DOCKETED

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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

URS

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% NH_4OH) 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).

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Table 1: Worst-Case Release Scenario Parameters

Model Used:	ALOHA®, Version 5.4.4 released August 2013
Site Location:	El Segundo, California
Site Elevation:	20 feet *(approximate elevation of Power Blocks)*
Latitude and Longitude:	33.908773N, 118.524047W *(release from piping riser at the bottom of the access road)*
Chemical Name:	Aqueous Ammonia
Solution Strength:	29.4% (by weight)
Model Default:	Normal boiling point, molecular weight, safe limits of exposure
Infiltration Building Parameters:	Unsheltered surroundings
Wind:	1.5 m/s from the southwest, measured at 3 meter height
Ground Roughness:	Urban
Cloud Cover:	Partly cloudy - 5 tenths *(model default)*
Air Temperature:	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)*
Stability Class:	F *(model override)*
Inversion Height:	None
Relative Humidity:	72% *(average annual humidity median between morning and afternoon at Los Angeles WSO Airport)*
Puddle Area:	1,122 ft^2 *(277 gallon puddle spread out to a 1 cm depth) [(277 gal/7.48 ft^3/gal)/0.033 cm/ft.)]*
Puddle Volume:	277 gallons *(piping rupture)*
Ground Type:	Default soil *(no selection for asphalt)*
Ground Temperature:	Use air temperature if unknown: 110°F
Initial Puddle Temperature:	70°F *(assumed based on low temperature associated with underground tank storage)*
Release Duration:	58 minutes *(limited by default)*
Calculating Options:	Let ALOHA decide (select if unsure)

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

Model Used:	ALOHA®, Version 5.4.4 released August 2013
Site Location:	El Segundo, California
Site Elevation:	20 feet *(approximate elevation of Power Blocks)*
Latitude and Longitude:	33.908773N, 118.524047W *(release from piping riser at the bottom of the access road)*
Chemical Name:	Aqueous Ammonia
Solution Strength:	29.4% (by weight)
Model Default:	Normal boiling point, molecular weight, safe limits of exposure
Infiltration Building Parameters:	Unsheltered surroundings
Wind:	1.5 m/s from the southwest, measured at 3 meter height
Ground Roughness:	Urban
Cloud Cover:	Partly cloudy, 5 tenths *(model default)*
Air Temperature:	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)*
Stability Class:	C *(model calculated)*
Inversion Height:	None
Relative Humidity:	72% *(average annual humidity median between morning and afternoon at Los Angeles WSO Airport)*
Puddle Area:	1,762 ft^2 *(435 gallon puddle spread out to a 1 cm depth) [(435 gal/7.48 ft^3/gal)/0.033 cm/ft.)]*
Puddle Volume:	435 gallons *(piping rupture)*
Ground Type:	Default soil *(no selection for asphalt)*
Ground Temperature:	Use air temperature if unknown: 110°F
Initial Puddle Temperature:	70°F *(assumed based on low temperature associated with underground tank storage)*
Release Duration:	1 hour *(limited by default)*
Calculating Options:	Let ALOHA decide (select if unsure)

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.

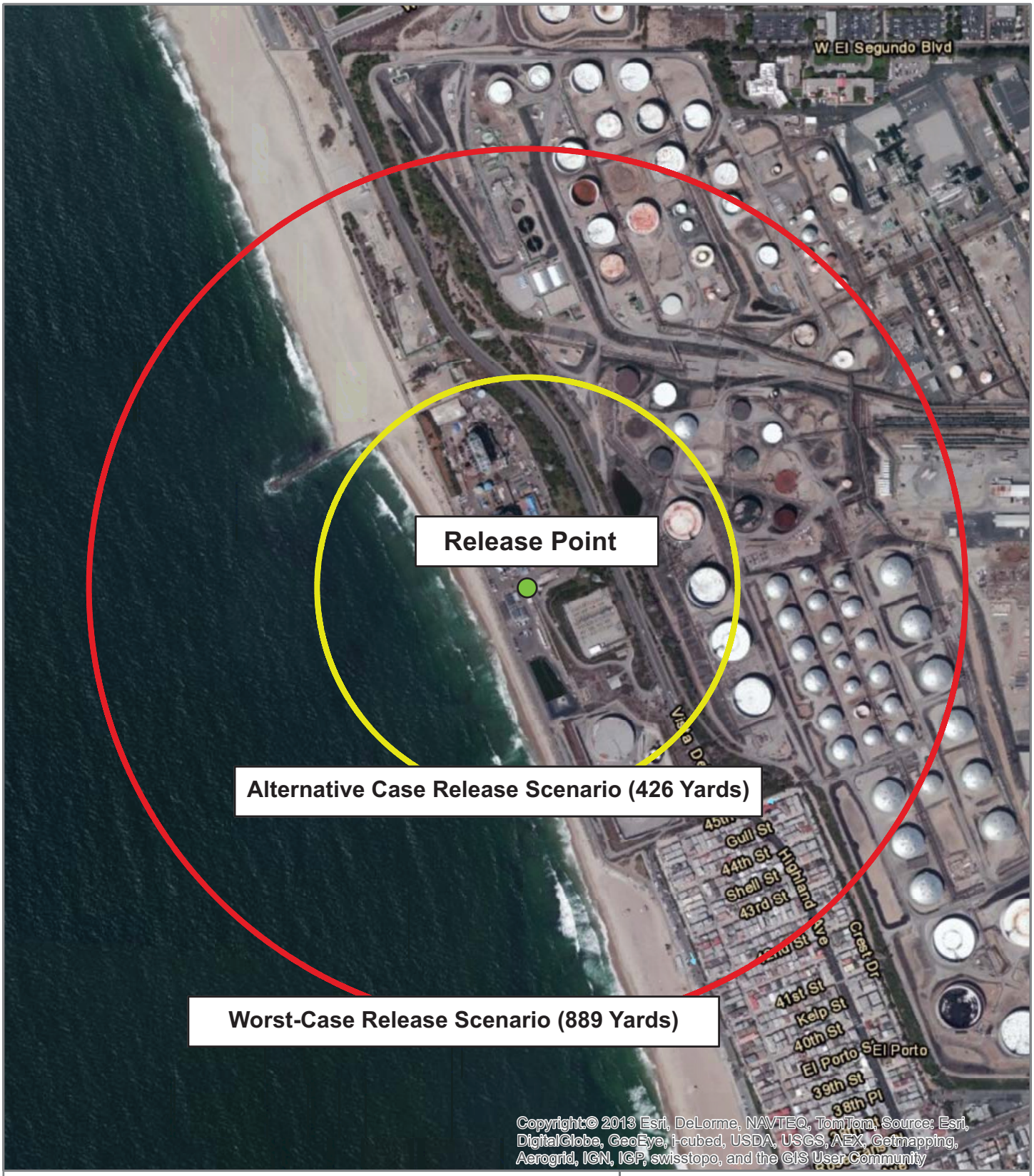
Should you have any further questions or wish to discuss this, please do not hesitate to contact me at (714) 265-3134.

