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SECTION ACRONYMS/ABBREVIATIONS

ACRONYM/ ABBREVIATION	DEFINITION
Cal-ARP	California Accidental Release Prevention
CalTrans	California Department of Transportation
CCR	California Code of Regulations
CFR	Code of Federal Regulations
CEQA	California Environmental Quality Act
CUPA	Certified Unified Program Agency
DOT	United States Department of Transportation
DPLU	Department of Planning and Land Use
ERPG-2	Emergency Response Planning Guideline Level 2
HDPE	High-Density Polyethylene
MSDS	Material Safety Data Sheets
NO_X	Nitrogen Oxides
ppmv	Parts per million by volume
RMP	Risk Management Plan
SCR	Selective Catalytic Reduction
SDG&E	San Diego Gas and Electric
SPCC	Spill Prevention, Control and Countermeasures
SR	State route
STPEL	Short-Term Public Emergency Limit

6.15 HAZARDOUS MATERIALS HANDLING

This section identifies hazardous materials that will be used for the Project, measures in place for safe handling of these materials, and an evaluation of potential impacts. Design features have been incorporated into the Project regarding the storage and use of hazardous materials to minimize the potential for impacts. After a hazardous material arrives onsite and is used, it may turn into a hazardous waste, requiring disposal or treatment at an appropriately licensed facility. Hazardous wastes are discussed in Section 6.14 - Waste Management.

Aqueous ammonia is the only hazardous material that will be present onsite in a quantity requiring a Risk Management Plan (RMP) under California Accidental Release Prevention (Cal-ARP) regulations. The aqueous ammonia to be used onsite will not be concentrated enough to require an RMP under the Federal regulations, but State regulations are more stringent. Key design features of the Project that keep potential impacts of aqueous ammonia storage below a level of significance include the following:

- Choice of aqueous, rather than anhydrous, form of ammonia to reduce consequences if there were an accidental release.
- Choice of 19.0 percent (by weight) aqueous ammonia concentrations to further reduce potential hazard from the usual commercial concentration of 29.4 percent (by weight).
- Secondary containment at the aqueous ammonia storage tank and truck unloading facility, designed to limit volatilization from the aqueous ammonia in the event of an accidental release.

Worker safety programs described in Section 6.17 will address hazardous materials storage locations, emergency response procedures, employee training requirements, hazard recognition, fire control procedures, hazard communications training, personal protection equipment training and release reporting requirements. The program of employee training for safe handling of hazardous materials will include both initial and refresher training to assure that appropriate personnel are kept up to date on coordination with response agencies, proper use of onsite emergency response equipment, and hazardous materials information contained in the Business Plan, and Spill Prevention, Control and Countermeasure (SPCC) Plan. The Business Plan will contain detailed instructions for plant personnel to follow in the event of a hazardous material release, fire, flood, earthquake or explosion. Maps, diagrams, contacts, teams, first aid and a description of the Incident Command System will be included.

6.15.1 Existing Conditions

The Site is located on a former citrus grove located in an unincorporated area of San Diego County. There is currently no routine use of hazardous materials at the Site.

Transportation corridors, including Interstate 15 and SR 76, carry truck traffic transporting hazardous materials. A regional natural gas pipeline corridor occurs near the intersection of SR 76 and Rice Canyon road.

Section 112(r) of the Clean Air Act established the federal program to manage the risks of hazardous materials and the potential offsite consequences of an accidental release. The California Office of Emergency Services established the Cal-ARP Program to carry out the federal requirements. The Cal-ARP Program specifies those hazardous materials and quantities that require preparation of a RMP and analysis of offsite consequences.

The Cal-ARP Program defines three program levels with different requirements, depending on the accident history and potential impact of releases of regulated substances. The Program requires that the owner or operator coordinate closely with the administering agency to determine the appropriate level of documentation required for an RMP. At a minimum, the RMP includes one worst-case release scenario and offsite consequence analysis for each process utilizing a Regulated Substance, a 5-year accident history for the process, assurance that response actions have been coordinated with local emergency planning and response agencies, and certification that no additional measures are necessary to prevent offsite impacts from accidental releases.

Aqueous ammonia is the only hazardous material that will be stored at the site in quantities in excess of Cal-ARP thresholds. Based on the analysis of the worst-case and alternative release scenarios outlined in Section 6.15.2.2, the Project qualifies for Program 1 under Cal-ARP. Under Program 1, an RMP will be developed and approved prior to the arrival of aqueous ammonia at the Site. This RMP will include the following minimum requirements:

- Description of the worst-case scenario and offsite consequence analysis (see Section 6.15.2.2).
- Documentation that the nearest public receptor(1) is beyond the distance to the toxic endpoint for aqueous ammonia.
- Documentation that, during the past 5 years, the processes using aqueous ammonia have had no accidental release that caused offsite impacts.(2)
- Assurance that response actions have been coordinated with local emergency planning and response agencies.
- Certification that "no additional measures are necessary to prevent offsite impacts from accidental releases."

There are no schools, hospitals, day-care facilities, emergency response facilities nor long-term health care facilities located near of the Site. The nearest public receptor is a single-family residence located approximately 0.4 miles northwest of the Site. Land uses in the Site vicinity are identified in Section 6.9 – Land Use.

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(1) A public receptor is defined as "...offsite residences, institutions (e.g., schools, hospitals), industrial, commercial, and office buildings, … parks, or recreational areas inhabited or occupied by the public at any time without restriction by the stationary source where members of the public could be exposed to toxic concentrations, radiant heat, or overpressure, as a result of an accidental release."

(2) Offsite impacts for the purpose of the 5-year accidental release history include death, injury, or response or restoration activities for an exposure of an environmental receptor (CCR Title 19, Division 2, Chapter 4.5, Section 2735.4).

