M E M O R A N D U M

DATE: January 26, 2015

TO: Kelli Wetzel, P.E., Permit Writer, Air Program

FROM: Darrin Mehr, Air Quality Analyst, Air Program

PROJECT: P-2009.0001 PROJ 61360 PTC Modification – Facility-wide PTC Including Ada County's Hidden Hollow Landfill and Fortistar Energy's Hidden Hollow Energy sources and Installation of a Hydrogen Sulfide Control System

SUBJECT: Demonstration of Compliance with IDAPA 58.01.01.203.02 (NAAQS) and 203.03 (TAPs)

1.0 Summary

Ada County Solid Waste Division submitted a Permit to Construct (PTC) application for modifications to the Ada County Landfill (ACLF) PTC, for the facility located near Boise, Idaho. Project-specific air quality impact analyses involving atmospheric dispersion modeling of estimated emissions associated with the proposed modification were submitted to DEQ and performed by DEQ to demonstrate that the proposed modification would not cause or significantly contribute to a violation of any ambient air quality standard (IDAPA 58.01.01.203.02 and 203.03 [Idaho Air Rules Section 203.02 and 203.03]). CH2M HILL, Inc. (CH2M HILL), Ada County's permitting consultant, submitted the analyses and applicable information and data enabling DEQ to evaluate potential impacts to ambient air.

CH2M HILL performed project-specific air quality impact analyses to demonstrate compliance of the proposed project with air quality standards. The project consisted of a PTC modification to Ada County's current PTC for the following:

- Ada County owns and operates the Ada County Landfill (also referred to as the Hidden Hollow Landfill). The landfill currently consists of refuse material storage cells that are capped with overburden and are equipped with vacuum extraction systems to collect landfill gas (LFG) generated from the decomposition of material within the cells. Ada County's gas collection system routes the collected LFG to either or both of two existing permitted enclosed ground level flares or to Hidden Hollow Energy's (HHE's) electrical generator engines.
- Fortistar Methane Group, LLC (Fortistar) owns and operates a facility operating under the title of HHE. HHE consists of 2 existing CAT 3520C landfill gas-fired engines for the purpose of generating electricity. The engines are sited on a small parcel of land leased from Ada County. The leased parcel is entirely enclosed within the ACLF and access is through gates and roadways controlled by Ada County. The landfill gas is supplied by Ada County's ACLF. These engines are regulated under PTC P-2009.0098 PROJ 60803, issued June 19, 2012. Two additional CAT 3520C landfill gas-fired generator engines were permitted to operate under this PTC but were not constructed within the 2-year period allowed by the PTC. Thus, the PTC provisions for Engines No. 3 and No. 4 were voided.
- This project re-applies for the construction of two CAT 3520C landfill gas-fired generator sets. The PTC modification's modeling analyses account for their use in a separate operating scenario.
- The ACLF and HHE will be considered a single facility under this permitting action. All sources of regulated air pollutants have been combined in a single submittal, with Ada County as the

permittee. Potential to emit for all sources is represented in the modeling demonstration under three distinct operating scenarios that vary the total permitted capacity of landfill gas collected of 4,699 standard cubic feet per minute (scfm) to three combinations of the two existing ACLF ground-level enclosed flares and the four CAT 3520C landfill gas-fired flares (two existing and two new engines being permitted with this project). The ambient air boundary for the project will be established at the ACLF boundaries. Areas within the ACLF where the public has access will still be treated as ambient air for the limited number of operating hours, in terms of hours of each day and the days of the week that these areas are open to the public.

- The November 14, 2014 application revision submittal incorporated an emission control system to reduce the levels of hydrogen sulfide (H_2S). Use of the control system was evaluated with a reduction of H_2S from 1,500 parts per million by volume (ppm_v) to a level of 600 ppm_v. A reduction in H_2S in the landfill gas stream sent to the HHE generator engines and the ACLF flares results in reduced quantities of SO_2 emissions, produced when H_2S is combusted in the flares or engines.

The DEQ review summarized by this memorandum addressed only the rules, policies, methods, and data pertaining to the pollutant dispersion modeling analyses used to demonstrate that the estimated emissions associated with operation of the proposed facility or modification will not cause or significantly contribute to a violation of any applicable air quality standard. This review did not evaluate compliance with other rules or analyses that do not pertain to the air impact analyses. This review also did not evaluate the accuracy of emissions estimates. Evaluation of emissions estimates is the responsibility of the permit writer.

This memorandum is based on the modeling protocol and initial submittal documents from CH2M HILL, on behalf of ACLF, which were received by DEQ on the following dates:

- August 14, 2013
- September 5, 2013
- September 17, 2013
- September 24, 2013
- October 13, 2013.

The DEQ modeling protocol approval was issued December 12, 2013 and acknowledges each of these submittals.

The following submittals were received in support of the permit application modeling demonstration:

- April 29, 2014: The initial PTC application, modeling report, and modeling files were received by DEQ.

- October 20, 2014: Email from CH2M HILL identifying limits on emergency generator testing.

- October 23, 2014: Email for exhaust parameter documentation on landfill gas-fired generator engines.

- November 14, 2014: A revised modeling demonstration for all pollutants was received, including a final modeling report and electronic modeling files. Revised modeling was needed to correct errors associated with the modeling demonstration's receptor grid, increase H_2S levels from the initial application's concentration of 400 ppm_v to 600 ppm_v in the landfill gas delivered to the flares and landfill gas-fired generator engines, and to more accurately represent the exhaust flow

rates and temperatures for the two enclosed flares. SO_2 emission rates were increased accordingly with the increased H_2S concentration limit in the LFG processed.

- December 8, 2014: Revised 1-hour NO_2 modeling analyses, including NO_2 background concentrations in total impacts was received. Ozone background values were also changed.

DEQ also conducted sensitivity analyses to identify the ambient impacts of the facility's 24-hour PM_{10} and $PM_{2.5}$ emissions for Operating Scenario #3 under the partial grid setup reflecting the requested business operating hours used in Operating Scenarios #1 and #2.

The submitted modeling information and air quality impact analyses: 1) utilized appropriate methods and models; 2) was conducted using reasonably accurate or conservative model parameters and input data (review of emissions estimates was not within the scope of this DEQ modeling review); 3) adhered to established DEQ guidelines for new source review dispersion modeling; 4) showed either a) that predicted pollutant concentrations from emissions associated with the modification as modeled were below Significant Impact Levels (SILs) or other applicable regulatory thresholds; or b) that predicted pollutant concentrations from emissions associated with the modification as modeled, when appropriately combined with co-contributing sources and background concentrations, were below applicable National Ambient Air Quality Standards (NAAQS) at ambient air locations where and when the modification has a significant impact; 5) showed that Toxic Air Pollutant (TAP) emissions increases associated with the modification do not result in increased ambient air impacts exceeding allowable TAP increments. Table 1 presents key assumptions and results to be considered in the development of the permit.

Table 1. KEY CONDITIONS USED IN MODELING ANALYSES	
Criteria/Assumption/Result	**Explanation/Consideration**
This project increases the maximum collected landfill gas from the previous permit-allowable rate of 3,350 scfm to a level of 4,699 scfm. All three modeling scenarios assumed a maximum LFG flow of 4,699 scfm based on the following breakdown: **Modeling Scenario 1:** 4,699 scfm LFG going to the two LFG flares. **Modeling Scenario 2:** 1,200 scfm LFG going to two LFG engines, and 3,499 scfm LFG going to the two LFG flares (2,320 scfm LFG to Flare 1 and 1,179 scfm LFG to Flare 2). **Modeling Scenario 3:** 2,400 scfm LFG going to four LFG engines, and 2,299 scfm to Flare 1 only.	All three operating scenarios fully utilize 4,699 scfm in either the LFG-fired generator engines or the enclosed flares. Modeled emissions rates reflect the following maximum LFG throughputs for each emissions unit: • Flare 1 (FLARE1): 2,320 scfm • Flare 2 (FLARE2): 2,379 scfm • LFG Generator 1 (HGEN1): 600 scfm • LFG Generator 2 (HGEN2): 600 scfm • LFG Generator 3 (HGEN3): 600 scfm • LFG Generator 4 (HGEN4): 600 scfm Compliance with the applicable ambient air quality standards will be met regardless of allocation of the maximum allowable 4,699 scfm of LFG to any of the listed emissions units.
All landfill gas combusted in FLARE1, FLARE2, HGEN1, HGEN2, HGEN3, and HGEN4 was modeled based on landfill gas containing a continuous concentration of 600 parts per million by volume (ppm_v) of H_2S. The H_2S contained in the landfill gas is converted to SO_2 through the combustion process in the flares and electrical generator engines. These emissions units control H_2S but emit uncontrolled SO_2 as a result.	A limit of 600 ppm_v for the 4,699 scfm of landfill gas distributed in any combination to the four LFG-fired generator engines and two flares would cause predicted ambient impact at or below the impacts presented in the permit application's modeling demonstration for the 1-hour SO_2 NAAQS. The maximum predicted design impact plus the ambient background due to the landfill fugitive SO_2 emissions and typical SO_2 backgrounds was below the 1-hour SO_2 NAAQS, with a total impact of 176.3 $\mu g/m^3$, 1-hour average, or 90% of the allowable NAAQS.
GEN3 and GEN4 are small emergency generator engines located at the Household Hazardous Waste Collection Building and the Scales Building respectively. GEN3 is a 44 brake horsepower (bhp) diesel engine. GEN4 is an 80 bhp diesel engine. These emissions units were not modeled in the facility-wide modeling. These units are exempted from the 1-hr NO_2 NAAQS demonstration for the testing and maintenance operations per DEQ policy unless DEQ's Director determines these sources must be included to assure compliance with the 1-hour NO_2 NAAQS.	The 1-hour NO_2 SIL and NAAQS modeling exemption policy does not include an exemption from modeling for ambient standards of other pollutants. Testing and maintenance operations confined to a short duration of one hour or less per day limits the ambient impacts from these engines. Based on the size of these generator engines and the limited number of hours of operation, DEQ did not require inclusion of these sources in the NAAQS impact analyses.
The contractor's wood chipper generator engine (CHIPGEN) was modeled at 24 hours per day and 8,760 hours per year at the maximum emission rates without any restrictions for the "Full Ambient Air Boundary" case and for all hours of ACLF business hours for the "Partial Ambient Air Boundary" case.	Hourly and annual emissions were conservatively modeled for all averaging periods for the wood chipper engine.

Air impact analyses are required by Idaho Air Rules to be conducted according to methods outlined in 40 CFR 51, Appendix W (Guideline on Air Quality Models). Appendix W requires that facilities be

modeled using emissions and operations representative of design capacity or as limited by a federally enforceable permit condition. The submitted information and analyses demonstrated to the satisfaction of the Department that operation of the proposed facility or modification will not cause or significantly contribute to a violation of any ambient air quality standard, provided the key conditions in Table 1 are representative of facility design capacity or operations as limited by a federally enforceable permit condition.

2.0 Background Information

2.1 Applicable Air Quality Impact Limits and Modeling Requirements

This section identifies applicable ambient air quality standards and analyses used to demonstrate compliance with air quality standards.

2.1.1 Area Classification

The ACLF facility is located in northern Ada County, which is designated as an attainment or unclassifiable area for lead (Pb), nitrogen dioxide (NO_2), ozone, particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers ($PM_{2.5}$), and sulfur dioxide (SO_2). The area is in attainment but is being managed under a maintenance plan for carbon monoxide (CO) and particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM_{10}). There are no Class I areas within 10 kilometers of this location.

2.1.2 Modeling Applicability for Criteria Pollutants

Idaho Air Rules Section 203.02 state that a PTC cannot be issued unless the application demonstrates to the satisfaction of DEQ that the new source or modification will not cause or significantly contribute to a NAAQS violation. Atmospheric dispersion modeling is used to evaluate the potential impact of a proposed project to ambient air and demonstrate NAAQS compliance. However, if the emissions associated with a project are very small, project-specific modeling analyses may not be necessary.

If the emissions increase associated with a project are below modeling applicability thresholds established in the *Idaho Air Quality Modeling Guideline* (State of Idaho Guideline for Performing Air Quality Impact Analyses. Doc. ID AQ-011 {September 2013} http://www.deq.idaho.gov/media/1029/modeling-guideline.pdf), then a project-specific analysis is not required. Modeling applicability emissions thresholds were developed by DEQ based on modeling of a hypothetical source designed to reasonably assure that impacts are below the applicable Significant Impact Level (SIL). DEQ has established two threshold levels: Level 1 thresholds are unconditional thresholds, requiring no approval for use by DEQ; Level 2 thresholds are conditional upon DEQ approval, which depends on evaluation of the project and the site, including emissions quantities, stack parameters, number of sources emissions are distributed amongst, distance between the sources and the ambient air boundary, and the presence of sensitive receptors near the ambient air boundary.

2.1.3 Significant and Cumulative NAAQS Impact Analyses

If modeled maximum pollutant impacts to ambient air from the emissions sources associated with a new facility or the emissions increase associated with a modification exceed the significant impact levels (SILs) of Idaho Air Rules Section 006 (referred to as a significant contribution in Idaho Air Rules) or as incorporated by reference as per Idaho Air Rules Section 107.03.b, then a cumulative NAAQS impact analysis is necessary to demonstrate compliance with NAAQS and Idaho Air Rules Section 203.02. A

cumulative NAAQS impact analysis may also be required for permit revisions driven by compliance/enforcement actions, any correction of emissions limits or other operational parameters that may affect pollutant impacts to ambient air, or other cases where DEQ believes NAAQS may be threatened by the emissions associated with the proposed project.

