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<td><strong>Submission Date:</strong></td>
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<td><strong>Docketed Date:</strong></td>
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February 28, 2014

VIA E-FILING

El Segundo Energy Center Petition to Amend (00-AFC-14)
Christine Stora, Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

Re: El Segundo Energy Center Petition to Amend (00-AFC-14)
Supplemental Worst-Case Analysis Data for Data Request Set 3 (Nos. 91 and 92)

Dear Ms. Stora:

On February 11, 2014, California Energy Commission staff ("Staff") requested certain data to supplement El Segundo Energy Center LLC’s ("ESEC LLC") October 31, 2013 responses to Data Requests 91 and 92 (CEC TN# 201092) for Staff’s analysis of the El Segundo Energy Center Petition to Amend (00-AFC-14). Accordingly, ESEC LLC has enclosed the theoretical analyses of worst-case and alternative off-site, ammonia release scenarios requested by Staff. In addition, under separate cover, ESEC LLC has provided supplemental responses with respect to the ammonia underground storage tank and the ammonia totes. Please contact me, my colleague Allison Harris, or George Piantka at NRG Energy, if there are questions about the enclosed information.

Locke Lord LLP

By: ____________________________________
John A. McKinsey
Attorneys for El Segundo Energy Center LLC

JAM: awph
Enclosures
February 28, 2014

Mr. George Piantka
NRG Energy, West Region
5790 Fleet Street, Suite 200
Carlsbad, California  92008

Re:  Supplemental Data Related to Data Request DR 91 and 92; El Segundo Energy Center Petition to Amend (00-AFC-14): Aqueous Ammonia Release Scenario Offsite Consequence Analysis
El Segundo Generating Station, 301 Vista Del Mar, El Segundo, California

Dear Mr. Piantka:

URS Corporation (URS) is herein pleased to present the results of an alternative Offsite Consequence Analysis (OCA) of the worst-case aqueous ammonia release scenario identified in the Risk Management Plan (RMP) for the El Segundo Generating Station (ESGS) dated January 15, 2013. The release scenarios were defined using the General Guidance on Risk Management Programs for Chemical Accident Prevention issued by the U.S. Environmental Protection Agency (EPA), dated March 2009. The OCA in the January 13, 2013 RMP used EPA's RMP*Comp modeling software to simulate the dispersion of ammonia into the atmosphere and the resulting distance to the 150 parts per million (ppm) endpoint concentration. The endpoint for the worst-case release scenario was estimated to be 0.2 mile (approximately 350 yards) from release point. In this alternative OCA, the same release scenarios were used to estimate the resulting distance to the alternative level of 75 ppm, using the Area Locations of Hazardous Atmospheres (ALOHA) model to simulate the dispersion of ammonia. The alternative analysis of the 75 ppm ammonia endpoint concentration endpoint was requested by the California Energy Commission (CEC) as part of the Hazardous Materials technical analysis for the El Segundo Energy Center Petition to Amend (Docket 00-AFC-14C).

Worst-Case Release Scenario

The RMP identified the worst-case scenario as the complete release of aqueous ammonia (29.4% NH₄OH) in a quantity equal to the liquid capacity of the larger of the two pipelines, the Units 3 and 4 pipeline. The release is assumed to occur at the lowest point in the aboveground pipeline (i.e., the bottom of the site access road) which results in a release of 277 gallons.