6.15.2 Impacts

Significance criteria were determined on the basis of the CEQA Guidelines, Appendix G, Environmental Checklist Form, and on performance standards and thresholds adopted by responsible agencies. An impact may be considered significant if a project:

- Creates a significant hazard to the public or the environment through the routine transport, use or disposal of a hazardous material.
- Creates a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of a hazardous material into the environment.
- Emits hazardous emissions or involves handling a hazardous material, substance or waste within 1/4 mile of an existing or proposed school.
- Is located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, creates a significant hazard to the public or the environment.
- Impairs implementation of, or physically interferes with, an adopted emergency response plan or emergency evacuation plan.

Hazardous materials that will be used or stored for ongoing Project operations include aqueous ammonia, petroleum products, flammable and compressed gases, and minor amounts of paints, solvent and other materials required for plant maintenance.

Hazardous materials will be transported to the Project by licensed vendors. Because these hazardous materials are transported in interstate commerce, they are not the responsibility of an individual customer (e.g., Orange Grove Energy) but, instead, are regulated under transportation laws and regulations administered by the United States Department of Transportation (DOT) and the California Department of Transportation (Caltrans).

Ammonia is needed for the selective catalytic reduction (SCR) system to reduce nitrogen oxides produced by natural gas combustion. The 19 percent concentration aqueous ammonia has been selected for the Project due to its more basic safe handling requirements compared to more concentrated aqueous solutions or anhydrous ammonia, which is the pressurized gaseous form of ammonia.

Specific features have been incorporated into the Project design to keep potential impacts below a level of significance, as shown in the quantitative offsite consequence analysis (see Section 6.15.2.2). Alternative engineering design features that provide equivalent or superior protection against potential offsite impacts may be used in final design and construction of aqueous ammonia storage and handling facilities.

Potentially significant impacts will be avoided because hazardous materials will be transported, handled, used and disposed of in ways that prevent the release of these materials. An accidental release can only occur if hazardous materials are handled improperly or if a catastrophic event occurs. Although the probability of such event occurring is extremely low, design features have been included in the Project to reduce potential impacts to a level that is less than significant.

Potential offsite impacts of a unforeseen aqueous ammonia release are evaluated in terms of the ground-level concentrations. In the analysis of the offsite consequences of a hypothesized accidental release, a significant impact will not occur if the toxic or flammable endpoint (i.e., Emergency Response Planning Guideline Level 2 [ERPG-2] concentration) is less than the distance to the nearest public receptor.

Level-of-concern concentrations used to characterize potential public health impacts associated with the hypothetical release of aqueous ammonia include:

- ERPG-2: The ERPG-2 concentration for ammonia is 150 ppm, averaged over 1 hour (AIHA, 2006). It is defined as the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing irreversible or other serious health effects or symptoms that could impair an individual's ability to take protective action.
- Short-Term Public Emergency Limit (STPEL): The STPEL is a concentration set by the National Research Council at 75 ppmv, averaged over 30 minutes. The Commission uses this concentration as a guideline to assess potential acute health impacts due to ammonia exposures. Concentrations below 75 ppm for 30 minutes are believed to have no human health or environmental impacts and, therefore, are insignificant.

6.15.2.1 Construction Impacts

During Project construction, hazardous materials stored onsite will include materials such as paints, coatings and adhesives, compressed gasses, and petroleum projects. These materials will be stored in a locked utility shed or secured in a fenced area and protected from weather. Fuels, lubricants and other materials needed for operation of construction equipment will be transported to the Site on an as-needed basis by contractors.

Contractors will be required to provide qualified personnel that are trained in their job duties for construction including appropriate handling of hazardous materials to comply with applicable laws and regulations. During construction, an onsite safety supervisor will be designated to implement health and safety programs and, if necessary, to contact emergency response personnel and the nearest hospital. Material Safety Data Sheets (MSDS) will be kept onsite for each chemical used at the plant, and construction employees will be aware of their location and content.

Construction contractors for the Project will be required to have or develop standard operating procedures for servicing and fueling construction equipment. These procedures will, at a minimum, include the following:

- No smoking, open flames or welding will be allowed in fueling/service areas.
- Fueling, service and maintenance will be conducted only by trained personnel.
- Refueling will be conducted only with pumps, hoses and nozzles designed for this purpose.
- Disconnected hoses will be handled in a manner to prevent residual fuel and liquids from being released into the environment.

- Service trucks will be provided with fire extinguishers and spill containment equipment, such as absorbents.
- Accidental spills will be cleaned up immediately. Impacted soil will be containerized and managed pursuant to applicable LORS.
- Emergency phone numbers will be available onsite.
- Containers used to store hazardous materials will be properly labeled and kept in good condition.

Orange Grove Energy will require contractors to comply with all LORS for handling of hazardous materials during construction. Compliance with LORS, safety training programs, and standard operating procedures for spill prevention will result in a less than significant potential for serious hazardous materials incidents. No additional measures beyond those above are needed to reduce the potential impacts for impacts below a level of significance.

6.15.2.2 Operations Impacts

Hazardous materials will be used and stored onsite to support the operation of the Project. Table 2.8-1 in Section 2.0 – Project and Facility Description, identifies the hazardous material to be used. The inventory of hazardous materials for the site will be kept up to date in the Business Plan to be submitted to the Certified Unified Program Agency (CUPA), in accordance with requirements of CCR Title 19, Division 2, Chapter 4, Article 4.

6.15.2.2.1 General Operating Practices for Hazardous Materials

Hazardous material will be stored at designated locations designed for the purpose. Most hazardous material will be contained in equipment or tanks. On occasions when hazardous materials are delivered to the Site in drums or other containers, they will be stored in their original delivery containers until used. Hazardous chemical storage areas will be designed with secondary containment to prevent leaks or spills from being released to the environment. Tanks containing hazardous chemicals will have secondary containment capable of holding the largest reasonably foreseeable spill (e.g., the tank contents for a single-tank containment), plus precipitation from a 24-hour, 25-year storm event if secondary containment is not sheltered from weather.