The SIL analyses for a facility modification involves modeling the increase in allowable or potential emissions that results from the proposed modification. Any decreases in emissions are modeled as negative values to account for the reduction in impacts to ambient air.
A cumulative NAAQS impact analysis for attainment area pollutants involves assessing ambient impacts (typically the design values consistent with the form of the standard) from facility-wide emissions, and emissions from any nearby co-contributing sources, and then adding a DEQ-approved background concentration value to the modeled result that is appropriate for the criteria pollutant/averaging-time at the facility location and the area of significant impact. The resulting pollutant concentrations in ambient air are then compared to the NAAQS listed in Table 2. Table 2 also lists SILs and specifies the modeled design value that must be used for comparison to the NAAQS. NAAQS compliance is evaluated on a receptor-by-receptor basis.

If the cumulative NAAQS impact analysis indicates a violation of the standard, the permit may not be issued if the permitted facility or modification has a significant contribution (exceeding the SIL) to the modeled violation. This evaluation is made specific to both time and space. If the SIL analysis indicates the facility/modification has an impact exceeding the SIL, there may not be a significant contribution to a violation if impacts are below the SIL at the specific receptor showing the violation during time periods when there is a modeled violation.

Compliance with Idaho Air Rules Section 203.02 is demonstrated if : a) all modeled impacts of the SIL analysis are below the applicable SIL or other level determined to be inconsequential to NAAQS compliance; or b) modeled design values of the cumulative NAAQS impact analysis (modeling all emissions from the facility and co-contributing sources, and a background concentration) are less than applicable NAAQS at receptors where impacts from the proposed facility/modification exceeded the SIL or other identified level of consequence; or c) if the cumulative NAAQS analysis showed NAAQS violations, the impact of proposed facility/modification to any modeled violation was inconsequential (typically assumed to be less than the established SIL) for that specific receptor and for the specific modeled time when the violation occurred.

NO_2 and SO_2 short-term standards with an averaging period of one hour were promulgated by EPA several years ago. The standards became applicable for permitting purposes in Idaho when they were incorporated by reference *sine die* into Idaho Air Rules (Spring 2011).

The 24-hour and annual average SO_2 primary NAAQS were revoked in 2010. See 75 Federal Register 35520, June 22, 2010.

The $PM_{2.5}$ annual standard was reduced from 15 $\mu g/m^3$ to 12 $\mu g/m^3$ on December 14, 2012. The revised standard became applicable for permitting purposes when it was incorporated *sine die* into Idaho Air Rules in spring of 2014.

Table 2. APPLICABLE REGULATORY LIMITS				
Pollutant	**Averaging Period**	**Significant Impact Levels[a] (μg/m^3)[b]**	**Regulatory Limit [c] (μg/m^3)**	**Modeled Design Value Used[d]**
PM_{10}[e]	24-hour	5.0	150[f]	Maximum 6th highest[g]
$PM_{2.5}$[h]	24-hour	1.2	35[i]	Mean of maximum 8th highest[j]
	Annual	0.3	12[k]	Mean of maximum 1st highest[l]
Carbon monoxide (CO)	1-hour	2,000	40,000[m]	Maximum 2nd highest[n]
	8-hour	500	10,000[m]	Maximum 2nd highest[n]
Sulfur Dioxide (SO_2)	1-hour	3 ppb[o] (7.8 μg/m^3)	75 ppb[p] (196 μg/m^3)	Mean of maximum 4th highest[q]
	3-hour	25	1,300[m]	Maximum 2nd highest[n]
Nitrogen Dioxide (NO_2)	1-hour	4 ppb (7.5 μg/m^3)	100 ppb[s] (188 μg/m^3)	Mean of maximum 8th highest[t]
	Annual	1.0	100[r]	Maximum 1st highest[n]
Lead (Pb)	3-month[u]	NA	0.15[r]	Maximum 1st highest[n]
	Quarterly	NA	1.5[r]	Maximum 1st highest[n]
Ozone (O_3)	8-hour	40 TPY VOC[v]	75 ppb[w]	Not typically modeled

a. Idaho Air Rules Section 006 (definition for significant contribution) or as incorporated by reference as per Idaho Air Rules Section 107.03.b.
b. Micrograms per cubic meter.
c. Incorporated into Idaho Air Rules by reference, as per Idaho Air Rules Section 107.
d. The maximum 1st highest modeled value is always used for the significant impact analysis unless indicated otherwise. Modeled design values are calculated for each ambient air receptor.
e. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers.
f. Not to be exceeded more than once per year on average over 3 years.
g. Concentration at any modeled receptor when using five years of meteorological data.
h. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.
i. 3-year mean of the upper 98th percentile of the annual distribution of 24-hour concentrations.
j. 5-year mean of the 8th highest modeled 24-hour concentrations at the modeled receptor for each year of meteorological data modeled. For the SIL analysis, the 5-year mean of the 1st highest modeled 24-hour impacts at the modeled receptor for each year.
k. 3-year mean of annual concentration. The NAAQS was revised from 15 μg/m^3 to12 μg/m^3 on December 14, 2012.
l. 5-year mean of annual averages at the modeled receptor.
m. Not to be exceeded more than once per year.
n. Concentration at any modeled receptor.
o. Interim SIL established by EPA policy memorandum.
p. 3-year mean of the upper 99th percentile of the annual distribution of maximum daily 1-hour concentrations.
q. 5-year mean of the 4th highest daily 1-hour maximum modeled concentrations for each year of meteorological data modeled. For the significant impact analysis, the 5-year mean of 1st highest modeled 1-hour impacts for each year is used.
r. Not to be exceeded in any calendar year.
s. 3-year mean of the upper 98th percentile of the annual distribution of maximum daily 1-hour concentrations.
t. 5-year mean of the 8th highest daily 1-hour maximum modeled concentrations for each year of meteorological data modeled. For the significant impact analysis, the 5-year mean of maximum modeled 1-hour impacts for each year is used.
u. 3-month rolling average.
v. An annual emissions rate of 40 ton/year of VOCs is considered significant for O_3.
w. Annual 4th highest daily maximum 8-hour concentration averaged over three years.

2.1.4 Toxic Air Pollutant Analyses

Emissions of toxic substances are generally addressed by Idaho Air Rules Section 161:

> *Any contaminant which is by its nature toxic to human or animal life or vegetation shall not be emitted in such quantities or concentrations as to alone, or in combination with other contaminants, injure or unreasonably affect human or animal life or vegetation.*

Permitting requirements for toxic air pollutants (TAPs) from new or modified sources are specifically addressed by Idaho Air Rules Section 203.03 and require the applicant to demonstrate to the satisfaction of DEQ the following:

Using the methods provided in Section 210, the emissions of toxic air pollutants from the stationary source or modification would not injure or unreasonably affect human or animal life or vegetation as required by Section 161. Compliance with all applicable toxic air pollutant carcinogenic increments and toxic air pollutant non-carcinogenic increments will also demonstrate preconstruction compliance with Section 161 with regards to the pollutants listed in Sections 585 and 586.

Per Section 210, if the total project-wide emissions increase of any TAP associated with a new source or modification exceeds screening emission levels (ELs) of Idaho Air Rules Section 585 or 586, then the ambient impact of the emissions increase must be estimated. If ambient impacts are less than applicable Acceptable Ambient Concentrations (AACs) for non-carcinogens of Idaho Air Rules Section 585 and Acceptable Ambient Concentrations for Carcinogens (AACCs) of Idaho Air Rules Section 586, then compliance with TAP requirements has been demonstrated.

Idaho Air Rules Section 210.20 states that if TAP emissions from a specific source are regulated by the Department or EPA under 40 CFR 60, 61, or 63, then a TAP impact analysis under Section 210 is not required for that TAP.

2.2 Background Concentrations

Background concentrations are used in the cumulative NAAQS impact analyses to account for impacts from sources not explicitly modeled. Background concentrations were needed for 1-hour SO_2, 24-hour PM_{10}, 24-hour $PM_{2.5}$, 1-hour and 8-hour CO, 1-hour NO_2 and annual NO_2 standards. Project-specific modeling analyses were not needed for other criteria pollutants because emissions increases associated with the proposed project were below established DEQ modeling applicability thresholds. Lead emissions were not listed in the emission estimate tables or electronic spreadsheet. DEQ modeling staff assumed that potential lead emissions from the facility do not exceed the modeling threshold of 14 pounds per month.

The 1-hour average SO_2 ambient background accounted for fugitive SO_2 emissions from the landfill itself. Section 6.2.1 and Appendix K of the PTC application provides an explanation of the landfill's contribution to the ambient background concentration. The highest predicted fugitive SO_2 emissions occurred during daytime hours. This maximum daytime SO_2 concentration was assumed to be constant for all hours of the day for the fugitive background concentration component. This is a conservative assumption when modeling for compliance with a 1-hour ambient standard.

Table 3 provides ambient background concentrations used in the full impact analyses. NO_2 background values are presented in Table 4.

Table 3. BACKGROUND CONCENTRATIONS		
Pollutant	**Averaging Period**	**Background Concentration ($\mu g/m^3$)[a]**
CO[b]	1-hour	7,060[f]
	8-hour	2,100[g]
SO_2[c]	1-hour	14.8[h] + 15.42[i] = 30.22 total
PM_{10}[d]	24-hour	73[j]
$PM_{2.5}$[e]	24-hour	20[k]
	Annual	6.2[l]

a. Micrograms per cubic meter.
b. Carbon monoxide.
c. Sulfur dioxide.
d. Particulate matter with an aerodynamic diameter of 10 microns or less.
e. Particulate matter with an aerodynamic diameter of 2.5 microns or less.
f. Average value of 2nd high values for 2010, 2011, and 2012 data from Eastman Building, located at 166 N 9th Street, Boise.
g. Average value of 2nd high values for 2010, 2011, and 2012 data from Eastman Building, located at 166 N 9th Street, Boise.
h. Average of 99th percentile values from 2010-2012 data, St. Luke's Meridian site.
i. Estimated SO_2 background contribution from fugitive landfill emissions not accounted for with the St. Luke's Meridian monitoring data. Calculations provided by CH2M HILL, April 24, 2014 PTC application, Appendix K.
j. DEQ Treasure Valley airshed modeling.
k. Average of the 98th percentile 24-hour values from each year of data for 2010, 2011, and 2012. St. Luke's Meridian site.
l. Average of the weighted mean values from each year of 2010-2012. St. Luke's Meridian site.

Background concentrations for 1-hour NO_2 were based on monitoring data collected at the St. Luke's Meridian site by DEQ during January 2009 through January 2011. A separate NO_2 background value was used for each hour of the day, using the 98th percentile value of monitoring data for each hour of the day. Hourly 1-hour NO_2 background concentrations are given in Table 4.

Table 4. BACKGROUND 1-HOUR NO_2 CONCENTRATIONS					
Hour Ending	**Concentration ($\mu g/m^3$)[a]**	**Hour Ending**	**Concentration ($\mu g/m^3$)[a]**	**Hour Ending**	**Concentration ($\mu g/m^3$)[a]**
1	43.2	9	54.6	17	11.2
2	41.4	10	43.2	18	15.0
3	33.8	11	32.0	19	30.1
4	32.0	12	26.7	20	54.4
5	30.1	13	17.3	21	56.4
6	37.6	14	11.3	22	58.3
7	43.2	15	11.3	23	58.3
8	48.9	16	11.2	24	54.5

a. micrograms per cubic meter.

3.0 Modeling Impact Assessment

3.1 Modeling Methodology

This section describes the modeling methods used by the applicant's consultant, CH2M HILL, to demonstrate pre-construction compliance with applicable air quality standards for the facility's emission sources.

3.1.1 Overview of Analyses

CH2M HILL performed project-specific air impact analyses that were determined by DEQ to be

reasonably representative of the proposed modification and facility-wide potential operations scenario of the combination of ACLF and HHE sources. Results of the submitted analyses demonstrated compliance with applicable air quality standards to DEQ's satisfaction, provided the facility is operated as described in the submitted application and in this memorandum.

Table 5 provides a brief description of parameters used in the modeling analyses.

Table 5. MODELING PARAMETERS

Parameter	Description/Values	Documentation/Addition Description
General Facility Location	Near Boise in Northern Ada County	The area is an attainment or unclassified area for all criteria pollutants. .
Model	AERMOD	AERMOD with the PRIME downwash algorithm, version 12345.
Meteorological Data	Boise	2008-2012. See Section 3.1.6 of this memorandum.
Terrain	Considered	Receptor, building, and emissions source elevations were determined using a USGS 1 arc second National Elevation Dataset (NED) file.
Building Downwash	Considered	Plume downwash was considered for the structures associated with the facility.
Receptor Grid	**Partial Grid – Receptors within ACLF during business hours (see Figure X)**	
	Grid 1	25-meter spacing along ACLF property boundary and along landfill roadways.
	Grid 2	15-meter spacing locations at areas within the ACLF, including the HHHW collection area, the active cell public access area, and regions areas east of the active areas).
	Grid 3	15-meter spacing in areas along the northern property boundary where relatively high impacts were expected.
	Grid 4	100-meter spacing in a 5,300 meter (x) by 5,900 meter (y) grid centered on Grids 1, 2, and 3.
	Grid 5	500-meter spacing in a 13,500 meter (x) by 14,500-meter (y) grid centered on Grid 4
	Full Ambient Air Boundary—Receptors external to ACLF during all hours	
	Grid 1	25-meter spacing along ACLF property boundary.
	Grid 2	15-meter spacing in areas along the eastern and the northern property boundary where relatively high impacts were expected.
	Grid 3	100-meter spacing in a 6,100 meter (x) by 5,900 meter (y) grid centered on Grids 1 & 2
	Grid 4	500-meter spacing in a 14,500 meter (x) by 14,500-meter (y) grid centered on Grid 3

3.1.2 Modeling Protocol and Methodology

A modeling protocol was submitted to DEQ on August 1, 2013, prior to submittal of the application. The protocol was submitted by CH2M HILL and DEQ provided an electronic protocol approval letter on December 12, 2013.