Sincerely,

URS Corporation

Tariq Hussain
Vice President

Enclosures as noted



N

0 100 200 400 Yards

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)
  No Inversion Height                    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
     (averaged over a minute or more)
  Total Amount Hazardous Component Released: 606 pounds
```

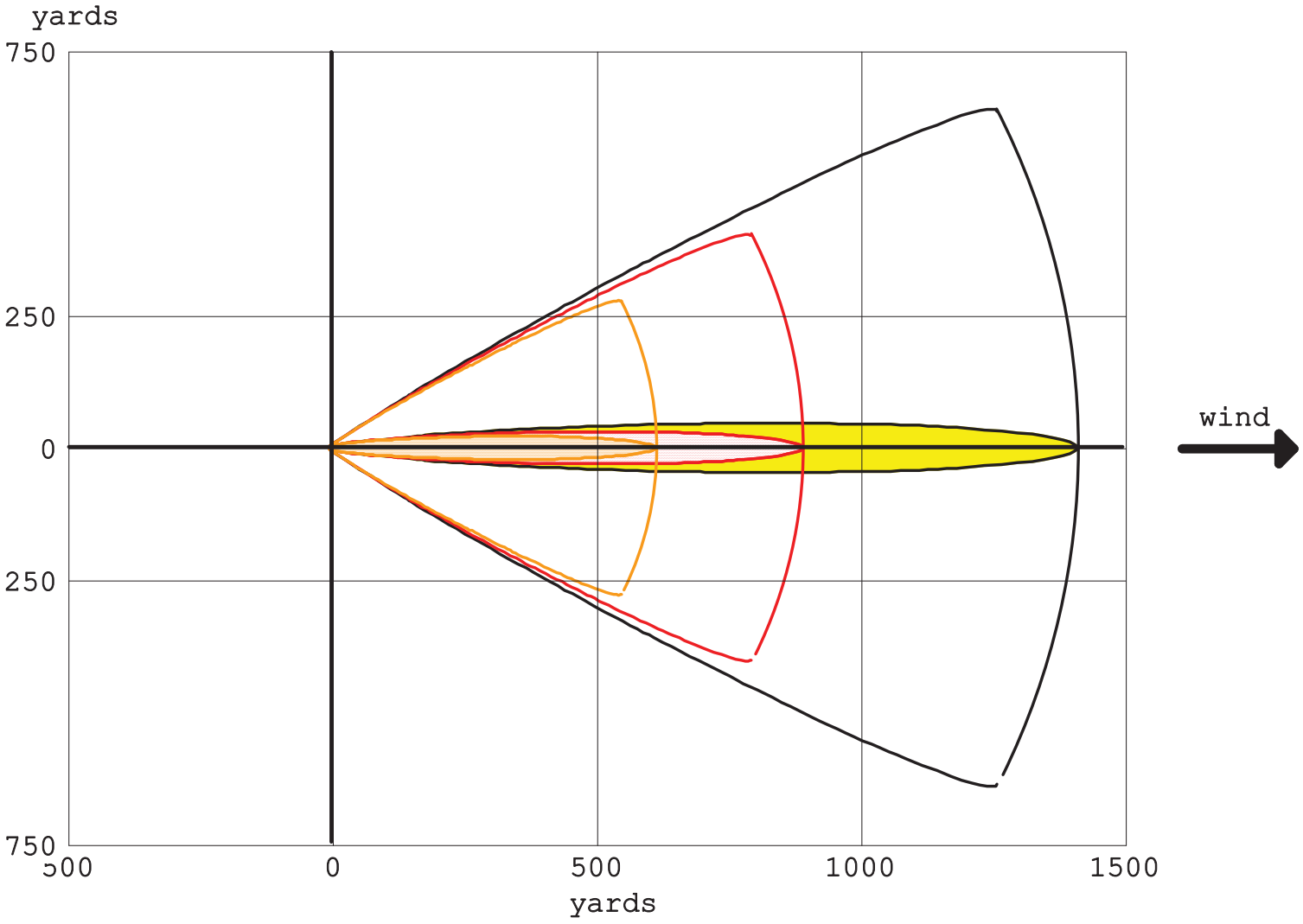
WORST CASE RELEASE SCENARIO
CATASTROPHIC RELEASE OF 29.4% NH_4OH FROM THE UNITS 3 AND 4
PIPELINE AT ITS LIQUID VOLUME CAPACITY

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))



```
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% NH_4OH 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))