Hazardous materials will be handled in accordance with applicable LORS. Incompatible materials will be stored separately.

Personal protection equipment will be provided for workers handling hazardous materials. Personnel working with chemicals will be trained in proper handling techniques and emergency response procedures to chemical spills or accidental releases. Details of training and safety programs for workers are described in Section 6.17. Several programs at the plant will address hazardous materials storage locations, emergency response procedures, employee training requirements, hazard recognition, fire control procedures, hazard communications training, personal protection equipment training, and release reporting requirements. These programs will address chemical risk management in accordance with Cal-ARP regulations, the Business Plan,

SPCC plan, worker safety program, fire response program, plant safety program and facility standard operating procedures.

6.15.2.2.2 Petroleum Products

The potential for impacts from petroleum-containing hazardous materials will be less than significant because of the following spill prevention and safe handling measures:

- Petroleum products will be delivered and stored in containers approved by the DOT, which are capable of resisting impacts that may potentially occur during transport and handling (e.g., 55-gallon steel drums).
- Bulk petroleum storage and use will be limited to locations designed for this purpose. Secondary containment will be provided at all bulk storage locations.
- Process areas of the Site will be designed to contain surface drainage.
- Equipment oil reservoir levels will be checked frequently. If a level changes significantly, corrective action will be triggered immediately.
- Equipment oil reservoirs will have alarms and high- and low-level sensors. The sensors, alarms and associated instrumentation are calibrated regularly.
- Small pumps and other lubricated equipment will have pans to contain drips from gaskets or seals. Excessive leaks will be promptly corrected by plant maintenance programs.

A comprehensive plan for responding to accidental spills or leaks of petroleum-containing hazardous materials will be implemented under Code of Regulations Title 40 SPCC Plan requirements and CCR Title 19 Business Plan requirements.

6.15.2.2.3 Spill Prevention and Response Procedures

A comprehensive SPCC Plan will provide spill prevention and response procedures and other information needed for potential impacts of a potential oil spill to be less than significant. The Table of Contents of the SPCC Plan is provided in Table 6.15-1. The Emergency Response Plan described in Section 6.17.2.2.3 will address spill prevention and response procedures for hazardous materials used onsite.

In the instance of a spill or release or threatened release involving a hazardous material, the event will be reported immediately to the facility emergency coordinator, who will immediately go to the scene of the emergency to assess the situation. The plant emergency response team and other key personnel on the emergency contact list in the Business Plan also will be notified. The emergency coordinator will determine if the spill, release or threatened release is reportable to regulatory agencies.

Any release or threatened release of hazardous material that may pose a significant or potentially significant hazard to human health and safety, the environment or property, will be immediately reported verbally to: San Diego County Fire Department (911), San Diego County Department of Health, Division of Environmental Health Services, and California Office of Emergency Services. Immediate reporting will occur as soon as possible following knowledge of such a

release, without impeding necessary immediate controls or emergency measures. Immediate reporting will include at least the following information, in accordance with CCR Title 19, Section 2703:

- Name and telephone number of the reporter.
- Name and address of the facility.
- Time and type of incident (e.g., release, fire).
- Name and quantity of material(s) involved, to the extent known.
- Extent of injuries, if any.
- Possible hazards to human health or the environment outside of the facility.
- Whether or not agency assistance is required.

Certain types of releases in excess of reportable quantities specified in Code of Federal Regulations (CFR) Title 40, Sections 302.4 and 355 may require additional reporting to the National Response Center, the Regional Water Quality Control Board, or other agencies. The Project will comply with these reporting requirements.

Table 6.15-1 – Table of Contents of SPCC Plan

SECTION	REQUIREMENT TITLE OR DESCRIPTION	REGULATORY CITATION
i	Management approval	112.7
ii	Additional facilities, procedures, methods or equipment	112.7
1.1	Conformance with 40 CFR 112 Requirements	112.7(a)(1)
1.2	Deviations	112.7(a)(2)
1.3	Facility description	112.7(a)(3)
1.4	Type of oil	112.7(a)(3)(i)
1.5	Discharge prevention measures for routine oil loading, unloading and transfers	112.7(a)(3)(ii)
1.6	Discharge or drainage controls, equipment and procedures for the control of a discharge	112.7(a)(3)(iii)
2.0	Countermeasures for discharge discovery, response and cleanup	112.7(a)(3)(iv)
2.1	Methods of disposal	112.7(a)(3)(v)
2.1	Contact lists and phone numbers	112.7(a)(3)(vi)
2.3	Procedures for spill information reporting	112.7(a)(4)
2.4	Procedures usable in an emergency	112.7(a)(5)
3.1	Prediction of potential spill flow direction, rates and quantities	112.7(b)
3.2	Containment and/or diversionary structures	112.7(c)
3.3	Impracticability	112.7(d)
4.1	Inspections, tests and records	112.7(e)
4.2	Training	112.7(f)(1)
4.3	Designated Accountable Person	112.7(f)(2)
4.4	Discharge Prevention Briefings	112.7(f)(3)