On September 4, 2013, CH2M HILL submitted a pre-application email requesting clarification of the methods used to calculate emissions for emergency generator engines operating as intermittent sources. On September 5, 2013, DEQ advised CH2M HILL that the two existing emergency generator engines are exempt from modeling for the 1-hour NO_2 NAAQS per DEQ's guidance policy for modeling intermittent sources for 1-hour NO_2 NAAQS compliance demonstrations. Section 3.2.1 describes the DEQ guidance policy and its applicability to the emergency engines.

Project-specific modeling was generally conducted using data and methods described in the protocol and in the *Idaho Air Quality Modeling Guideline*.

3.1.3 Evaluation of Ozone Impacts

Ozone (O_3) differs from other criteria pollutants in that it is not typically emitted directly into the atmosphere. O_3 is formed in the atmosphere through reactions of VOCs, NOx, and sunlight. Emissions of VOCs and NOx from the proposed modification were evaluated for their potential to cause a violation of the 8-hour O_3 NAAQS.

DEQ reviewed facility-wide VOC and NOx emissions, expressed as tons per year (T/yr) based on the post-project controlled potential to emit values in ACLF's emission inventory. Potential emissions were listed at 34.1 T/yr VOC and 57.5 T/yr NOx. Short-term emissions from the testing of emergency generators were not considered because these sources are only intermittently operated.

The following is a simplified summary of the atmospheric chemistry in a VOC rich atmosphere:

$$NO_2 + h\upsilon \rightarrow NO + O$$
$$O + O_2 \rightarrow O_3$$
$$O_3 + NO \rightarrow NO_2 + O_2$$
$$HO_2 + NO \rightarrow NO_2 + OH$$

Atmospheric dispersion models used in stationary source air permitting analyses (see Section 3.1.4) cannot be used to accurately estimate O_3 impacts resulting from VOC and NOx emissions from an industrial facility. O_3 concentrations resulting from area-wide emissions are predicted by using more complex airshed models such as the Community Multi-Scale Air Quality (CMAQ) modeling system. DEQ has used CMAQ to estimate O_3 concentrations for the Treasure Valley and evaluate potential O_3 control strategies. Use of the CMAQ model is very resource intensive and DEQ asserts that routinely performing a CMAQ analysis for a particular permit application is not a reasonable requirement for air quality permitting, especially for minor source permitting.

DEQ has not typically required minor sources to evaluate potential O_3 impacts as a part of the stationary source air permitting process. This is consistent with EPA regulation and policy. As stated in a letter from Gina McCarthy of EPA to Robert Ukeiley, acting on behalf of the Sierra Club (letter from Gina McCarthy, Assistant Administrator, United States Environmental Protection Agency, to Robert Ukeiley, January 4, 2012):

> *. . . footnote 1 to sections 51.166(I)(5)(I) of the EPA's regulations says the following: "No de minimis air quality level is provided for ozone. However, any net emission increase of 100 tons per year or more of volatile organic compounds or nitrogen oxides subject to PSD would be required to perform an ambient impact analysis, including the gathering of air quality data."*
>
> *The EPA believes it unlikely a source emitting below these levels would contribute to such a violation of the 8-hour ozone NAAQS, but consultation with an EPA Regional Office should still be conducted in accordance with section 5.2.1.c. of Appendix W when reviewing an application for sources with emissions of these ozone precursors below 100 TPY."*

The VOC and NOx emissions from the Ada County Landfill project are below the suggested 100 ton/year threshold to trigger a project-specific O_3 impact applicability evaluation.

3.1.4 Model Selection

Idaho Air Rules Section 202.02 requires that estimates of ambient concentrations be based on air quality

models specified in 40 CFR 51, Appendix W (Guideline on Air Quality Models). The refined, steady state, multiple source, Gaussian dispersion model AERMOD was promulgated as the replacement model for ISCST3 in December 2005. AERMOD retains the single straight line trajectory of ISCST3, but includes more advanced algorithms to assess turbulent mixing processes in the planetary boundary layer for both convective and stable stratified layers.

AERMOD was used for the modeling analyses to evaluate impacts of the facility.

NO_2 1-hour impacts are assessed using a tiered approach to account for $NO/NO_2/O_3$ chemistry. Tier 1 assumes full conversion of NO to NO_2. Tier 2 assumes a 0.80 default ambient ratio of NO_2/NOx. Tier 3 accounts for more refined assessment of the NO to NO_2 conversion, and a supplemental modeling program can be used with AERMOD to better account for $NO/NO_2/O_3$ atmospheric chemistry. Either the Plume Volume Molar Ratio Method (PVMRM) or the Ozone Limiting Method (OLM) can be specified within the AERMOD input file. As stated in EPA guidance (Memorandum: from Tyler Fox, Leader, Air Quality Modeling Group, C439-01, Office of Air Quality Planning and Standards, USEPA; to Regional Air Division Directors. *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard.* March 01, 2011), EPA has not indicated a general preference for one option over the other (PVMRM vs OLM) for particular applications. CH2M HILL elected to use PVMRM for the ACLF project. Section 3.1.5 provides a description of parameters and data used for PVMRM.

3.1.5 Data and Parameters Used for Modeling 1-Hour NO_2 with PVMRM

PVMRM was used with AERMOD to provide a more refined estimate of 1-hour NO_2 concentrations at specific receptors. Table 6 lists the data and parameters used for PVMRM. Hourly O_3 data were used in PVMRM to estimate the conversion of NO to NO_2. O_3 hourly monitoring data were collected from the St. Luke's Meridian site. The O_3 data provided by DEQ to CH2M HILL in a December 13, 2013, modeling protocol approval letter were collected during periods when O_3 is expected to be at its highest levels during the year - generally starting in April or May and extending through September. The data analyzed included: July 27, 2007 – September 30, 2007; May 1 2008 – September 30, 2008; and May 1, 2009 – September 30, 2011.

Monitoring data were analyzed to generate single hourly values for each of the 24 hourly periods within a day. Data were sorted by hour and then the upper 99th percentile was calculated for each hour of the day across all days. For each hour modeled, a background O_3 value equal to the 99th percentile was used as input to PVMRM. This method is very conservative because it does not account for seasonal variation in O_3 concentrations, the data were collected during the time of year when maximum ozone concentrations are expected, and the values used for all days modeled represent the upper 99th percentile of monitored values.

CH2M HILL used an in-stack NO_2/NOx ratio of 0.20 for the diesel-fired engine that powers the contractor's chipper unit. CH2M HILL provided support documentation for the non-default in-stack ratio. DEQ agrees this value is appropriate based on CH2M HILL's in-stack ratio database documentation and the value matches the recommended default value for the NO_2/NOx ratio listed in *Modeling Compliance of the Federal 1-Hour NO_2 NAAQS, CAPCOA Guidance Document*, Appendix C-In-Stack NO_2/NOx Ratios, California Air Pollution Control Officers Association, October 27, 2011. All other NOx sources were modeled with the EPA default ratio of 0.5. DEQ approves of all in-stack ratio assumptions used in the 1-hour NO_2 NAAQS analyses.

Table 6. PARAMETERS AND DATA FOR PVMRM		
Parameter	**Value**	**Source/Comments**
NO_2/NOx ratio for In-Stack Emissions	0.5 for all other sources (HGEN1, HGEN2, HGEN3, HGEN4, FLARE1, and FLARE2. 0.2 for CCHIPGEN (the 990 hp non-road contractor chipper generator engine).	0.5 is an EPA suggested default when source-specific data are not available. HGEN1-HGEN4 are landfill gas-fired generator engines. FLARE1 and FLARE2 combust landfill gas. The CCHIPGEN is fired on diesel and 0.2 is the default CAPCOA in-stack NO_2/NOx ratio.
Ambient Equilibrium for NO_2/NOx	0.90	Default value.
O_3 Concentrations	Value specified for each hour modeled.	DEQ provided values were based on data from the St. Luke's site in Meridian, Idaho.

Table 7 lists hourly O_3 concentrations used in the PVMRM for the 1-hour NO_2 impact analyses. The ozone background concentration values used in the final December 8, 2014, analyses were conservatively high. Background O_3 concentration values provided to CH2M HILL in the December 13, 2013, modeling protocol approval notice incorrectly identified ppb concentration units as µg/m^3. Review of the modeling files submitted with the application indicated that background O_3 concentration values were correctly included in the modeling analyses as ppb, even though the modeling report indicated they were included as µg/m^3.

Table 7. BACKGROUND OZONE CONCENTRATIONS					
Hour	**Concentration (ppb)[a]**	**Hour**	**Concentration (ppb)[a]**	**Hour**	**Concentration (ppb)[a]**
1	46.25	9	42.09	17	68.78
2	45.40	10	47.90	18	66.04
3	44.40	11	54.60	19	61.28
4	42.96	12	60.00	20	56.20
5	40.13	13	63.26	21	50.86
6	39.49	14	70.89	22	47.00
7	36.20	15	70.95	23	48.71
8	38.26	16	69.50	24	47.60

[a.] parts per billion by volume

3.1.6 Meteorological Data

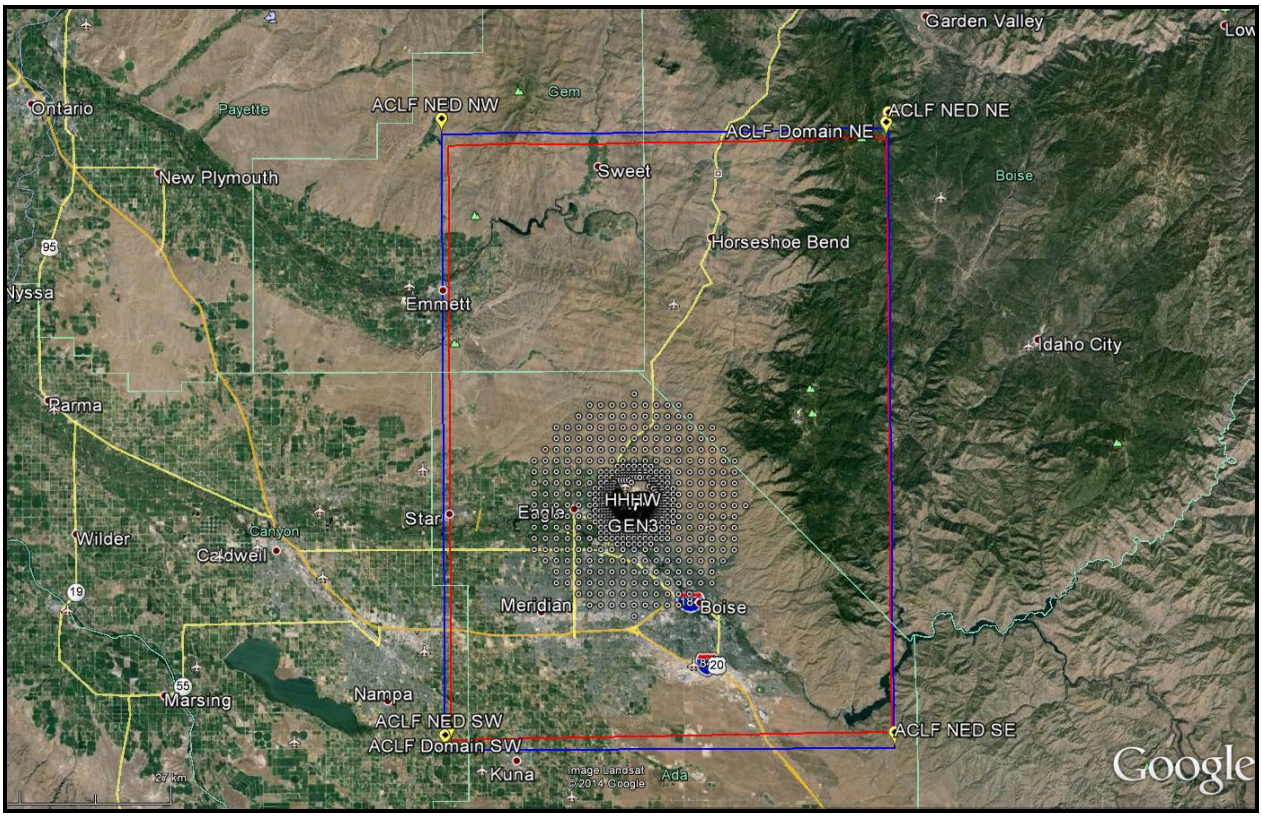
DEQ provided CH2M HILL with model-ready meteorological data processed from Boise surface and Boise upper air meteorological data for a consecutive five-year period covering 2008-2012. These data were collected by the National Weather Service at the Boise airport. They were process into AERMOD-ready files using the EPA preprocessing program AERMINUTE Version 11325 and AERMET Version 12345. A 0.5 meter per second lower wind speed threshold was used for processing in AERMET. DEQ determined these data were reasonably representative for the ACLF site. More representative data of sufficient quality for use in dispersion models were not available for the area.

