from Current MSW Industry Position and State-of-the-Practice on LFG Collection Efficiency, Methane Oxidation, and Carbon Sequestration in Landfills (SCS Engineers, 2007)

Uncollected Emissions

Amount of CH_4 collected during Reporting Period	40.08	mmscf CH_4
LFG System Collection Efficiency	92.83%	
Amount of Uncollected CH_4	3.09	mmscf CH_4
Amount of Uncollected CH_4	58	metric tons/yr
CH_4 Oxidation Factor	32.03%	
Uncollected CH_4 Emitted through cover	**2.10**	**mmscf CH_4**
	40	**metric tons/yr**

* Methane oxidation factors from, "Current MSW Industry Position and State-of-the-Practice on LFG Collection Efficiency, Methane Oxidation, and Carbon Sequestration in Landfills" (SCS Engineers, 2007)

Carbon Dioxide Emissions Calculations - NOTE THESE ARE BIOGENIC SOURCES

Carbon Dioxide recovered during the reporting year.

	LFG flow	CO_2%	CO_2 flow
Device 1	129.96	36.93%	48.00
Device 2	0.00	0.00%	0.00
Device 3	0.00	0.00%	0.00
Device 4	0.00	0.00%	0.00
Device 5	0.00	0.00%	0.00
Device 6	0.00	0.00%	0.00

48.00 mmscf/yr CO_2

2.49E+03 metric tons/yr

	Default DE
Flare	99.96%
Engine	98.34%
Turbine	99.97%

Control Devices

							Combusted CH_4 (mmscf)	
					Device Type	Proposed DE		
Methane sent to Device 1:	40.08	DE	99.88%	OR	N/A	**99.88%**	40.03	
Methane sent to Device 2:	0.00	DE	0.00%	OR	N/A	**0.00%**	0.00	
Methane sent to Device 3:	0.00	DE	0.00%	OR	N/A	**0.00%**	0.00	
Methane sent to Device 4:	0.00	DE	0.00%	OR	N/A	**0.00%**	0.00	
Methane sent to Device 5:	0.00	DE	0.00%	OR	N/A	**0.00%**	0.00	
Methane sent to Device 6:	0	DE	0.00%	OR	N/A	**0.00%**	0.00	
							40.0289929	mmscf/yr CH_4
						Emissions from combustion	**2.08E+03**	**metric tons/yr CO_2**

Converstion Factors:

1 gram	=	1.000E-06	metric tons
1 mmscf	=	1000000	scf
1 mol CO2	=	44.01	g
1 m^3	=	35.31	scf
1 m^3	=	1000	L
1 mol CO_2	=	24.04	L (@20C by ideal gas law)

Ratio of molecular weight of CO_2 to CH_4 2.75

* Methane destruction rates from, "Current MSW Industry Position and State of the Practice on LFG Destruction Efficency in Flares, Turbines, and Engines" (SCS Engineers, 2007)
* Collection efficiencies from, "Current MSW Industry Position and State-of-the-Practice on LFG Collection Efficiency, Methane Oxidation, and Carbon Sequestration in Landfills" (SCS Engineers, 2007)

Uncollected Emissions

Amount of CO_2 collected during Reporting Period	48.00	mmscf CO_2
LFG System Collection Efficiency	**92.83%**	
Uncollected CO_2 Emitted through Cover	**3.71**	**mmscf CO_2**
	1.92E+02	**metric tons/yr**
CH_4 oxidized in cover	19	metric tons/yr
CO_2 emitted through cover from oxidixed methane	**5.15E+01**	**metric tons/yr**

Landfill GHG Calculation Summary

Methane Emissions

Uncontrolled CH_4 Emitted from Control Devices	9.09E-01	metric ton/yr
Uncollected Emissions of CH_4	3.97E+01	metric ton/yr
Total Methane Emissions from Landfill	**4.06E+01**	**$MTCH_4$**
	8.54E+02	**$MTCO_2E$**

Carbon Dioxide Emissions

CO_2 Recovered and Sent through Control Device	2.49E+03	metric ton/yr
CO_2 from Combustion	2.08E+03	metric ton/yr
Uncollected CO_2 Emissions from Landfill	1.92E+02	metric ton/yr
CO_2 from CH_4 Oxidation in Cover	5.15E+01	metric ton/yr
Total Carbon Dioxide Emissions from Landfill	**4.81E+03**	**$MTCO_2$**