This scenario was the basis for ammonia dispersion modeling using the ALOHA model currently available from EPA (Version 5.4.4 released August 2013) and the worst-case meteorological data required by EPA. This worst-case release analysis relies on numerous conservative assumptions that are extremely unlikely to occur in concert, such as highest possible initial evaporation rate, maximum ambient temperature, lowest wind speeds, and stable atmospheric conditions that would result in the highest ammonia concentrations at the furthest distances from the release point. Table 1 provides a summary of the parameters input into the ALOHA model for the worst-case release scenario. ALOHA calculated the rate of ammonia release from the resulting pooled liquid and the resulting distance to the selected 75 ppm endpoint concentration. Enclosed are the ALOHA Text Summary and ALOHA Toxic Threat Zone reports that identify an 889-yard distance from the release point to the 75 ppm endpoint concentration for the worst-case release. The endpoint radius was then illustrated on a satellite photograph of ESGS (enclosed Figure 1).
Table 1: Worst-Case Release Scenario Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Used</td>
<td>ALOHA®, Version 5.4.4 released August 2013</td>
</tr>
<tr>
<td>Site Location</td>
<td>El Segundo, California</td>
</tr>
<tr>
<td>Site Elevation</td>
<td>20 feet (approximate elevation of Power Blocks)</td>
</tr>
<tr>
<td>Latitude and Longitude</td>
<td>33.908773N, 118.524047W (release from piping riser at the bottom of the access road)</td>
</tr>
<tr>
<td>Chemical Name</td>
<td>Aqueous Ammonia</td>
</tr>
<tr>
<td>Solution Strength</td>
<td>29.4% (by weight)</td>
</tr>
<tr>
<td>Model Default</td>
<td>Normal boiling point, molecular weight, safe limits of exposure</td>
</tr>
<tr>
<td>Infiltration Building Parameters</td>
<td>Unsheltered surroundings</td>
</tr>
<tr>
<td>Wind</td>
<td>1.5 m/s from the southwest, measured at 3 meter height</td>
</tr>
<tr>
<td>Ground Roughness</td>
<td>Urban</td>
</tr>
<tr>
<td>Cloud Cover</td>
<td>Partly cloudy - 5 tenths (model default)</td>
</tr>
<tr>
<td>Air Temperature</td>
<td>110°F (highest daily maximum temperature ever recorded based on available data from the Western Regional Climate Center’s website for the Los Angeles WSO Airport Weather Station No. 045114)</td>
</tr>
<tr>
<td>Stability Class</td>
<td>F (model override)</td>
</tr>
<tr>
<td>Inversion Height</td>
<td>None</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>72% (average annual humidity median between morning and afternoon at Los Angeles WSO Airport)</td>
</tr>
<tr>
<td>Puddle Area</td>
<td>1,122 ft² (277 gallon puddle spread out to a 1 cm depth)</td>
</tr>
<tr>
<td></td>
<td>[(277 gal/7.48 ft²/gal)/0.033 cm/ft.)</td>
</tr>
<tr>
<td>Puddle Volume</td>
<td>277 gallons (piping rupture)</td>
</tr>
<tr>
<td>Ground Type</td>
<td>Default soil (no selection for asphalt)</td>
</tr>
<tr>
<td>Ground Temperature</td>
<td>Use air temperature if unknown: 110°F</td>
</tr>
<tr>
<td>Initial Puddle Temperature</td>
<td>70°F (assumed based on low temperature associated with underground tank storage)</td>
</tr>
<tr>
<td>Release Duration</td>
<td>58 minutes (limited by default)</td>
</tr>
<tr>
<td>Calculating Options</td>
<td>Let ALOHA decide (select if unsure)</td>
</tr>
</tbody>
</table>

Alternative Release Scenario

As an even more conservative alternative to the worst-case release scenario, the RMP identified the complete rupture of the Units 3 and 4 pipeline with the additional quantity released from the two supply pumps operating at full capacity [7 gallons per minute (gpm)] for a duration of 15 minutes before the Control Room remotely shuts off the pumps. The release is assumed to occur at the same lowest point in the aboveground pipeline, as that of the worst-case release scenario, which results in a release of 435 gallons. This alternative scenario is not expected to occur, but instead represents an extreme range of possible combinations of events.

This alternative scenario was input into ALOHA using more realistic meteorological data for the actual site conditions, as allowed by EPA for alternative release scenarios. This scenario included a higher wind speed and less stable atmospheric condition which resulted in lower ammonia endpoint concentrations at closer distances from the release point than that of the worst-case release. The enclosed Table 2 summarize the parameters input into ALOHA for the alternative release scenario to calculate the rate of ammonia release from the resulting pooled liquid and the distance to the 75 ppm ammonia endpoint concentration.