3.1.7 Terrain Effects

CH2M HILL used a 1 arc second National Elevation Dataset (NED) file, in the NAD83 datum, to calculate elevations of receptors. The modeling domain was fully encompassed by the extents of coverage of the NED terrain file. The terrain preprocessor, AERMAP, was used to extract the elevations from the NED files and assign them to receptors in the modeling domain in a format usable by AERMOD. AERMAP also determined the hill-height scale for each receptor. The hill-height scale is an elevation

value based on the surrounding terrain which has the greatest effect on that individual receptor. The model AERMOD uses those heights to evaluate whether the emissions plume has sufficient energy to travel up and over the terrain or if the plume will travel around the terrain. The facility is located in the Boise foothills and terrain effects are anticipated to be an important consideration. See Figure 1 for a view of the modeling domain depicted in a Google earth photographic image.

Figure 1. Modeling Domain (red outline) and USGS Terrain Data File Coverage (blue outline)



3.1.8 Building Downwash

Potential downwash effects on the emissions plume were accounted for in the model by using building parameters as described by CH2M HILL in the submitted application. The Building Profile Input Program for the PRIME downwash algorithm (BPIP-PRIME) was used to calculate direction-specific dimensions and Good Engineering Practice (GEP) stack height information from building dimensions/configurations and release parameters for input to AERMOD.

Figure 2 below shows the 3-dimensional outline of the model setup exported by the Providence/Oris Solutions BEEST graphic user interface to Google earth.

The House Hold Hazardous Waste and Scales Buildings were also appropriately included in the model setup as structures.

Figure 2. Layout of Buildings Near the Primary Sources at the ACLF

3.1.9 Ambient Air Boundary

The ACLF and HHE are considered one facility for the purposes of air quality permitting. Per Idaho DEQ's July 1, 2013, letter[1] the two facilities will be recognized as a single facility for this project, based on DEQ's concurrence that "…ACLF ultimately has control over the fuel supply and fuel distribution to HHE operations. Therefore, the conclusion has been reached that the ACLF ultimately has control over HHE operations."

The ambient air boundary for the project is the same as was used for previous permitting projects for the ACLF. HHE's emission sources are contained within the ambient air boundary and ambient impacts for both ACLF and HHE emission sources are aggregated for the NAAQS compliance demonstrations.

There are areas within the outer property boundary of the ACLF where the general public is allowed access during normal business hours. These active public dumping areas for landfill waste, dumping areas for wood by-product waste, access roadways, parking lots, and structures within the ACLF were treated as ambient air on the days of the week and hours of day considered to be normal business hours when the landfill is open to public entry. Additional details regarding public access and receptor placement are provided in Section 3.1.10 and in the ACLF modeling report. Figures 3 and 4 show outlines of the two ambient air boundaries used in this modeling demonstration.

[1] Letter regarding "Single-Facility Concurrence Request, Facility ID No. 001-00195, Ada County Landfill, Boise, Morrie Lewis, Permit Writer, DEQ, to Dave Logan, Director, Ada County Operations Department and Suparna Chakladar, Sr. Director, Environmental Services, Hidden Hollow Energy, LLC.

Figure 3. Exterior Ambient Air Boundary – "Full" Case

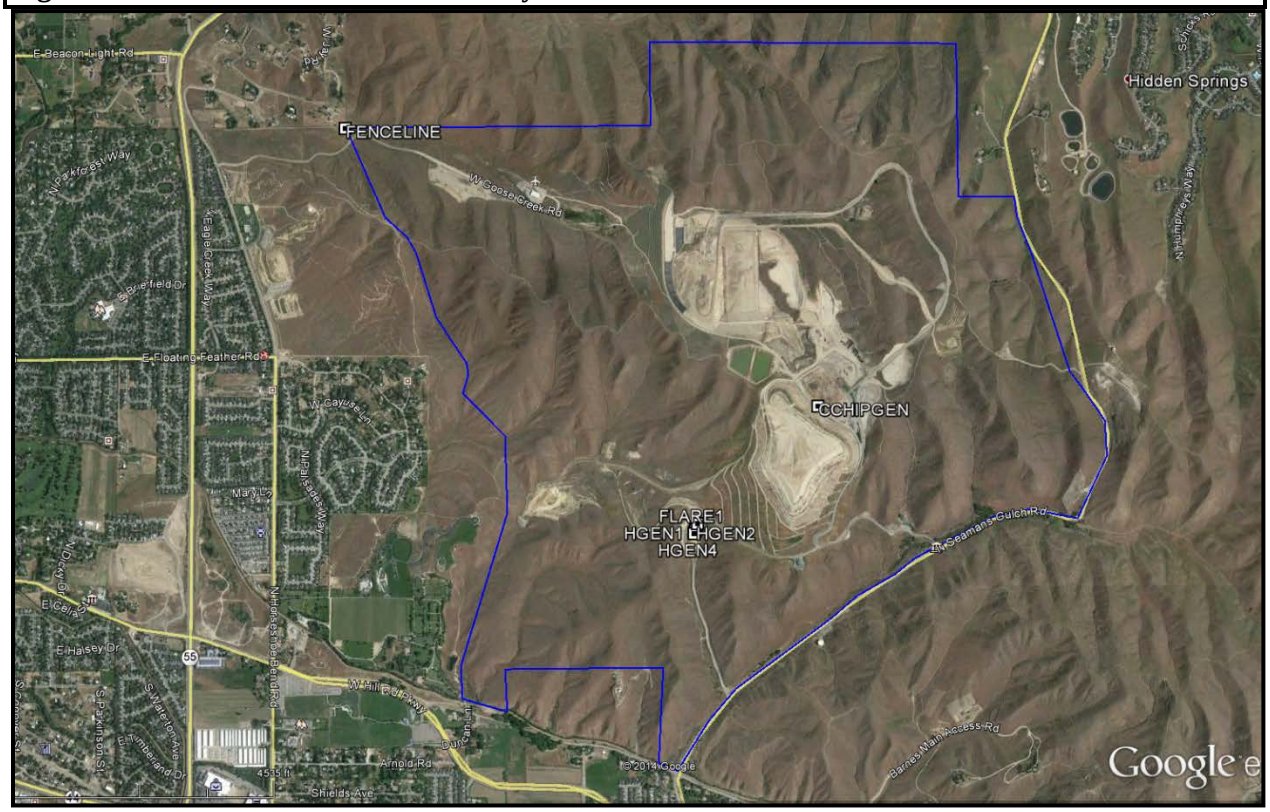
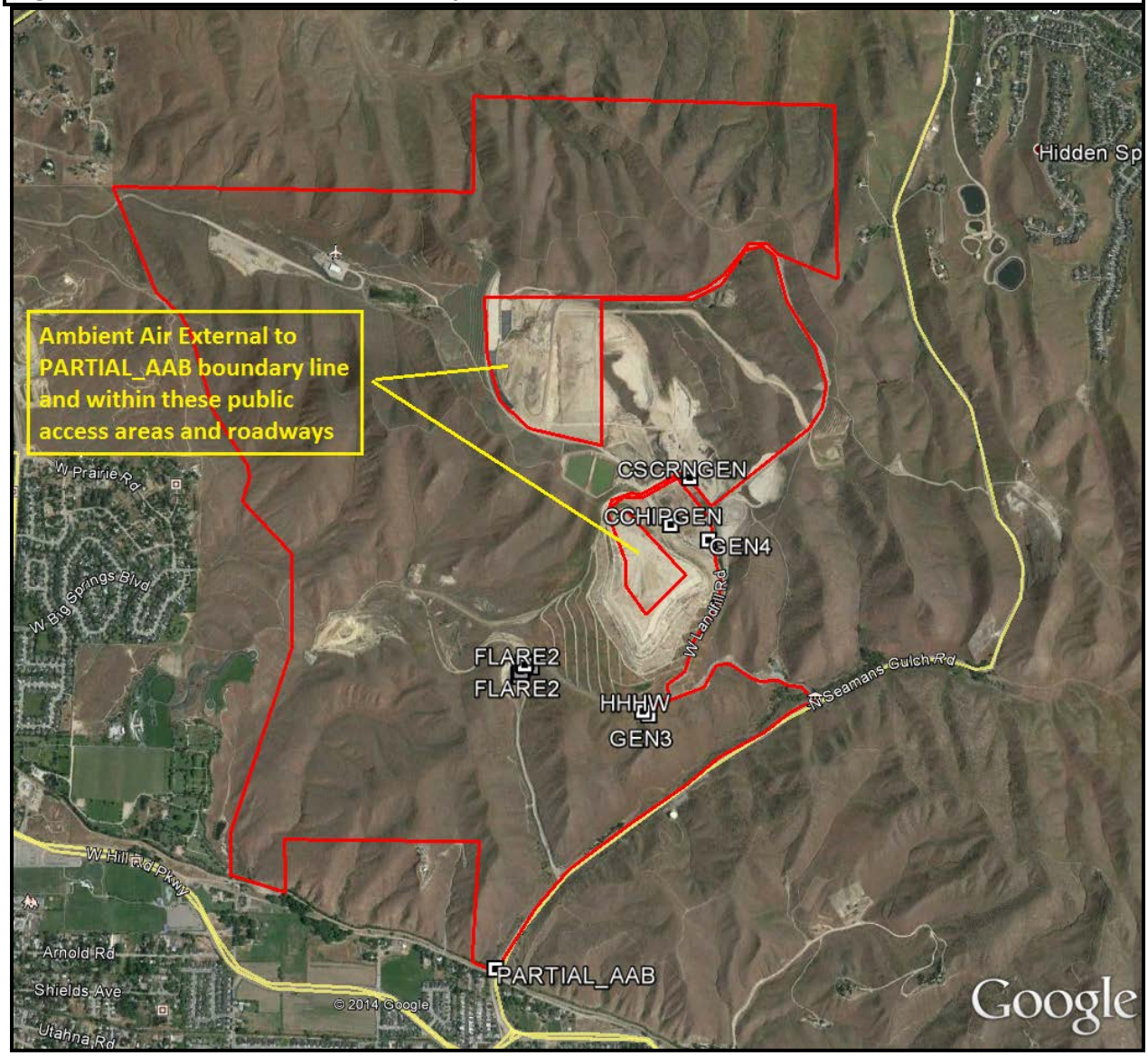


Figure 4. Partial Ambient Air Boundary Case Outline



3.1.10 Receptor Network

Table 5 describes the receptor network used in the submitted modeling analyses. DEQ contends that the receptor network was adequate to reasonably assure compliance with applicable air quality standards at all ambient air locations.

Two receptor networks were used to identify ambient impacts for this project. The "Full AAB" or "full ambient air boundary" set of receptors was used to identify ambient impacts for the ACLF and HHE sources on a 24 hour per day and 8,760 hour per year basis.

The "Partial AAB" or "partial ambient air boundary" in the November 14, 2014, modeling demonstration used all Full AAB receptors external to the outer ACLF property boundary and included receptors within the ACLF along roadways and regions where the public was considered to have access during the

business hours of the landfill. Spacing of the receptors within the landfill's public access areas ranged from a few meters to a maximum of 25 meters along the roadway perimeters, with most receptors spaced at 15 meters apart. Partial AAB receptors accounted for impacts only for periods identified as normal business hours. This separate set of conditions used receptors external and internal to the ACLF by applying hour-of-day and day-of-week operating factors to each of the emissions units (generator engines and flares). The hour-of-day operating factors modeled emissions at 100% of model input emission rates were 8 am through 6 pm for days of the week Monday through Saturday. To account for the effects of daylight savings time the hours of operation were initiated one hour earlier for the months of April through October.

The magnitude of modeled impacts is greatly affected by the proximity of receptors relative to emissions points, and impacts are especially affected by terrain in the surrounding area. Consequently, receptor density is an important factor when evaluating the adequacy of the NAAQS and/or TAPs compliance demonstration. The receptor network used in the impact analyses was updated and significantly strengthened in the November 14, 2014, revised modeling demonstration. Receptors were not originally placed along some portions of the ambient air boundary for the Full AAB receptor grid. Ambient air boundary receptors along the eastern and northern regions of the facility were placed outside of the actual ambient air boundary, resulting in analyses that did not account for impacts at all areas considered as ambient air. The November 14, 2014, submittal corrected all receptor coverage issues and the density of receptors was substantially increased. CH2M HILL decreased receptor spacing to 15 meters to enable resolution of maximum impacts in areas where the design value impacts were predicted to occur. Receptor density was also increased in areas of complex terrain and areas closest to the sources where the highest impacts were predicted to occur.

DEQ determined the November 14, 2014, revisions to the receptor grid are appropriate and the 15-meter separation of receptors in the "hot spot" regions adequately resolves maximum impacts for this project. Figures 5, 6, and 7 below show the receptor grids used in the analyses. The regions that appear completely blacked out within Figures 5 and 6 represent the regions where 15-meter spacing was used.