Sequestered Carbon

Carbon Sequestered within Landfill	**2.19E+05**	**$MTCO_2E$**

California Carbon Sequestration Default Values and Rationale

(to be used if a waste characterization study has not been done at landfill)

SCS White Paper Classification and Values (Section 5 3, Page 24)

Refuse Component (White Paper Classification)	Grass	Leaves	Branches	Food	Coated Paper	Old Newsprint	Old Corrugated Containers	Office Paper	Magazines/3rd Class Mail	Municipal Solid Waste	TOTAL
USEPA Carbon Storage Factor (MTCE/Wet Short Ton Refuse)	0 08	0 19	0 31	0 02	0 30	0 35	0 22	0 04	0 22	0 17	1 91
	AVG. 0.135										

CIWMB Equivalent. CIWMB 2004 Waste Characterization Study Results (Table 7: Composition of California's Overall Disposed Waste Stream, 2003)

Refuse Component (CIWMB Waste Classifications)	Leaves and Grass[1]	Branches and Stumps[1]	Food	Magazines and Catalogs[3]	Newspaper	Uncoated Corrugated Cardboard[4]	Computer Paper, Color Ledger, White Ledger[5]	Phone Books and Directories[6]	Municipal Solid Waste	TOTAL
Estimated Percentage of Waste Stream	4 20%	0 30%	14 60%	0 80%	2 20%	5 70%	1 30%	0 20%	70 70%	100 00%
Estimated Tons of Waste Stream	1 696.022	119.754	5.854 352	311.143	887.091	2.312.147	488.944	89.403	28.476.472	40.235.326

Calculated Default Carbon Storage Factors to be used in GHG CCAR Emissions Inventory

Refuse Component	Leaves and Grass	Branches	Food	Coated Paper	Old Newsprnt	Old Corrugated Containers	Office Paper	Magazines/3rd Class Mail	Municipal Solid Waste	TOTAL
GHG Emissions Inventory Carbon Storage Default Factor (MTCE/Wet Short Ton Refuse)	0 00567	0 00093	0 00292	0 0024	0 0079	0 01254	0 00052	0 00044	0 12019	0 15353

Rationale in selecting Carbon Storage Values:

1) Leaves and grass were combined in CIWMB Study The carbon storage factor (CSF) of 0 19 and 0 08 respectively were averaged (0 135) to compute a default CSF for the newly combined Leaves and Grass category.

2) Branches and Stumps were combined in CIWMB Study

3) White Paper Source defines "Coated Paper" as clay coating with smooth glossy finish CIWMB defines "Magazines and Catalogs" as items made of glossy coated paper

4) White Paper Source defines "Old Corrugated Containers" as boxboard, kraft paper, virgin and recycled corrugated boxes CIWMB defines "Uncoated Corrugated Cardboard" as usually having three layers, the center layer is wavy and sandwiched between the two outer layers ie, shipping and moving boxes, computer packaging cartons

5) White Paper Source defines "Office Paper" as chemical pulp which most lignin has been removed. ie high grade office paper CIWMB defines "Computer Paper" as paper used for most computer printouts, ie continuous feed printers, "Color Ledger" is defined as colored bond. rag or stationary grade paper, ie colored photocopy and letter paper. "White Ledger" is defined as uncolored bond rage. or stationary grade paper, ie white photocopy paper. white laser printer paper, and letter paper

6) White Paper Source defines "Magazines/3rd Class Mail" as a mix of coated paper and office paper. also assumes that not all magazines are coated. some are similiar to newsprint CIWMB defines "Phone Books and Directories" as thin paper between coated covers. these items are bound along spine with glue. ie whole or damaged telephone books. real estate listings. and some non-glossy mail order catalogs

Sources:

A) SCS Engineers 2007 *Current MSW Industry Position and State-of-the-Practice on LFG Collection Efficiency, Methane Oxidation, and Carbon Sequestration in Landfills* Report submitted to Solid Waste Industry Climate Solutions Group (SWICS). July 2007

B) Cascadia Consulting Group, Inc 2004 *Statewide Waste Characterization Study* Report submitted to the California Integrated Waste Management Board (CIWMB) December 2004

Calculation:

Default CSF (MTCE/Wet Short Tons Refuse) = USEPA Carbon Storage Factor (MTCE/Wet Short Ton Refuse) * 2004 CA Estimated Percent of Waste Stream (%)