Enclosed are the ALOHA Text Summary and ALOHA Toxic Threat Zone reports that identify a 426 yard distance from the release point to 75 ppm. The endpoint radius was then illustrated on a satellite photograph of ESGS (enclosed Figure 1).
Table 2: Alternative Release Scenario Parameters

<table>
<thead>
<tr>
<th>Model Used:</th>
<th>ALOHA®, Version 5.4.4 released August 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Location:</td>
<td>El Segundo, California</td>
</tr>
<tr>
<td>Site Elevation:</td>
<td>20 feet (approximate elevation of Power Blocks)</td>
</tr>
<tr>
<td>Latitude and Longitude:</td>
<td>33.908773N, 118.524047W (release from piping riser at the bottom of the access road)</td>
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<tr>
<td>Chemical Name:</td>
<td>Aqueous Ammonia</td>
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<tr>
<td>Solution Strength:</td>
<td>29.4% (by weight)</td>
</tr>
<tr>
<td>Model Default:</td>
<td>Normal boiling point, molecular weight, safe limits of exposure</td>
</tr>
<tr>
<td>Infiltration Building Parameters:</td>
<td>Unsheltered surroundings</td>
</tr>
<tr>
<td>Wind:</td>
<td>1.5 m/s from the southwest, measured at 3 meter height</td>
</tr>
<tr>
<td>Ground Roughness:</td>
<td>Urban</td>
</tr>
<tr>
<td>Cloud Cover:</td>
<td>Partly cloudy, 5 tenths (model default)</td>
</tr>
<tr>
<td>Air Temperature:</td>
<td>110°F (highest daily maximum temperature ever recorded based on available data from the Western Regional Climate Center’s website for the Los Angeles WSO Airport Weather Station No. 045114)</td>
</tr>
<tr>
<td>Stability Class:</td>
<td>C (model calculated)</td>
</tr>
<tr>
<td>Inversion Height:</td>
<td>None</td>
</tr>
<tr>
<td>Relative Humidity:</td>
<td>72% (average annual humidity median between morning and afternoon at Los Angeles WSO Airport)</td>
</tr>
<tr>
<td>Puddle Area:</td>
<td>1,762 ft² (435 gallon puddle spread out to a 1 cm depth)</td>
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<tr>
<td>Puddle Volume:</td>
<td>435 gallons (piping rupture)</td>
</tr>
<tr>
<td>Ground Type:</td>
<td>Default soil (no selection for asphalt)</td>
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<tr>
<td>Ground Temperature:</td>
<td>Use air temperature if unknown: 110°F</td>
</tr>
<tr>
<td>Initial Puddle Temperature:</td>
<td>70°F (assumed based on low temperature associated with underground tank storage)</td>
</tr>
<tr>
<td>Release Duration:</td>
<td>1 hour (limited by default)</td>
</tr>
<tr>
<td>Calculating Options:</td>
<td>Let ALOHA decide (select if unsure)</td>
</tr>
</tbody>
</table>

Offsite Analysis

The analysis of this alternative worst-case release scenario results in an endpoint radius of 889 yards from the release point. As illustrated in Figure 1, offsite areas include the adjoining Vista Del Mar Boulevard, Chevron Oil Refinery, public beach and California Coastal National Monument, and a portion of the El Porto residential neighborhood of the City of Manhattan Beach immediately to the south of ESGS.

Under the analysis of this alternative worst-case release scenario, an endpoint radius of 426 yards from the release point is evidenced. As illustrated in Figure 1, offsite areas include the adjoining Vista Del Mar Boulevard, Chevron Oil Refinery, and public beach and California Coastal National Monument, but would not reach the El Porto residential neighborhood south of ESGS.

This OCA takes into account numerous conservative assumptions that have likely resulted in a significant over-estimation of the likely predicted distances to toxic endpoints. Notable is the stable atmospheric conditions used that are significantly different from those normally experienced at the site, including wind that is predominantly from the west at significantly higher speeds than the 1.5 meter/second speed used in the worst-case release modeled.
Should you have any further questions or wish to discuss this, please do not hesitate to contact me at (714) 265-3134.

Sincerely,

**URS Corporation**

Tariq Hussain  
Vice President

Enclosures as noted
Figure 1

NRG ESGS OCA

Worst-Case and Alternative Case Modelling
SITE DATA:
Location: EL SEGUNDO, CALIFORNIA  
Building Air Exchanges Per Hour: 0.57 (unsheltered single storied)  
Time: February 17, 2014  1214 hours PST (user specified)