Figure 5. Full Ambient Air Boundary Receptor Coverage

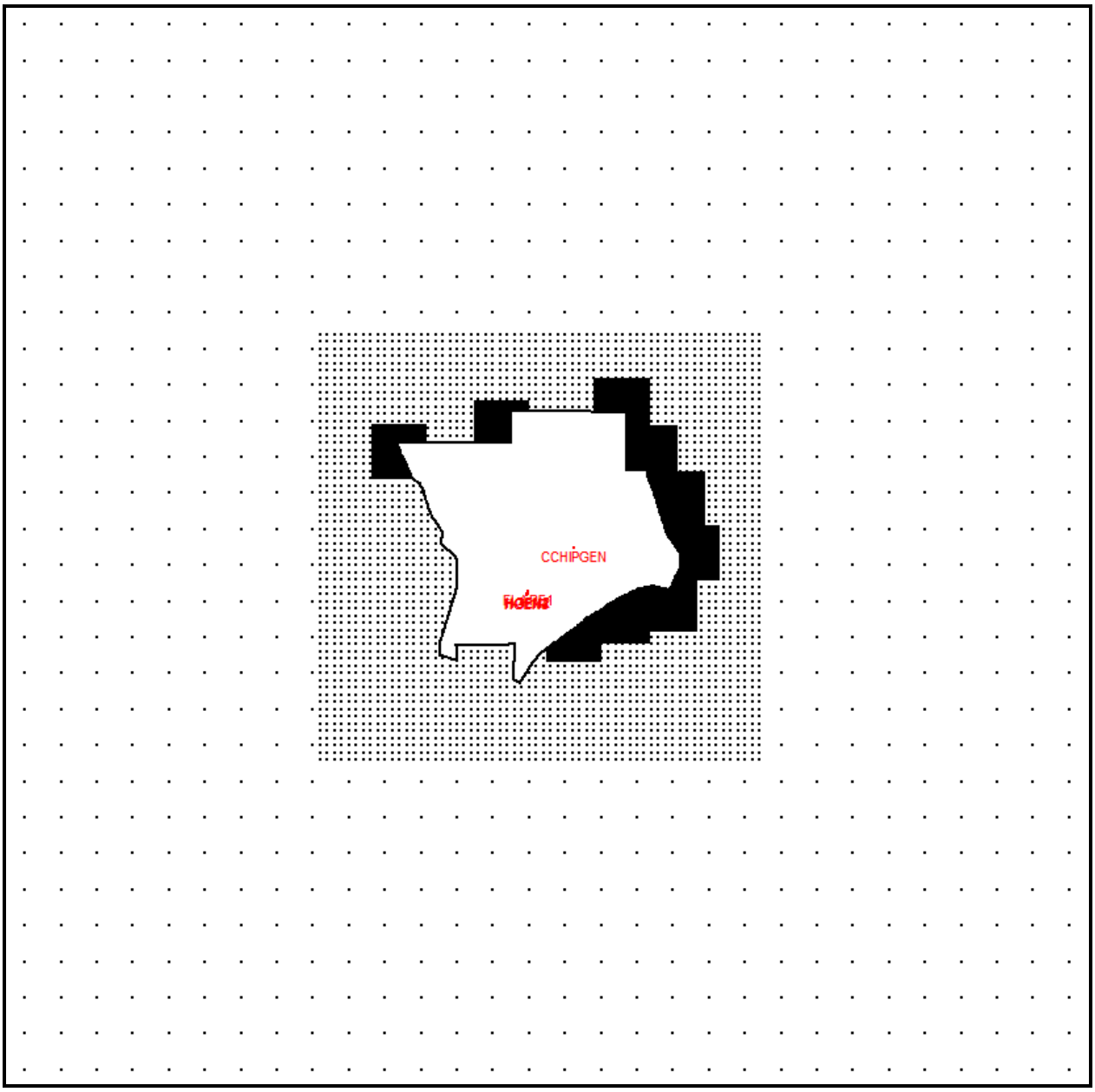


Figure 6. Partial Ambient Air Boundary Receptor Coverage

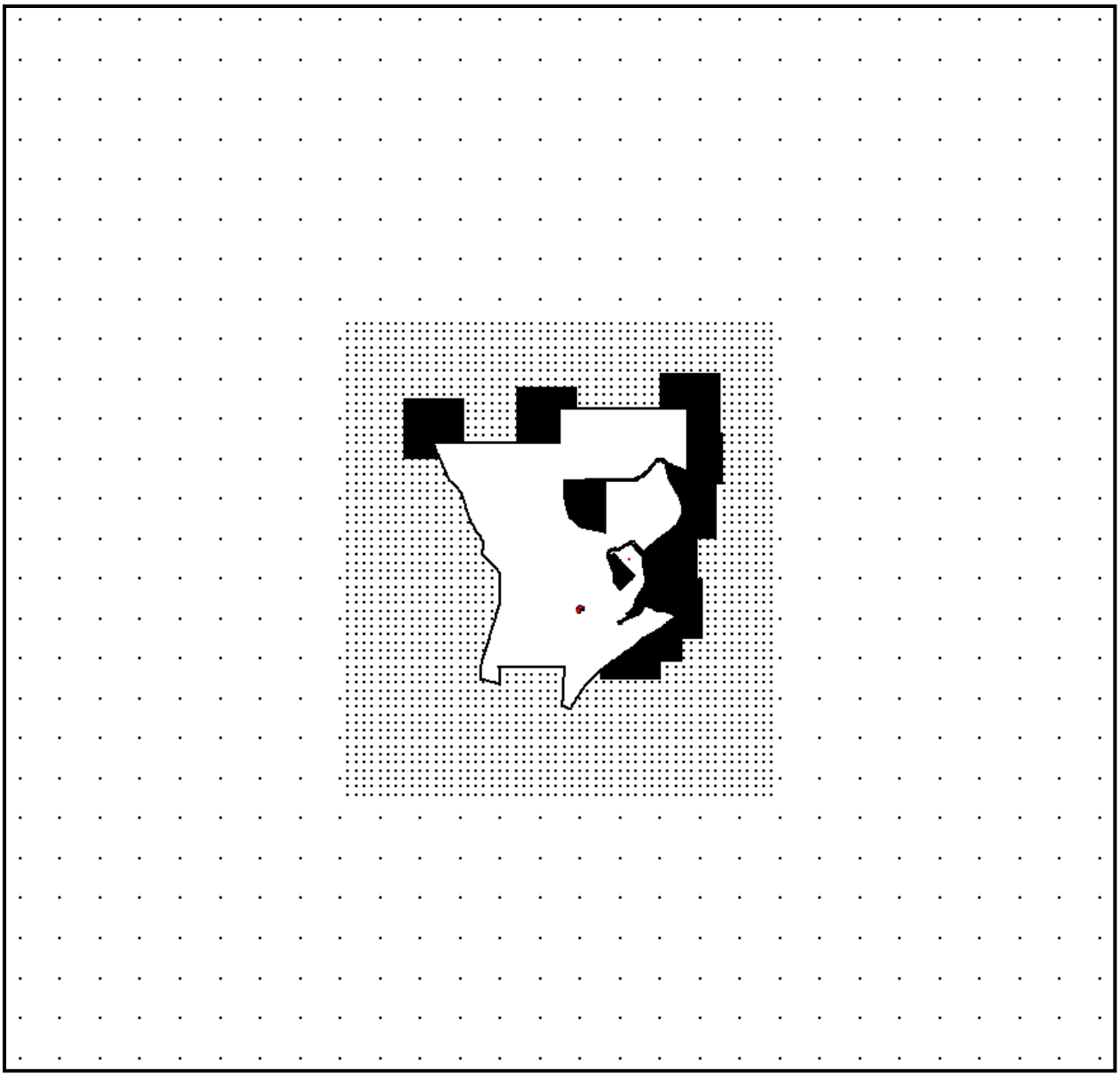
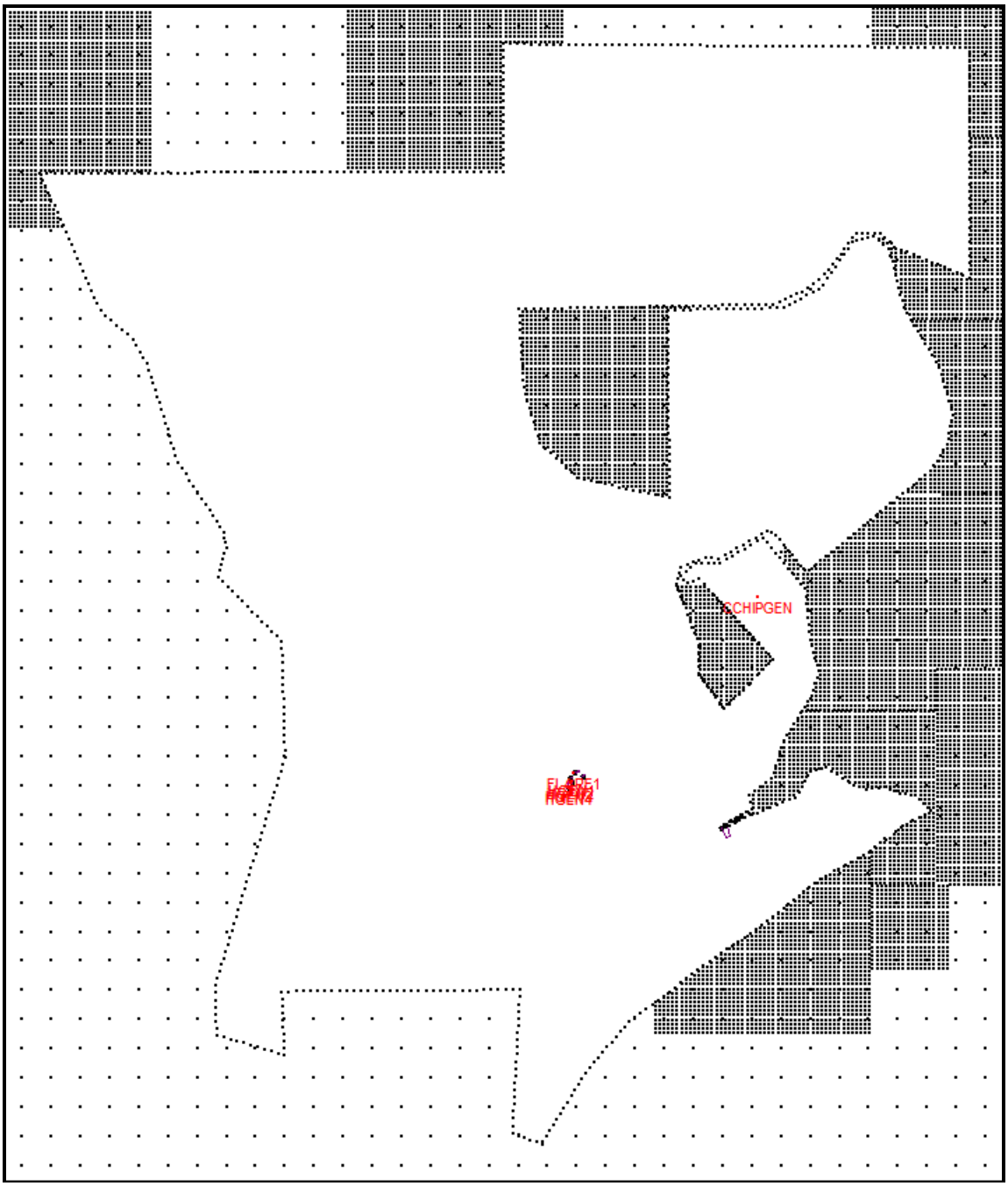


Figure 7. Close-up View of the Partial Ambient Air Boundary Receptors



3.2 Emission Rates

Emissions rates of criteria pollutants and TAPs for the ACLF and HHE sources were provided by the applicant for the applicable averaging periods. DEQ modeling review, described in this memorandum, did not include review of emissions rates for accuracy. Review and approval of estimated emissions was the responsibility of the DEQ permit writer.

3.2.1 Criteria Pollutant Emissions Rate

Table 8 lists criteria pollutant emissions rates used in the project-specific modeling analyses for 1-hour, 8-hour, and/or 24-hour averaging periods. The rates listed represent the maximum allowable rate as averaged over the specified period. Total NO_x emissions were modeled for compliance with the 1-hour NO_2 NAAQS, with the PVMRM algorithms accounting for NOx chemistry.

Table 8. SHORT-TERM ANALYSES MODELED CRITERIA POLLUTANT EMISSIONS

Source ID	Description	Emission Rates (lb/hr[a])				
		NOx[b]	SO_2[c]	PM_{10}[d]	$PM_{2.5}$[e]	CO[f]
Scenario 1: 4,699 scfm LFG[g] flared						
FLARE1	Enclosed LFG Flare #1	3.04	14.11	1.60	1.60	0.76
FLARE2	Enclosed LFG Flare #2	3.12	14.47	1.64	1.64	0.78
CCHIPGEN	Contractor Diesel-fired Chipper Engine	22.66	0.01	0.41	0.39	6.02
Scenario 2: 1,200 scfm to two LFG generator engines and 3,499 flared						
HGEN1	LFG-fired Generator Engine	2.46	3.65	0.78	0.78	14.77
HGEN2	LFG-fired Generator Engine	2.46	3.65	0.78	0.78	14.77
FLARE1	Enclosed LFG Flare #1	3.04	14.11	1.60	1.60	0.76
FLARE2	Enclosed LFG Flare #2	1.54	7.17	0.81	0.81	0.39
CCHIPGEN	Contractor Diesel-fired Chipper Engine	22.66	0.01	0.41	0.39	6.02
Scenario 3: 2,400 to four LFG generator engines and 2,299 flared						
HGEN1	LFG-fired Generator Engine	2.46	3.65	0.78	0.78	14.77
HGEN2	LFG-fired Generator Engine	2.46	3.65	0.78	0.78	14.77
HGEN3	LFG-fired Generator Engine (new)	2.46	3.65	0.78	0.78	14.77
HGEN4	LFG-fired Generator Engine (new)	2.46	3.65	0.78	0.78	14.77
FLARE1	Enclosed LFG Flare #1	3.01	13.98	1.58	1.58	0.75
CCHIPGEN	Contractor Diesel-fired Chipper Engine	22.66	0.01	0.41	0.39	6.02

a. Pounds per hour.
b. Oxides of nitrogen, 1-hour averaging period.
c. Sulfur dioxide, 1-hour averaging period.
d. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers, 24-hour averaging period.
e. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers, 24-hour averaging period.
f. Carbon monoxide, 1-hour averaging period and 8-hour averaging period
g. Landfill gas.