SECTION	REQUIREMENT TITLE OR DESCRIPTION	REGULATORY CITATION
5.0	Security	112.7(g)(1) and (5)
5.1	Secure valves and pumps in closed/off positions	112.7(g)(2) and (3)
5.2	Cap Out of service connections	112.7(g)(4)
6.0	Facility tank car/ tank truck unloading	112.7(h)
7.0	Field-constructed container repair, alteration, reconstruction, or change in service	112.7(i)
8.0	Conformance with other requirements	112.7(j)
9.1	Conformance with 40 CFR 112.7 and 112.8	112.8(a)
9.2	Requirements for valves at dike areas and inspection of drainage before discharging	112.8(b)(1) and (2)
9.3	Catchment basins for drainage from undiked areas	112.8(b)(3)
9.4	Diversionary system for drainage from undiked areas	112.8(b)(4)
9.5	Drainage treatment in more than one treatment unit	112.8(b)(5)
9.6	Bulk storage container compatibility	112.8(c)(1)
9.7	Bulk storage container secondary containment	112.8(c)(2)
9.8	Control rainwater and inspect prior to release	112.8(c)(3)
9.9	Buried metallic tanks	112.8(c)(4) and (5)
9.10	Inspection and testing of above containers	112.8(c)(6)
9.11	Control leakage from internal heating coils.	112.8(c)(7)
9.12	Overfill prevention	112.8(c)(8)
9.13	Effluent treatment facilities	112.8(c)(9)
9.14	Promptly correct visible leakage	112.8(c)(10)
9.15	Mobile storage containers	112.8(c)(11)
9.16	Buried piping coating and corrosion protection; repair	112.8(d)(1)
9.17	Cap out of service connections	112.8(d)(2)
9.18	Piping supports	112.8(d)(3)
9.19	Inspect aboveground valves, piping, etc.	112.8(d)(4)
9.20	Protect aboveground piping from vehicles	112.8(d)(5)

Immediate reporting will be performed by the emergency coordinator or designee. The emergency coordinator or designee will determine the need for outside assistance and contact appropriate response organizations (e.g., medical providers, ambulance service, police), as necessary.

6.15.2.2.4 Fire and Explosion Risks

Flammable materials will be used for operations, including natural gas fuel. The Project natural gas pipeline lateral will extend approximately 2.0 miles from the existing San Diego Gas and Electric (SDG&E) gas transmission line to the Site. The gas pipeline will be constructed, owned

and operated by SDG&E. Orange Grove Energy will take delivery of natural gas fuel at an onsite metering station. The gas pipeline lateral will be located within the right-of-way of SR 76 and will not encroach on other land or habituated structures. The gas pipeline lateral will be operated in accordance with DOT safety regulations and other LORS. As a result, no hazardous materials related impact is anticipated from the gas pipeline lateral. Natural gas onsite will be in closed systems designed in accordance with all LORS. No hazardous material impact is anticipated to occur from the operation of natural gas systems onsite.

Compressed gases will be stored and used at the facility to support operations and maintenance include calibration gasses for emissions monitoring and carbon dioxide (CO_2) for fire suppression. Safety measures for compressed gasses will include:

- Compressed gasses will be controlled and periodically inventoried under the Business Plan prepared pursuant to 19 CCR.
- Compressed gases will be stored in DOT-approved cylinders, secured to prevent upset and physical damage. Both DOT and Occupational Safety and Health Administration (OSHA) regulations include provisions for safe management of compressed gas cylinders.
- Incompatible gases (e.g., flammable gases and oxidizers) will be stored separately.

Use of compressed gasses at the facility in accordance with LORS designed for public and worker safety is not anticipated to result in any hazardous materials-related impact.

6.15.2.2.5 Hazardous Materials Requiring Offsite Consequence Analysis

Aqueous ammonia (19.0 percent solution) for the Project will be stored in a 10,000-gallon aboveground storage tank. The presence of aqueous ammonia at this quantity requires an offsite consequence analysis, which is an evaluation of potential acute public health impacts from an accidental release. Additional details and supporting calculations associated with the offsite consequence analysis conceptual design and modeling are included in Appendix 6.15-A.

6.15.2.2.6 Offsite Consequence Analysis

The offsite consequence analysis was performed for the following two hypothetical accidental release scenarios: "worst case" and "alternative." An alternative scenario is included because of the low probability of the worst-case scenario. The alternative scenario is also unlikely to occur, but has a somewhat more realistic probability of occurrence than the worst case scenario. For both scenarios, distances to specified concentrations of ammonia were estimated. Where specified "level of concern" concentrations reach offsite, then potential public health impacts must be evaluated.

It should be noted that neither the “worst case” nor “alternative” accidental release scenarios are likely to occur during the life of the Project. The SCR system will include instrumentation that controls the injection rate of ammonia for NO_x control. The aqueous ammonia storage and handling facilities will be equipped with protective equipment such as continuous tank level monitors, temperature and pressure monitors and alarms, excess flow and emergency isolation

valves, and a concrete containment structure surrounding the tank and piping. System maintenance and repairs will be conducted only by trained technicians. The aqueous ammonia system will be designed and operated to prevent accidental release.

Additional details regarding the definitions of the worst-case and alternative release scenarios, determination of emission rates, meteorological parameters associated with the dispersion modeling, and quantitative results of the analysis are provided in Appendix 6-15.A. An overview of the worst-case and alternative release scenarios and a summary of the results of the analysis are provided in the following sections.