CHEMICAL DATA:
Chemical Name: AQUEOUS AMMONIA  
Solution Strength: 29.4% (by weight)  
Ambient Boiling Point: 80.5° F  
Partial Pressure at Ambient Temperature: greater than 1 atm  
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%  
Hazardous Component: AMMONIA  
Molecular Weight: 17.03 g/mol  
AEGL-1 (60 min): 30 ppm  
AEGL-2 (60 min): 160 ppm  
AEGL-3 (60 min): 1100 ppm  
IDLH: 300 ppm  
LEL: 150000 ppm  
UEL: 280000 ppm

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
Wind: 1.5 meters/second from SW at 3 meters  
Ground Roughness: urban or forest  
Cloud Cover: 5 tenths  
Air Temperature: 110° F  
Stability Class: F (user override)  
Relative Humidity: 72%

SOURCE STRENGTH:
Evaporating Puddle (Note: chemical is flammable)  
Puddle Area: 1122 square feet  
Puddle Volume: 277 gallons  
Ground Type: Default soil  
Ground Temperature: 110° F  
Initial Puddle Temperature: 70° F  
Release Duration: 58 minutes  
Max Average Sustained Release Rate: 77.7 pounds/min  
Total Amount Hazardous Component Released: 606 pounds

WORST CASE RELEASE SCENARIO
CATASTROPHIC RELEASE OF 29.4% NH₄OH FROM THE UNITS 3 AND 4  
PIPELINE AT ITS LIQUID VOLUME CAPACITY
Time: February 17, 2014  1214 hours PST (user specified)

Chemical Name: AQUEOUS AMMONIA
Solution Strength: 29.4% (by weight)

Hazardous Component: AMMONIA
Wind: 1.5 meters/second from SW at 3 meters

THREAT ZONE:
Model Run: Gaussian
Red : 889 yards --- (75 ppm)
Orange: 612 yards --- (160 ppm = AEGL-2 [60 min])
Yellow: 1409 yards --- (30 ppm = AEGL-1 [60 min])

---

greater than 75 ppm
greater than 160 ppm (AEGL-2 [60 min])
greater than 30 ppm (AEGL-1 [60 min])
wind direction confidence lines
SITE DATA:
Location: EL SEGUNDO, CALIFORNIA
Building Air Exchanges Per Hour: 0.57 (unsheltered single storied)
Time: February 17, 2014  1341 hours PST (user specified)

CHEMICAL DATA:
Chemical Name: AQUEOUS AMMONIA
Solution Strength: 29.4% (by weight)
Ambient Boiling Point: 80.5° F
Partial Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%
Hazardous Component: AMMONIA               Molecular Weight: 17.03 g/mol
AEGL-1 (60 min): 30 ppm      AEGL-2 (60 min): 160 ppm     AEGL-3 (60 min): 1100 ppm
IDLH: 300 ppm             LEL: 150000 ppm           UEL: 280000 ppm

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
Wind: 1.5 meters/second from SW at 3 meters
Ground Roughness: urban or forest    Cloud Cover: 5 tenths
Air Temperature: 110° F                Stability Class: C
No Inversion Height                         Relative Humidity: 72%

SOURCE STRENGTH:
Evaporating Puddle (Note: chemical is flammable)
Puddle Area: 1762 square feet         Puddle Volume: 435 gallons
Ground Type: Default soil            Ground Temperature: 110° F
Initial Puddle Temperature: 70° F
Release Duration: ALOHA limited the duration to 1 hour
Max Average Sustained Release Rate: 111 pounds/min
                                      (averaged over a minute or more)
Total Amount Hazardous Component Released: 929 pounds

ALTERNATIVE RELEASE SCENARIO
RELEASE OF 29.4% NH₄OH FROM UNITS 3 AND 4 PIPELINE WITH SUPPLY PUMPS ACTIVE AND A DELAYED RESPONSE TIME
Time: February 17, 2014  1341 hours PST (using computer's clock)

Chemical Name: AQUEOUS AMMONIA
Solution Strength: 29.4% (by weight)

Hazardous Component: AMMONIA
Wind: 1.5 meters/second from SW at 3 meters

THREAT ZONE:
Model Run: Gaussian
Red   : 426 yards --- (75 ppm)
Orange: 301 yards --- (160 ppm = AEGL-2 (60 min))
Yellow: 617 yards --- (30 ppm = AEGL-1 (60 min))

---

greater than 75 ppm
greater than 160 ppm (AEGL-2 [60 min])
greater than 30 ppm (AEGL-1 [60 min])
--- wind direction confidence lines