Emissions from the periodic testing of two small emergency generator engines (source IDs GEN3 and GEN4), each less than 100 bhp) are intermittent sources that only operate on an infrequent basis. The internal combustion (IC) engines are only used for emergency conditions and during periodic operational testing. As such, these sources are difficult to model in a way that accounts for impacts in a reasonably accurate but conservative manner.

For air quality standards that use the maximum observed concentration or second highest concentration as the compliance design value, regulatory assessment of pollutant impacts from intermittent sources can be appropriately modeled assuming continual operation. This assumption is appropriate because the source could be reasonably expected to operate during worst-case conditions, and the highest impact is the value used to evaluate compliance. For NAAQS having an averaging period longer than 1 hour (e.g., 8-hour, 24-hour, or annual NAAQS), short-term emissions can often be smeared or distributed over the longer averaging period, calculating an average emissions rate for the period of interest.

The main challenge of accurately modeling intermittent sources to evaluate the potential for violating the 1-hour NO_2 NAAQS arises because of the probabilistic form of the standard. The probabilistic form of

the NAAQS causes the operational frequency of an intermittent source to be a key consideration in the compliance evaluation. For example, if the only source at a facility is an intermittent source that operates once every quarter or four times per year, it is nearly impossible for the source to cause or contribute to a violation of the 1-hour NO_2 standard unless the background NO_2 concentration periodically exceeds the standard. For this example, the source does not operate frequently enough (four times each year) to impact the design concentration, which is the 3-year average of the 98th percentile of the annual distribution of daily maximum 1-hour concentrations. The 1-hour NO_2 design value at any specific ambient air location is estimated through dispersion modeling by using the 5-year average of the eighth highest of the daily 1-hour maximum concentrations from each year. However, if the facility has additional substantial NO_2 sources of substantial magnitude, the contribution of the NO_2 emissions from even a very infrequent NO_2 source could measurably affect compliance with the 1-hour NO_2 NAAQS at some downwind locations.

Demonstrating NAAQS compliance for permitting purposes typically involves modeling permit allowable emissions over all allowable operation times, which often is continual operation (8,760 hours per year). If a source is allowed to operate during any particular hour of the year, then modeling is performed by assessing the impacts for each hour of the year. Modeling an intermittent source by assuming continual operation would artificially skew the distribution, thereby over-representing the source's impact. However, specific hours during which an intermittent source will operate are usually unknown.

The US Environmental Protection Agency (EPA) provided guidance on modeling intermittent NO_2 sources in a March 2011 memorandum from Tyler Fox, leader of the air quality modeling group, to regional air directors. The memo identifies the problem with modeling intermittent sources as continuous sources:

> We are concerned that assuming continuous operations for intermittent emissions would effectively impose an additional level of stringency beyond that intended by the level of the standard itself. As a result, we feel that it would be inappropriate to implement the 1-hour NO_2 standard in such a manner and recommend that compliance demonstrations for the 1-hour NO_2 NAAQS be based on emission scenarios that can logically be assumed to be *relatively continuous or which occur frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations* [emphasis added]. EPA believes that existing modeling guidelines provide sufficient discretion for reviewing authorities to exclude certain types of intermittent emissions from compliance demonstrations for the 1-hour NO_2 standard under these circumstances.

DEQ developed a guidance policy in 2013 on modeling intermittent sources for compliance with the 1-hour NO_2 NAAQS. The following statement was taken from the policy:

> Upon a review of other states' application of the Tyler Fox memo, comments from the public and Idaho industry, an internal review of Idaho sources, NO_2 background levels, and various sample model runs, DEQ has determined that Nitrogen Oxides (NO_x) emissions from the intermittent operational testing of engines powering emergency generators or fire-suppression water pumps may be excluded from the project-specific significant impact level (SIL) analysis and the cumulative NAAQS analysis for 1-hour NO_2, providing the annual hours of operation from testing and maintenance are less than or equal to 100 hours.
>
> This determination is applicable to minor source air permitting projects and is not limited to any specific number of engines present at a facility. The Director may require deviation from this guidance if deemed appropriate to assure compliance with 1-hour NO_2 NAAQS and IDAPA 58.01.01.203 or 01.403. DEQ will determine how emergency engines are included in permits for

major sources, specifically those applicable to the Prevention of Significant Deterioration (PSD) program, on a case-by-case basis.

DEQ also determined that exclusion of ACLF emergency generator intermittent emissions of other criteria pollutants from NAAQS compliance demonstrations is appropriate. This was based on the magnitude of emissions, operational frequency, level of applicable standards relative to emissions, and the potential for public exposures.

Emission rates listed in Table 9 were modeled to demonstrate compliance with annual standards and were modeled for 8,760 hours per year in the Full ambient air boundary case and for 12 hours per day during normal business hours Monday through Saturday for the partial ambient air boundary case.

Table 9. ANNUAL AVERAGE ANALYSES MODELED CRITERIA POLLUTANT EMISSIONS

Source ID	Description	Emission Rates (lb/hr[a])	
		NOx[b]	$PM_{2.5}$[c]
Scenario 1: 4,699 scfm LFG[d] flared			
FLARE1	Enclosed LFG Flare #1	3.04	1.60
FLARE2	Enclosed LFG Flare #2	3.12	1.64
CCHIPGEN	Contractor Diesel-fired Chipper Engine	22.66	0.39
Scenario 2: 1,200 scfm to two LFG generator engines and 3,499 flared			
HGEN1	LFG-fired Generator Engine	2.46	0.78
HGEN2	LFG-fired Generator Engine	2.46	0.78
FLARE1	Enclosed LFG Flare #1	3.04	1.60
FLARE2	Enclosed LFG Flare #2	1.54	0.81
CCHIPGEN	Contractor Diesel-fired Chipper Engine	22.66	0.39
Scenario 3: 2,400 to four LFG generator engines and 2,299 flared			
HGEN1	LFG-fired Generator Engine	2.46	0.78
HGEN2	LFG-fired Generator Engine	2.46	0.78
HGEN3	LFG-fired Generator Engine (new)	2.46	0.78
HGEN4	LFG-fired Generator Engine (new)	2.46	0.78
FLARE1	Enclosed LFG Flare #1	3.01	1.58
CCHIPGEN	Contractor Diesel-fired Chipper Engine	22.66	0.39

a. Pounds per hour.
b. Oxides of nitrogen, annual averaging period.
c. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers, annual averaging period.
d. Landfill gas.

3.2.2 TAP Emissions Rates

CH2M HILL modeled those TAPs where the increase in TAP emissions associated with the proposed modification exceeded the emissions screening levels (ELs) of Idaho Air Rules Section 585 and 586. Only emissions of carcinogenic compounds were expected to exceed ELs specified in Section 586. Emission rates were provided in the permit application's emission calculation spreadsheet. The TAP emissions listed in the table below were presented under tabs "G-5 Flare Toxics" and "Controlled Flares Toxics". The calculations were described as accounting for a total landfill gas flow rate of 4,699 scfm. Only flare emissions were accounted for in the modeled TAPs emissions, and this flow rate should be regarded as a conservative value because the pre-modification PTE had already been established at 3,350 scfm in PTC Number P-2009.0001 Project 60972, issued on September 28, 2012. The TAPs emissions associated with the increase between 3,350 scfm and 4,699 scfm of LFG are subject to Section 210 PTC review for this project. Therefore, the evaluation of TAPs compliance based on the entire requested LFG throughput to the flares is conservative.

TAPs emissions for the LFG generator engines and the diesel-fired contractor chipper engine are exempt from TAPs rules, per Section 210.20 of the Idaho Air Rules, and were not included in the TAPs analyses.

Table 10 provides modeled emissions rates for TAPs. Identical emission rates were modeled for the Full AAB and Partial AAB receptor grid cases.

Table 10. MODELED CARCINOGENIC TOXIC AIR POLLUTANTS EMISSIONS RATES

Pollutant	Chemical Abstract Service Number	Emission Source	
		FLARE1 (lb/hr)[a]	FLARE2 (lb/hr)
Scenario 1			
1,1,2,2 –Tetrachloroethane	79-34-5	1.15E-03	1.18E-03
1,1,2-Trichloroethane	79-00-5	8.20E-05	8.47E-05
Ethylidene dichloride (1,1-dichloroethane)	75-34-3	1.43E-03	1.48E-03
Vinylidene chloride	75-35-4	1.19E-04	1.23E-04
Acrylonitrile	107-13-1	3.11E-04	3.20E-04
Methylene chloride	75-09-2	7.47E-03	7.72E-03
Vinyl chloride	75-01-4	2.80E-03	2.92E-03
Benzene	71-43-2	7.99E-04	8.26E-04
Scenario 2			
1,1,2,2 –Tetrachloroethane	79-34-5	1.15E-03	5.87E-04
1,1,2-Trichloroethane	79-00-5	8.17E-05	4.27E-05
Ethylidene dichloride (1,1-dichloroethane)	75-34-3	1.43E-03[b]	7.32E-04[b]
Vinylidene chloride	75-35-4	1.19E-04	6.10E-05
Acrylonitrile	107-13-1	3.11E-04	1.59E-04
Methylene chloride	75-09-2	7.47E-03	3.84E-03
Vinyl chloride	75-01-4	2.80E-03	1.45E-03
Benzene	71-43-2	7.99E-04	4.09E-04
Scenario 3			
1,1,2,2 –Tetrachloroethane	79-34-5	1.13E-03	0
1,1,2-Trichloroethane	79-00-5	8.31E-05	0
Ethylidene dichloride (1,1-dichloroethane)	75-34-3	1.42E-03[b]	0
Vinylidene chloride	75-35-4	1.18E-04	0
Acrylonitrile	107-13-1	3.06E-04	0
Methylene chloride	75-09-2	7.40E-03	0
Vinyl chloride	75-01-4	2.79E-03	0
Benzene	71-43-2	7.92E-04	0

a. Pounds per hour.

b. These emissions were modeled for the 24-hr avg period rather than the annual averaging period in the submitted modeling.

3.3 Emission Release Parameters

Table 11 lists emissions release parameters for sources modeled. All emissions units were modeled as point sources with vertical and uninterrupted releases of the exhaust plumes to atmosphere. Three separate operating scenarios were modeled. Only the flare release parameters were affected by different levels of LFG feed rates.

DEQ issued a modeling protocol approval letter to Ada County on December 13, 2013, which included, in part, a request that the application contain documentation and justification for all stack parameters used in the modeling analyses, clearly showing how stack gas temperatures and flow rates were estimated.

Generally, the final modeling demonstrations used release parameters that appeared to be within normally expected ranges for the source types modeled. An October 23, 2014, email from CH2M HILL to DEQ contained attachments and embedded emails with pertinent exhaust parameter documentation for the two flares and the four LFG-fired generator engines. Support documentation for the diesel-fired contractor wood chipper generator engine was submitted in the initial April 29, 2014, permit application.

Landfill gas-fired generator engines

All LFG-fired generator sets were modeled with identical exhaust parameters. Ada County and CH2M HILL provided manufacturer's specification sheets for the Caterpillar 3520C LFG-fired engines. The 100% load values for exit temperature and flow rate were modeled. Stack height and diameter were confirmed by Fortistar-HHE as representative of point of release to atmosphere conditions.

The October 23, 2014, email submittal provided the support documentation for all four HHE generator engines. Substantiation was provided using the following: Fortistar Energy, HHE's test report for the February 5 and 6, 2013, testing of HGEN1 and HGEN2; the Caterpillar Corporation specification sheets for the Model 3520C CAT LFG-fired engine; Section 3.2 of the June 19, 2012, DEQ modeling memo for the most recent HHE permitting project; and, an email from Fortistar describing the exit diameter and release height of the existing and proposed generator engine exhaust stacks. An exhaust flow rate in units of dry standard cubic feet per minute (dscfm) was provided for each engine in the test. Stack diameter, stack height, exhaust moisture content, and stack pressure were not provided in the source test documentation. The EPA reference methods that determine the information necessary to accurately convert the flow from dry standard cubic feet per minute to the desired units of actual cubic feet per minute, wet basis, were not included in this performance test because they are outside of the scope of the required testing. A partial conversion to acfm, lacking pressure and moisture components, using only the effect of increase in volume at the modeled exit temperature of 898 °F versus standard temperature of 68 °F, yielded an exhaust flow rate value of 11,417 cubic feet per minute (cfm) for HGEN1 while combusting 598 dscfm of LFG, and 11,152 cfm for HGEN2 while combusting 602 dscfm of LFG. Although this is not an "apples to apples" comparison of source test and modeled exhaust flow rates, DEQ believes the modeled flow rates are relatively representative of actual rated capacity flow rates in unit of acfm, provided the exit temperature at the point of the exhaust release to atmosphere is accurate.

ACLF and Fortistar assert that the information provided in the Caterpillar specification sheet represent the exit temperature at release, which is 898°F. The specification sheet flow rate, in units of acfm, was listed as 12,476 acfm, wet basis, plus or minus 6%, at 100% load.

Table 1 – Stack Parameters – of the November 14, 2014 modeling report lists the orientation of the LFG-fired generator engine as vertical and capped. These sources were modeled as uninterrupted release points. Capping the stack or changing the release orientation to horizontal could substantially change impacts, thereby invalidating the impact analyses. However, use of a "flap" type rain cap on a hinged spring that moves out of the exhaust stream during engine operation does not restrict flow and would not change modeled impacts.

Flares 1 and 2

Exit velocities for the two flares (Model IDs FLARE1 and FLARE2) were scaled to landfill gas flow rates for each scenario. Flare exit temperatures were assumed to remain constant for each operating scenario.