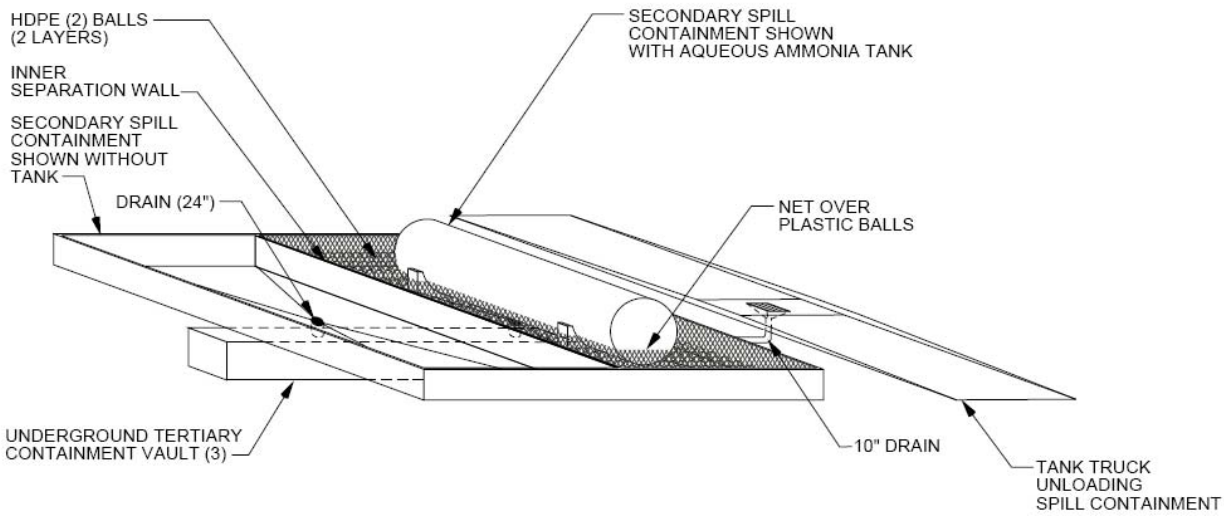
6.15.2.2.7 Potential Release Scenarios

Potential accidental release scenarios due to aqueous ammonia handling and use include losses from a storage tank, losses during unloading of a tank truck to a storage tank, losses in the aqueous ammonia delivery system from the storage tank to the vaporizers, and losses of vaporized ammonia during delivery to the SCR catalyst beds. Because of safety shut-offs to these last two subsystems, potential ammonia release quantities from these delivery system components in the event of an upset condition are small compared to losses from the storage tank or from tank truck unloading. The proposed location of the storage tank and unloading facility are shown in Figure 2.2-4 in Section 2.0 – Project and Facility Description.

The worst case is the hypothetical instantaneous release of a full storage tank induced by some improbable catastrophic event. Under this improbable scenario, the storage tank is assumed to instantaneously release its full contents of aqueous ammonia into the tank's secondary containment area (see Figure 6.15-1). The secondary containment design serves as a passive control system to limit the potential maximum surface area of aqueous ammonia to 1,000 square feet (ft^2).

The alternative release scenario involves the loss of aqueous ammonia during unloading of a tank truck. Under this scenario, a connector in the unloading piping is assumed to fail, allowing the aqueous ammonia to flow out freely through the 3-inch piping. In this scenario, the rate at which the aqueous ammonia escapes from the tank truck is determined by the 3-inch size of the piping used for unloading. The maximum volume of 8,000 gallons in the tank truck is assumed to flow into the drain at the base of the tank truck loading area along an area 21 feet long (i.e., one-half the length of the truck's tank) by 4 feet wide.

Figure 6.15-1 – Secondary Containment Area



NOTES:

(1) OTHER DESIGNS WITH EQUIVALENT PROTECTION ARE ALSO ACCEPTABLE.

(2) HIGH DENSITY POLYETHYLENE

(3) ONE POSSIBLE DESIGN WOULD BE TO HAVE A TERTIARY UNDERGROUND CONTAINMENT VAULT TO HOLD THE MAXIMUM CONTENTS OF THE TANK PLUS THE 24-HOUR 25-YEAR PRECIPITATION EVENT.

TRC	Project: **Orange Grove Project - SPPE Application**
	Source: SEGA, Inc.

6.15.2.2.8 Offsite Consequence Analysis Modeling Results

The results of the dispersion modeling for the worst-case and alternative release scenarios indicate that the ERPG-2 concentration of 150 ppm extends beyond the Project fence line in both scenarios. However, neither the ERPG-2 nor STPEL concentrations impact a residence or other public receptor in either the worst case or alternative scenario. Sensitive receptors and emergency response facilities are not located within the area potentially affected by these releases. Figures 6.15-2 and 6.15-3 depict the distances to the two level-of-concern concentrations for the worst-case and alternative scenarios, respectively.

6.15.2.2.9 Offsite Consequence Analysis Conclusions

The Project design features (Section 6.15.2.4) sufficiently reduce the likelihood and consequences of such releases such that no significant offsite consequences at receptors of public health concern are anticipated under the worst-case or alternative release scenarios. As discussed in Section 6.17, Project workers are trained to avoid and respond to accidental releases of hazardous materials, including ammonia. The combination of project design and worker training are anticipated to further reduce the magnitude of a potential release to levels that are even lower than assumed for the purpose of this analysis. Even under the conservative assumptions utilized in this analysis, the maximum modeled concentrations of ammonia are below the ERPG-2 and STPEL concentrations of 150 and 75 ppm, respectively, at the nearest residence or other public receptors. Consequently, the potential impacts associated with the hypothetical accidental release scenarios are less than significant.

As discussed in Section 6.17 – Worker Safety, workers at the Project are trained to avoid and respond to accidental releases of hazardous materials, including ammonia. The Project design and worker training reduce the safety hazard from an accidental aqueous ammonia release to an insignificant level.

In light of these findings, the Project will be eligible for Cal-ARP Program 1 because it meets the following requirements:

- "The distance to a toxic endpoint or flammable endpoint for a worst-case release is less than the distance to any public receptor." The toxic endpoint (i.e., ERPG-2 concentration) is 150 ppmv, or 104 milligrams of ammonia per cubic meter of air (mg/m^3).
- "For the 5 years prior to the submission of an RMP, the process has not had an accidental release of a regulated substance where exposure to the substance, its reaction products, overpressure generated by an explosion involving the substance, or radiant heat generated by a fire involving the substance has led to any of the following offsite consequences:
- Death,
- Injury, or
- Response or restoration activities for an exposure of an environmental receptor."
- "Emergency response procedures [will be] coordinated between the stationary source and local emergency planning and response organizations."