The initial modeling submittal for this project appeared to be based on an October 15 and 16, 2008, performance test. From Table 1 of the test report the average exhaust gas flow rates for "Exhaust Gas," in units of "CFM," were 2,320 cfm for Flare 1 at a flare temperature of 1,456 degrees Fahrenheit (°F), and 2,379 cfm for Flare 2 at a flare temperature of 1,448 °F. The initial exhaust flow rate values were based on the flow rate of landfill gas to the flares in units of standard cubic feet per minute (scfm). The October

2008 performance test report did not present all information necessary to convert standard cubic feet per minute to actual cubic feet per minute.

The April 29, 2014, modeling demonstration was revised and superseded by subsequent modeling submittals. The November 14, 2014, and December 8, 2014, submittals use less conservative flow rates for Flares 1 and 2. Although less conservative than the initial flow rates, the revised flow rates are based on DEQ-approved performance test data where all parameters were monitored that allowed for calculation of an exhaust flow rate in units of actual cubic feet per minute, wet basis. Performance test summary data are contained in Attachment A of the November 14, 2014, revised modeling report submittal.

Flare exhaust parameters for the final modeling demonstration were established based on a New Source Performance Standard test (40 CFR 60 Subpart WWW) for testing conducted on March 14 and 15, 2007 on ACLF's Flare 1 and Flare 2. This test provided both standard and actual cubic feet per minute values for the exhaust flow rates. The average flow rates were calculated from three individual test runs with data obtained from test ports located in the flare jacket. The flare jacket essentially acts as a stack. There are three thermocouples located at different heights within the flare jacket to verify good combustion of the LFG is occurring. Notations on the Method 1 data collection chart indicate the test sampling port is located at a height of 5 feet from the top of the flare jacket.

The average exhaust flow rate for Flare 1 was 76,715 acfm at an average LFG flare input flow rate of 1,310.2 scfm. The average temperature at the sampling port was 1,492°F. The average temperature at the top thermocouple was 1,405°F. The average exhaust flow rate for Flare 2 was 81,295 acfm at an average LFG flare input flow rate of 1,315.7 scfm. The average temperature at the sampling port was 1413.2°F. The average temperature at the top thermocouple was 1,407.1°F.

A performance summary created by the enclosed flare manufacturer, John Zink, was included in Attachment B of the November 14, 2014, submittal. The performance summary datasheets confirmed Flares 1 and 2 stack release heights of 40 feet and exit diameters of 10 feet. At a landfill gas flow rate of 2,000 scfm and temperature of 1,400°F, the flow rate was estimated to be 111,114 acfm. This document also placed the sampling port at a height of 5 feet below the exit height of the flare shells. This indicates that ACLF used reasonably conservative flow rates in the final modeling demonstration.

DEQ concludes that the exhaust flow rates for the flares are conservative for the modeling demonstration and are appropriate values for this project's modeling demonstration. The flare exit temperatures used in the modeling are also appropriate for the modeling demonstration, reasonably reflect the conditions that exist at the point the exhaust is released to the atmosphere.

Contractor diesel-fired engine

Exhaust parameter support documentation was provided in Appendix J of the April 29, 2014, PTC application for the 990 horsepower contractor's chipper diesel-fired engine (model ID CCHIPGEN). This support documentation was the Caterpillar manufacturer specification data for a CAT 3412EDITA diesel-fired engine. The modeled exhaust flow rate was 3,439 actual cubic feet per minute, based on a 50 meter per second exit velocity and 8-inch diameter stack. This is a conservative value based on the CAT performance data sheet which listed an exhaust flow rate of 5,717 acfm and an exit temperature of 912°F. Stack height was not included in the supplied documentation, but DEQ contends the 6 foot above grade modeled release height represents a reasonable or conservative value.

DEQ determined the permit application provides adequate documentation of modeled release parameters, and those parameters are appropriate for all emission units represented in the modeling demonstration.

Table 11. EMISSIONS RELEASE PARAMETERS							
Release Point	**Source Type**	**Source Location UTM[g] Coordinates, Zone 11, NAD83**		**Stack Height (m)[a] (ft)[b]**	**Modeled Diameter (m) (ft)**	**Stack Gas Temperature (K)[c] (°F)[d]**	**Stack Gas Flow Velocity (m/sec)[e] (ft/sec)[f]**
		X- coordinate or Easting (m)[a]	**Y-coordinate or Northing (m)**				
Scenario 1							
FLARE1	Point	557,489.99	4,838,641.83	12.19 (40)	3.05 (10.0)	1084 (1492)	4.96 (16.3)
FLARE2	Point	557,494.64	4,838,635.18	12.19 (40)	3.05 (10.0)	1040 (1413)	5.26 (17.3)
CCHIPGEN	Point	558,118	4,839,245	1.83 (6)	0.20 (0.67)	768.7 (924.0)	50.0 (164.0)
Scenario 2							
HGEN1	Point	557,482.925	4,838,615.04	4.39 (14.4)	0.36 (1.20)	754.3 (898.0)	56.0 (183.6)
HGEN2	Point	557,479.776	4,838,607.42	4.39 (14.4)	0.36 (1.20)	754.3 (898.0)	56.0 (183.6)
FLARE1	Point	557,489.99	4,838,641.83	12.19 (40)	3.05 (10.0)	1084 (1492)	4.96 (16.3)
FLARE2	Point	557,494.64	4,838,635.18	12.19 (40)	3.05 (10.0)	1040 (1413)	2.61 (8.5)
CCHIPGEN	Point	558,118	4,839,245	1.83 (6)	0.20 (0.67)	768.7 (924.0)	50.0 (164.0)
Scenario 3							
HGEN1	Point	557,482.925	4,838,615.04	4.39 (14.4)	0.37 (1.20)	754.3 (898.0)	56.0 (183.6)
HGEN2	Point	557,479.776	4,838,607.42	4.39 (14.4)	0.37 (1.20)	754.3 (898.0)	56.0 (183.6)
HGEN3	Point	557,475.196	4,838,597.17	4.39 (14.4)	0.37 (1.20)	754.3 (898.0)	56.0 (183.6)
HGEN4	Point	557,472.064	4,838,589.82	4.39 (14.4)	0.37 (1.20)	754.3 (898.0)	56.0 (183.6)
FLARE1	Point	557,489.99	4,838,641.83	12.19 (40)	3.05 (10.0)	1084 (1492)	4.92 (16.1)
CCHIPGEN	Point	558,118	4,839,245	1.83 (6)	0.20 (0.67)	768.7 (924.0)	50.0 (164.0)

a. Meters.
b. Feet.
c. Kelvin.
d. Degrees Fahrenheit.
e. Meters per second.
f. Feet per second.
g. Universal Transverse Mercator

3.4 Results for Significant Impact Level Analyses

CH2M HILL did not perform Significant Impact Level (SIL) analyses for this project. DEQ's modeling protocol approval specifically requested facility-wide modeling (cumulative impact analyses) for NAAQS demonstrations associated with this project. Cumulative NAAQS impact analyses involved modeling the entire ACLF facility, consisting of Hidden Hollow Landfill and Hidden Hollow Energy sources, then adding a background concentration value to the result.

3.5 Results for Cumulative Impact Analyses

Table 12 provides results for the cumulative NAAQS impact analyses performed for criteria pollutants of 1-hour NO_2, 1-hour SO_2, 1-hour and 8-hour CO, 24-hour PM_{10}, 24-hour $PM_{2.5}$, and annual $PM_{2.5}$.

Modeling was not performed for the 3-hour average secondary SO_2 NAAQS. The 1-hour primary SO_2 NAAQS is substantially more stringent than the 3-hour average secondary SO_2 NAAQS, and DEQ did not require additional modeling to demonstrate compliance with the secondary 3-hour standard based upon compliance with the primary 1-hour standard.

The ambient impacts for the two ambient air boundary configurations are included in the results table below. The full ambient air boundary case includes impacts for receptors along and external to the Ada County Landfill property boundary, with modeled impacts that occur over all hours within a year. The partial ambient air boundary case includes impacts for receptors along the ambient air boundary and within the ACLF along roads and designated areas where the general public is allowed access during specified operating hours. Ambient impacts for the partial ambient air boundary configuration are disregarded for all periods where public access is prohibited. The higher impact for the two configurations is considered the "design value concentration" and is added to the background concentration to provide the total ambient impact for the facility to compare against the allowable NAAQS.

The ambient impacts presented in ACLF's modeling analyses for Operating Scenario 3, with the partial ambient air boundary configuration, were greater than other modeled scenarios for all pollutants and averaging periods except 1-hour SO_2 and 1-hour NO_2. These results are very conservative because they did not account for operational factors adjusting for ACLF business hours when modeling all pollutants other than 1-hour SO_2 and 1-hour NO_2. The values presented in the December 8, 2014, version of Appendix L-1 of the application are ACLF's final submittal of modeling analyses. ACLF demonstrated NAAQS compliance to DEQ's satisfaction, assessing impacts from four LFG-fired generator engines and two enclosed flares incinerating LFG at various load rates.

Table 12. RESULTS FOR CUMULATIVE IMPACT ANALYSES							
Pollutant	**Averaging Period**	**Modeled Design Value Concentration ($\mu g/m^3$)[a]**		**Background Concentration ($\mu g/m^3$)**	**Total Ambient Impact for NAAQS Compliance ($\mu g/m^3$)**	**NAAQS[b] ($\mu g/m^3$)**	**Percent of NAAQS**
		Full Ambient Air Boundary (All Hours)	**Partial Ambient Air Boundary (Landfill Operating Hours)**				
Scenario 1							
$PM_{2.5}$[c]	24-hour	1.60[f]	**1.97[f]**	20	22.0	35	63%
	Annual	0.10[g]	**0.15[g]**	6.2	6.4	12	53%
PM_{10}[d]	24-hour	1.60[h]	**1.97[h]**	73	75.0	150	50%
NO_2[e]	1-hour	133.9[i]	**140.3[i]**	Included in model[j]	140.3	188	75%
	Annual	2.01[o]	**8.19[o]**	40	48.2	100	48%
SO_2[k]	1-hour	86.4[m]	**106.3[m]**	30.22	136.5	196	70%
CO[l]	1-hour	63[n]	**185[n]**	7,060	7,245	40,000	18%
	8-hour	13[n]	**38[n]**	2,100	2,138	10,000	21%
Scenario 2							
$PM_{2.5}$	24-hour	2.04[f]	**2.50[f]**	20	22.5	35	64%
	Annual	**0.17[g]**	0.15[g]	6.2	6.4	12	53%
PM_{10}[d]	24-hour	2.04	**2.50[h]**	73	75.5	150	50%
NO_2	1-hour	133.9[i]	**140.3[i]**	Included in model[j]	140.3	188	75%
	Annual	2.1[o]	**8.2[o]**	40	48.2	100	48%
SO_2	1-hour	96.2[m]	**107.5[m]**	30.22	137.7	196	70%
CO	1-hour	378[n]	**632[n]**	7,060	7,692	40,000	19%
	8-hour	82[n]	**83[n]**	2,100	2,183	10,000	22%
Scenario 3							
$PM_{2.5}$	24-hour	3.47[f]	**9.48[f]**	20	29.5	35	84%
	Annual	0.26[g]	**0.68[g]**	6.2	6.9	12	58%
PM_{10}	24-hour	3.47[h]	**9.48[h]**	73	82.5	150	55%
NO_2	1-hour	133.9[i]	**140.3[i]**	Included in model[j]	140.3	188	75%
	Annual	2.20[o]	**25.26[o]**	40	65.3	100	65%
SO_2	1-hour	**146.1[m]**	126.5[m]	30.22	176.3	196	90%
CO	1-hour	745[n]	**1340[n]**	7,060	8,400	40,000	21%
	8-hour	164[n]	**295[n]**	2,100	2,395	10,000	24%

a. Micrograms per cubic meter.
b. National ambient air quality standards.
c. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.
d. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers.
e. Nitrogen dioxide.
f. Modeled design value is the maximum 5-year mean of 8th highest 24-hour values from each year of a 5-year meteorological dataset. The value used in the compliance demonstration is the highest 1st high value of 5 individual years—a conservative approach.
g. Modeled design value is the maximum 5-year mean of annual average values from each year of a 5-year meteorological dataset.
h. Modeled design value is the maximum of 6th highest 24-hour values from a 5-year meteorological dataset. The design value used in ACLF's demonstration was the highest 1st high value out of 5 individual years of meteorological data—a conservative approach.
i. Modeled design value is the maximum 5-year mean of 8th highest daily 1-hour maximum impacts for each year of a 5-year meteorological dataset.
j. Background NO_2 concentrations are included with the modeled output value. The individual hour background NO_2 values listed in Table 4 of this memorandum for a 24-hour period were used for the NAAQS analysis.
k. Sulfur dioxide.
l. Carbon monoxide.
m. Modeled design value is the maximum 5-year mean value of the 4th highest maximum daily 1-hour impacts for each year of a 5-year meteorological dataset.
n. Modeled design value is the maximum 2nd high impact out of five individual years of meteorological data. ACLF's modeling demonstration uses the maximum 1st high impact out of five individual years of meteorological data—a conservative approach.
o. Modeled design value is the maximum 1st high annual mean impact out of five individual years of meteorological data. ACLF's modeling used the 1st high value based on a 5-year concatenated meteorological data file. Impacts are not near NAAQS and this will not affect the compliance status.

3.6 Results for Toxic Air Pollutant Analyses

All modeled TAPs impacts were below the applicable AAC and AACC increments of Idaho Air Rules Section 585 and 586. Emissions subject to TAPs rules and requiring modeling for compliance with TAP increments included emission increases for the two landfill gas flares (increasing allowable LFG combustion from 3,350 scfm to 4,699 scfm). TAPs emitted from internal combustion engines are exempted from modeling TAPs by Idaho Air Rules Section 210.20 if that source‘s TAPs emissions are regulated under a New Source Performance Standard or National Emission Standard for Hazardous Air Pollutants.

ACLF’s TAPs modeling demonstration applied a conservative approach for modeling the flare emissions. Rather than modeling just the increase in TAPs emissions attributed to the increase in LFG combusted in the flares from 3,350 scfm to 4,699 scfm (1,349 scfm), ACLF’s modeling demonstration accounts for the entire quantity of LFG for each of the 3 operating scenarios. The worst-case is Scenario 1 with 4,699 scfm total, with 2,320 scfm combusted in Flare 1 and 2,399 scfm in Flare 2. The analyses for Scenarios 2 and 3 account for lower TAPs emissions because less LFG is combusted in the flares for those scenarios, resulting in lower TAPs impacts than for Scenario 1. Table 14 presents the predicted ambient impacts for the TAPs modeling. The larger of the two ambient air receptor cases is regarded as the design concentration for the analyses and are presented in the table below.

All design value impacts occurred under Operating Scenario #1, where maximum emission rates for both flares operating at full capacity were modeled.

The modeling demonstration included modeled impacts for ethylidene dichloride. This project’s emission rate of this chemical compound is 2.90E-03 lb/hr, per the November 14, 2014, Revised Modeling Report-Landfill Emissions Calculations – NMOC & TAP Emissions (Controlled H_2S) and Table 7. There is a non-carcinogen, dichloroethane, and a carcinogen, 1,1-dichloroethane, that share the chemical abstract service (CAS) #75-34-3. The impacts results table identifies “ethylidene dichloride” in the impacts result tables of Attachment G-2-Toxic Facility Wide Modeling Results. The November 14, 2014, submitted analyses modeled this TAP with a 24-hour averaging period. The screening emission rate limit (EL) for this chemical compound is 27 lb/hr. The emission rate of 2.90E-03 lb/hr is below the non-carcinogenic EL, thus modeling is not required for the non-carcinogenic compound.

The emission rate of 1,1-dichloroethane of 2.90E-03 lb/hr exceeds the 2.5E-04 lb/hr carcinogenic compound EL. Impacts for carcinogens are determined on an annual averaging period. The latest modeling did not contain annual averaging period modeling. DEQ performed verification runs for the Partial and Full ambient air boundary cases under Operating Scenario 1, which presents the maximum TAPs emissions rates for both flares. Scenarios 2 and 3 will produce lower impacts as evident from review of the impacts listed in Table 14. The verification analysis clearly demonstrates that the potential impacts for this pollutant are well below the allowable ambient carcinogenic increment.

Table 13. RESULTS FOR TOXIC AIR POLLUTANT ANALYSES						
Toxic Air Pollutant	**Chemical Abstract Service Number**	**Averaging Period**	**Maximum Modeled Concentration Partial Ambient Air Boundary[c] ($\mu g/m^3$)[a]**	**Maximum Modeled Concentration Full Ambient Air Boundary[d] ($\mu g/m^3$)**	**AACC Increment[b] ($\mu g/m^3$)**	**Percent of Increment**
Operating Scenario 1						
Ethylidene dichloride (1,1-dichloroethane)	75-34-3	Annual	6E-05[e]	**8E-05[e]**	3.8E-02	0.2%
1,1,2,2 –Tetrachloroethane	79-34-5	Annual	5.00E-05	**6.00E-05**	1.7E-02	0.4%
1,1,2-Trichloroethane	79-00-5	Annual	3.37E-06	**4.33E-06**	6.2E-02	0.007%
Vinylidene chloride	75-35-4	Annual	4.90E-06	**1.00E-05**	2.0E-02	0.05%
Acrylonitrile	107-13-1	Annual	1.00E-05	**2.00E-05**	1.5E-02	0.1%
Methylene chloride	75-09-2	Annual	3.10E-04	**3.90E-04**	2.4E-01	0.2%
Vinyl chloride	75-01-4	Annual	**3.00E-04**	1.50E-04	1.4E-01	0.2%
Benzene	71-43-2	Annual	3.00E-05	**4.00E-05**	1.2E-01	0.03%
Operating Scenario 2						
Ethylidene dichloride (1,1-dichloroethane)	75-34-3	Annual	<6E-05[e]	**<8E-05[e]**	3.8E-02	<0.2%
1,1,2,2 –Tetrachloroethane	79-34-5	Annual	4.00E-05	**5.00E-05**	1.7E-02	0.3%
1,1,2-Trichloroethane	79-00-5	Annual	3.06E-06	**3.59E-06**	6.2E-02	0.006%
Vinylidene chloride	75-35-4	Annual	1.92E-06	**1.00E-05**	2.0E-02	0.05%
Acrylonitrile	107-13-1	Annual	**1.00E-05**	**1.00E-05**	1.5E-02	0.07%
Methylene chloride	75-09-2	Annual	2.70E-04	**3.20E-04**	2.4E-01	0.1%
Vinyl chloride	75-01-4	Annual	1.00E-04	**1.20E-04**	1.4E-01	0.09%
Benzene	71-43-2	Annual	**3.00E-05**	**3.00E-05**	1.2E-01	0.03%
Operating Scenario 3						
Ethylidene dichloride (1,1-dichloroethane)	75-34-3	Annual	<6E-05[e]	**<8E-05[e]**	3.8E-02	<0.2%
1,1,2,2 –Tetrachloroethane	79-34-5	Annual	**2.00E-05**	**2.00E-05**	1.7E-02	0.1%
1,1,2-Trichloroethane	79-00-5	Annual	**2.63E-06**	1.24E-06	6.2E-02	0.004%
Vinylidene chloride	75-35-4	Annual	**2.43E-06**	1.81E-06	2.0E-02	0.01%
Acrylonitrile	107-13-1	Annual	**1.00E-05**	4.68E-06	1.5E-02	0.07%
Methylene chloride	75-09-2	Annual	**1.50E-04**	1.10E-04	2.4E-01	0.06%
Vinyl chloride	75-01-4	Annual	**6.00E-05**	4.00E-05	1.4E-01	0.04%
Benzene	71-43-2	Annual	**2.00E-05**	1.00E-05	1.2E-01	0.02%

a. Micrograms per cubic meter.
b. Acceptable ambient concentration for carcinogens as listed in Idaho Air Rules Section 586
c. Impacts at these receptors accounted for only during official operating hours of the landfill.
d. Impacts at these receptors are accounted for at all times.
e. DEQ sensitivity run ambient impact, highest 1st high value, annual averaging period.

3.7 DEQ Sensitivity Analyses

3.7.1 Emergency Generator Engine Testing

Emissions units identified as “GEN3” and “GEN4” are small emergency generator engines located at the Household Hazardous Waste Collection Building and the Scales Building, respectively. GEN3 is a 44 brake horsepower (bhp) diesel engine. GEN4 is an 80 bhp diesel engine. These emissions units were not modeled in the facility-wide impact analyses.

These units are exempted from the 1-hr NO_2 NAAQS demonstration for the testing and maintenance operations per DEQ policy unless DEQ’s Director determines such sources must be included to assure NAAQS compliance. The 1-hour NO_2 SIL and NAAQS modeling exemption policy does not include an exemption from modeling for ambient standards of other pollutants.

The application's emission inventory provided the following emission rates at rated capacity. Annual emissions assumed 500 hours per year for operation due to testing and maintenance and incident operations. These points were considered in decision not to require modeling for these emergency generator engines.

- GEN3 emits 0.13 lb/hr and 65 lb/year of PM_{10} and $PM_{2.5.}$ For one hour of testing and maintenance operation averaged over 24 hours per day for a 24-hour NAAQS, this equates to 0.0054 lb/hr as a modeling emission rate.

- GEN4 emits 0.20 lb/hr and 100 lb/year of PM_{10} and $PM_{2.5}$. For one hour of testing and maintenance operation averaged over 24 hours per day for a 24-hour NAAQS, this equates to 0.0054 lb/hr as a modeling emission rate.

- Potential SO_2 emissions are limited to 0.0006 lb/hr for GEN3 and 0.0010 lb/hr and for GEN4 using Ultra Low Sulfur distillate fuel, so there would be little effect on 1-hour average SO_2 impacts.

- Potential CO emissions are 0.40 lb/hr for GEN3 and 0.62 lb/hr for GEN4. The margin of compliance with the 1-hour and 8-hour CO NAAQS is large.

- Annual emissions of all criteria pollutants for the 500 hour per year limitation are low enough to conclude there will be negligible effect on annual NAAQS compliance for emission rates that are averaged over 8,760 hours per year for any annual ambient standard.

Testing and maintenance operations which are limited to a short duration of one hour or less will minimize the ambient impacts from these engines. 24-hour average $PM_{2.5}$ and PM_{10} NAAQS demonstrations account for the duration of typical testing of emergency generator engines. If the emergency generator engines are run for a single hour for testing and maintenance, an average hourly emission rate that reflects the total daily emissions spread over the 24-hour averaging period greatly reduces the impacts attributed to these sources, thereby reducing the likelihood of any issues for compliance with those NAAQS.

CH2M HILL, with consultation with ACLF, confirmed that these engines are considered emergency generator engines with typical testing and maintenance operations of 1 hour or less per day (E-mail from Rick McCormick, CH2M HILL to Darrin Mehr, DEQ, dated October 20, 2014). The pertinent text of the email is provided below:

> "Regarding the first topic for the emergency generators, we confirmed with Ada County that any testing and/or maintenance can be limited to 1-hr. The run-times are short for testing and maintenance (each less than 1-hr). For any oil-change or coolant maintenance, the engine is not operating. Please establish enforceable permit conditions for each emergency generator limited to 1-hr for maintenance and testing."

The highest 24-hour $PM_{2.5}$ and PM_{10} ambient impacts presented in the ACLF modeling demonstration were predicted to occur using the partial ambient air boundary for Scenario 3 (all 4 LFG-fired generator sets at full capacity and FLARE1 at 2,299 scfm, or 99% of requested capacity). These impacts were high due to a conservative approach of not applying operational factors for operation of sources only during ACLF business hours. To resolve any question on the margin of compliance with PM_{10} and $PM_{2.5}$ NAAQS for Operating Scenario 3—Partial AAB, DEQ conducted a sensitivity run to identify the ambient

impacts of the facility-wide emissions with the appropriate operational factors, the design values allowed by EPA policy, and a 5-year concatenated meteorological data set. The results are listed in Table 14.

Table 14. OPERATING SCENARIO 3 PARTIAL AMBIENT AIR BOUNDARY IMPACTS FOR PM_{10} and $PM_{2.5}$

Pollutant	Averaging Period	Modeled Design Value Concentration For Entire Project ($\mu g/m^3$)[a]	Impact Rank	Design Impact Plus Background ($\mu g/m^3$)	NAAQS[f] ($\mu g/m^3$)	Impact Contribution to the Design Concentration Available to GEN3 and GEN4 ($\mu g/m^3$)
$PM_{2.5}$[c]	24-hour	1.27	8th high[e]	1.27 + 20 = 21.3	35	13.7
PM_{10}[d]	24-hour	2.96	6th high[e]	2.96 + 73 = 76.0	150	74

a. Micrograms per cubic meter.
b. Universal Transverse Mercator coordinates, given in meters.
c. Particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers.
d. Particulate matter with an aerodynamic diameter less than or equal to 10 micrometers.
e. Run with a 5-year concatenated meteorological data file.
f. National Ambient Air Quality Standards.

Based on the size of these generator engines, consideration of ACLF's testing and maintenance operations, and the margin of compliance with NAAQS not covered by an exemption policy, DEQ determined additional modeling analyses were not warranted.

3.7.2 Carcinogenic TAP Compliance

DEQ performed a verification analysis for the carcinogenic TAP increment for ethylidene dichloride—also referred to as 1,1-dichloroethane, CAS #75-34-3, which had been evaluated with a 24-hour averaging period instead of an annual averaging period. Dichloroethane is a non-carcinogenic TAP with the same CAS identification number. ACLF's submitted modeling analyses for other TAPs clearly showed that modeling only Operating Scenario 1 would be necessary to assess worst-case ambient impacts and confirm that the project's impacts were well below the increments. Both flares operating at requested capacity are reflected in Operating Scenario 1. Flaring operations—and thus, emissions—are reduced for Scenarios 2 and 3. The results of the verification analysis confirmed annual average impacts were well below the allowable increment and are listed below in Table 15.

Table 15. Ethylidene Dichloride Verification Run Ambient Impacts

Operating Scenario/ Receptor Grid	Averaging Period	AACC[a] ($\mu g/m^3$)[b]	Modeled Design Value Concentration ($\mu g/m^3$)	Impact Rank	Receptor UTM[c] Coordinates, Zone 11		
					X-Easting (m)[d]	Y-Northing (m)	Receptor Elevation (m)
Scenario 1 / Partial AAB Grid	Annual	3.8E-02	6E-05	1st High	558,004.00	4,838,455.00	921.41
Scenario 1 / Full AAB Grid	Annual	3.8E-02	8E-05	1st High	558,662.62	4,838,209.27	946.98

a. Acceptable ambient concentration for carcinogens.
b. Micrograms per cubic meter.
c. Universal Transverse Mercator coordinates.
d. Meters.

4.0 Conclusions

The ambient air impact analyses demonstrated to DEQ's satisfaction that emissions from the proposed project will not cause or significantly contribute to a violation of any ambient air quality standard.