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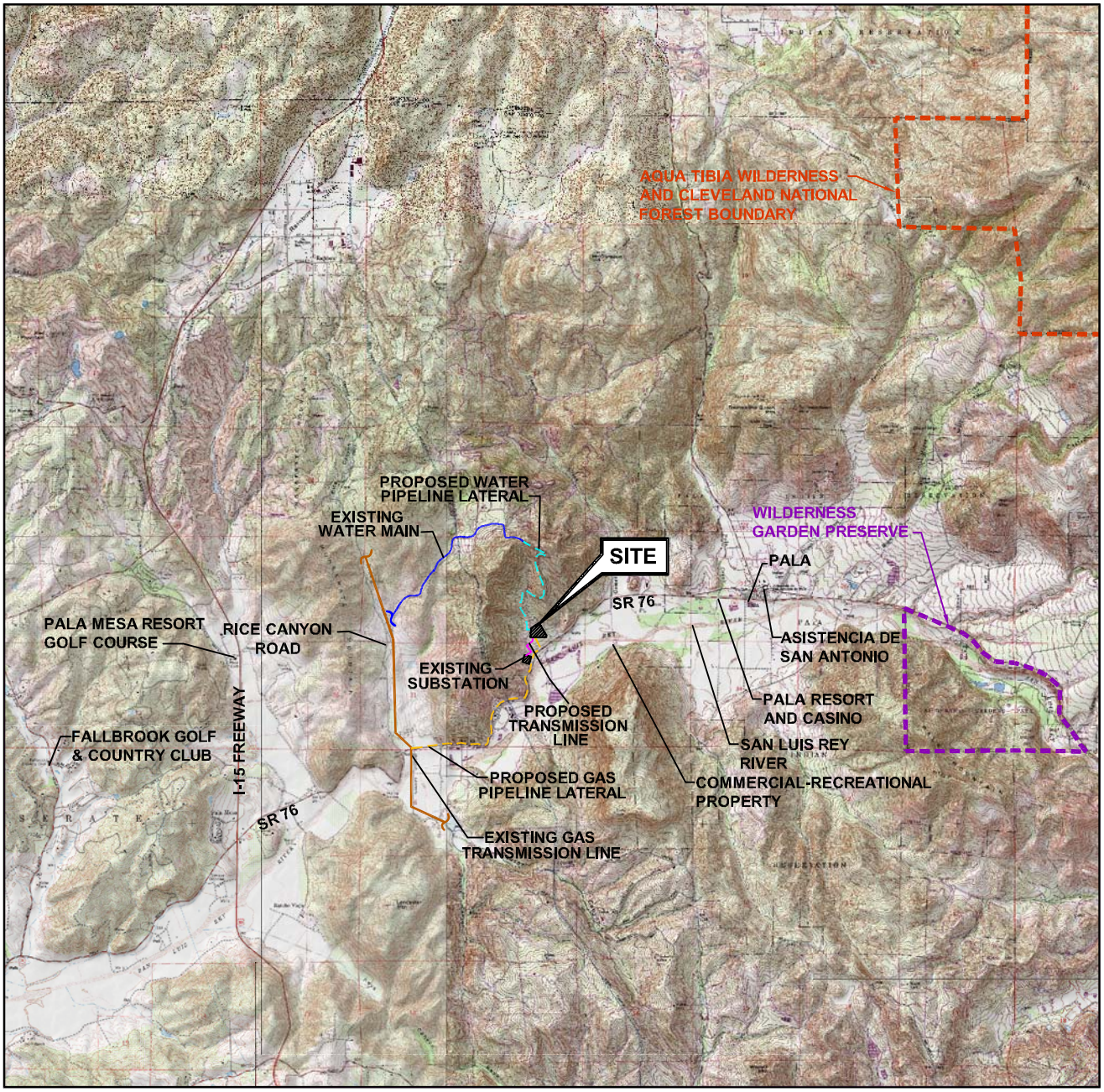


N

0 1 2 3 4 MILES

SCALE 1:96,000

SOURCE:

United States Geological Survey
7.5 Minute Topographic Map, 2000:
Pala, Bonsall, Temecula,
and Pechanga Quadrangles

TRC

PROJECT: 29031902

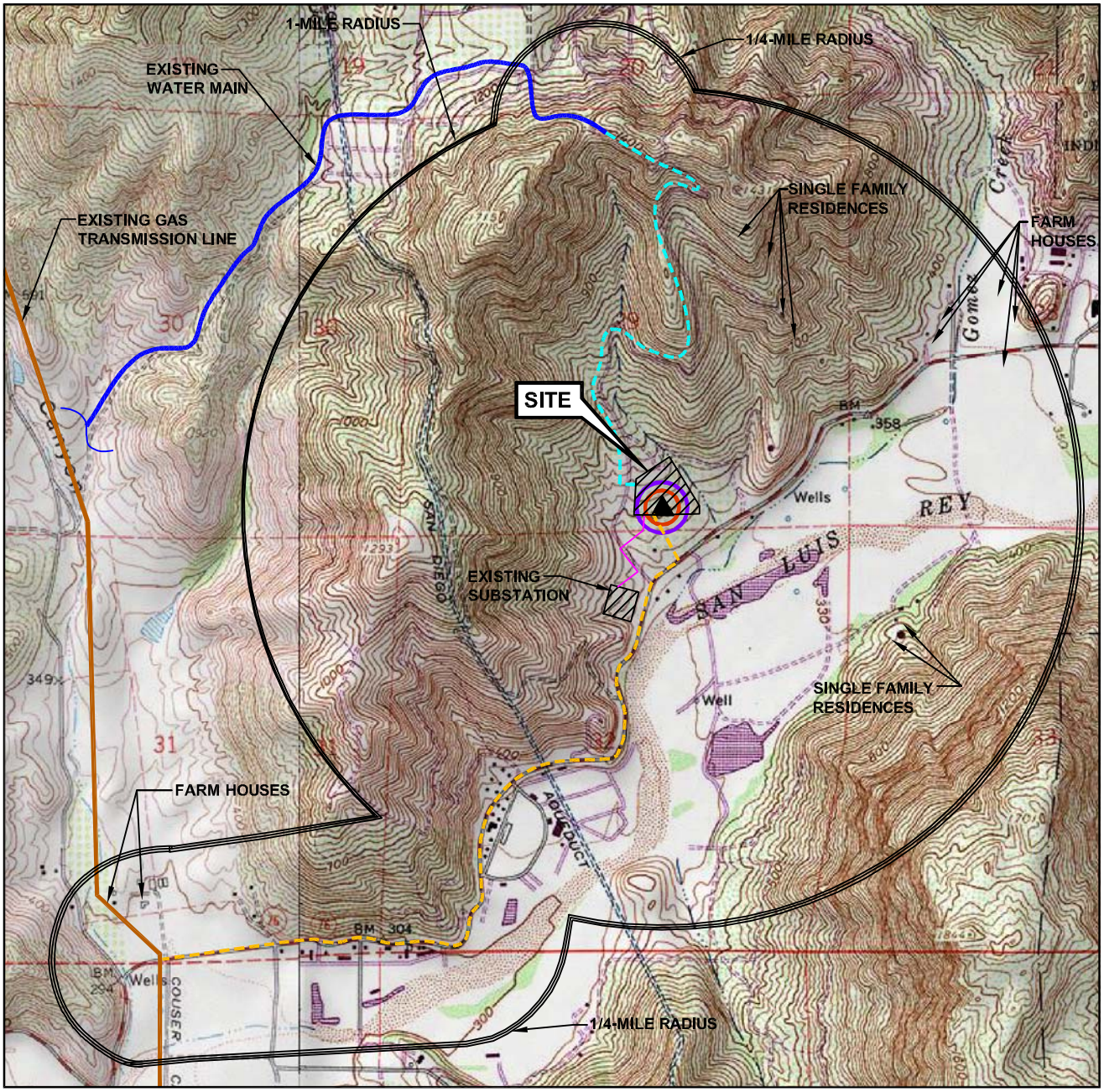
FACILITY:

ORANGE GROVE PROJECT
SAN DIEGO COUNTY, CALIFORNIA

RECREATIONAL AREAS AND HISTORICAL SITES

FIGURE 6.13-16

PS=1:1 L:□Graphics□ProjectsByNumber□29-xxxx□29-0319□290319 Recreational.dwg Jul 06, 2007 - 10:02am RCollins



0 1/4 1/2 3/4 1 MILE

SCALE 1:24,000

N

LEGEND

- Proposed Transmission Line
- Gas Pipeline Lateral
- Water Pipeline Lateral
- Location of Ammonia Storage Tank
- STPEL - 75 ppm
- ERPG-2 - 150 ppm

SOURCE:

United States Geological Survey
7.5 Minute Topographic Map, 2000:
Pala, Bonsall, Temecula,
and Pechanga Quadrangles

TRC

PROJECT: 125158

FACILITY:

ORANGE GROVE PROJECT
SAN DIEGO COUNTY, CALIFORNIA

ALTERNATE ACCIDENTAL AQUEOUS AMMONIA RELEASE SCENARIO

FIGURE 6.15-3

PS=1:1 L:\Graphics\ProjectsByNumber\29-xxxx\29-0319\2903 19 Alt-Ammonia.dwg Jul 18, 2007 - 10:29am RCollins

6.15.2.2.10 Unexpected Cessation of Operations

Closure of the power plant is not expected during its operational life. In the event of premature or unexpected cessation of operations, the facility will be maintained in a manner that will protect public health and safety and the environment. In the event that Orange Grove Energy determines the facility will close temporarily or permanently, then the Plant Manager will notify DPLU, the CUPA and other agencies of the circumstances and expected duration of closure. If it is determined that closure will occur for an extended term without continued maintenance of containment, safety, and emergency response systems, then hazardous materials will be removed from the Site in accordance with a work plan that will be submitted to the CUPA. Hazardous materials removed from the Site will be managed in accordance with LORS.

6.15.2.2.11 Summary of Operations Impacts

As described in preceding sections, compliance with LORS for hazardous material handling and other safety and release prevention programs will be in place to limit the risk of a serious hazardous materials incident. With the safety and release prevention measures that will occur, the impacts of hazardous material use by the Project will be less than significant. Long-term or cumulative impacts will be avoided by cleaning up any accidental spills as soon as they occur.

6.15.2.3 Cumulative Impacts

Other projects that have been evaluated for potential cumulative impacts are listed in Table 6.1-1. There are no projects with an identifiable potential for cumulative impacts related to hazardous material.

6.15.2.4 Project Design Features

The following are design and operational features that have been incorporated into the Project to avoid potentially significant environmental impacts:

- Choice of aqueous, rather than anhydrous, form of ammonia to reduce consequences if there were an accidental release.
- Choice of 19.0 percent (by weight) aqueous ammonia concentration to further reduce potential hazard compared to using the usual commercial concentration of 29.4 percent (by weight).
- Secondary containment will be provided at the aqueous ammonia storage tank and the tank truck unloading facility to limiting the area of potential spreading and volatilization in the event of an accidental release.

6.15.3 Mitigation Measures

Based on the above analysis of impacts and the design and operational features that have been incorporated into the Project, no mitigation measures are required.

6.15.4 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts are anticipated from the Project.

6.15.5 Laws, Ordinances, Regulations and Standards (LORS)

A summary of LORS related to hazardous material handling is provided in Table 6.15-2. Concerning aqueous ammonia, the Project will be in compliance with applicable LORS during construction and operation because the following will be accomplished prior to storage or use of aqueous ammonia for the Project:

- Workers handling aqueous ammonia for the Project will be thoroughly trained.
- The RMP will be prepared.
- The RMP will be approved by the CUPA.
- Emergency response procedures will be coordinated between facility personnel and local emergency planning and response organizations.

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Table 6.15-2 – LORS for Hazardous Materials Handling

JURIS-DICTION	AUTHORITY	AGENCY	REQUIREMENTS	COMPLIANCE	SPPE SECTION
Federal	CERCLA ("Superfund"), 42 USC §9601 et seq.; 40 CFR Part 302, as amended by SARA; 40 CFR Part 302, (SARA Title III); 42 USC §11001 et seq.; 40 CFR Parts 350, 355, 370.	EPA Region 9; San Diego County Environmental Health Department.	SARA Title III – reporting requirements for storage, handling, or production of significant quantities of hazardous materials.	The Project will comply with release notification in accordance with existing LORS. Reporting requirements for storage and handling of hazardous materials will be satisfied through a Hazardous Materials Business Plan.	6.15, 6.15.2.1, 6.15.2.2
	29 USC 651; 29 CFR §1910 et seq., §1926 et seq.	Cal-OSHA.	Meet requirements for hazardous materials communications and emergency response.	Employees will be trained in hazardous materials communication and emergency response.	6.15.2.1, 6.15.2.2
	CAA, Section 112(r).	EPA Region 9; California Office of Emergency Services; San Diego County Environmental Health Department.	Preparation of Risk Management Plan (RMP) for hazardous materials stored on project site.	Project will not trigger federal RMP requirements, since aqueous ammonia will be only 19 % concentration.	6.15, 6.15.2
State	8 CCR §339, 3200 et seq., 5139 et seq., 5160 et seq.	Cal-OSHA.	Address control of hazardous substances.	Project will meet or exceed these standards in handling hazardous materials.	6.15.2.1, 6.15.2.2
	California Health & Safety Code §25500-25543.3; 19 CCR §2720-2735.	San Diego County Department of Environmental Health.	Prepare Hazardous Materials Business Plan.	The construction contractor will submit a Hazardous Materials Business Plan for construction in accordance with these requirements. Orange Grove Energy will submit a Hazardous Materials Business Plan for operations in accordance with these requirements.	6.15.2.1, 6.15.2.2
	California Accidental Release Program (CalARP), California Health & Safety Code §25531 et seq.; CCR, Title 19, Chapter 4.5.	San Diego County Department of Environmental Health.	Risk Management Plan.	The Project will prepare an RMP in accordance with CalARP requirements before aqueous ammonia is delivered to the Site.	6.15, 6.15.1, 6.15.2.1, 6.15.2.2, 6.15.5
Local	None Applicable	None Applicable	None Applicable	None Applicable	None Applicable
Industry	None Applicable	None Applicable	None Applicable	None Applicable	None Applicable

The RMP will be prepared and approved prior to arrival of aqueous ammonia onsite. Table 6.15-3 provides contact information for those agencies having permit approval or enforcement authority.

Table 6.15-3 – Agency Contact Information

AGENCY AND CONTACT	AUTHORITY
Cal-OSHA - Division of Occupational Safety & Health Donald Cunningham 2424 Arden Way, Suite 410 Sacramento, California 95825 (916) 263-2800	Compliance with Worker Safety Training Requirements
San Diego County Department of Environmental Health Marc McCabe, Environmental Health Specialist III PO Box 129261, San Diego, California 92112 (619) 338-2453	RMP Approval
San Diego County Department of Environmental Health Joan Swanson, Environmental Health Specialist II PO Box 129261, San Diego, California 92112 (619) 338-2232	Hazardous Materials Business Plan

6.15.6 References

California Department of Food and Agriculture. Fertilizing Material Tonnage Report. 1996, 1997, 1998, 1999, 2000.

California Office of Emergency Services (OES). Final California Accidental Release Prevention (Cal-ARP) Program Regulations. California Code of Regulations (CCR) Title 19, Division 2, Chapter 4.5. November 16, 1998.

General Electric Corporation (GE). Lubricating Oil Recommendations for Gas Turbines With Bearing Ambients Above 500°F (260°C), GE Power Systems, GEK32568E. May 1999.

National Institute of Occupational Safety and Health (NIOSH). *NIOSH Pocket Guide to Chemical Hazards.* DHHS (NIOSH) Publication No. 97-140. U.S. Government Printing Office. Washington, D.C. 1997.

Perry, R.H. and D.W. Green (eds). *Perry's Chemical Engineers' Handbook*. 7th Edition. McGraw Hill: New York. 1997.

Sax, I. and N. Irving. Dangerous Properties of Industrial Materials. (3rd Edition). Van Nostrand Reinhold Company: New York. August 1968.

USEPA. *Risk Management Program Guidance in Offsite Consequence Analysis.* April 15, 1999.

Wray, T.K. "HazMat Chemist: Ammonia." HazMat World, p. 86. November 1991.

6.15-A. B

APPENDIX 6.15-A – OFFSITE CONSEQUENCES ANALYSIS

6.15-A.1.1.1 OFFSITE CONSEQUENCE ANALYSIS

The offsite consequence analysis was performed for the following two hypothetical accidental release scenarios: "worst case" and "alternative." An alternative scenario is included because of the low probability of the worst-case scenario. The alternative scenario is also unlikely to occur, but has a slightly higher probability of occurrence than the worst case scenario. For both scenarios, distances to specified concentrations of ammonia were estimated. Where specified "level of concern" concentrations reach offsite, then potential public health impacts must be evaluated.

The offsite consequence analysis includes four components. The first is to describe the scenario in enough detail to allow quantitative analysis. The description includes passive features designed to minimize emissions. The second component is to estimate emission rates associated with each scenario. The third component is to use atmospheric dispersion modeling to predict the distances to the levels of concern in each scenario. The fourth component assesses the potential degree and extent of offsite consequences of the concentrations computed by the dispersion modeling.

Worst-Case Release Scenario

Potential accidental release scenarios due to aqueous ammonia handling and use include losses from a storage tank, losses during unloading of a tank truck to a storage tank, losses in the aqueous ammonia delivery system from the storage tank to the vaporizers, and losses of vaporized ammonia during delivery to the SCR catalyst beds. Because of safety shut-offs to these last two subsystems, potential ammonia release quantities from these delivery system components in the event of an upset condition are small compared to losses from a storage tank or from tank truck unloading.

The proposed location of the storage tank and unloading facility are shown in Figure 2.2-4 in Section 2.0 of the SPPE Application. The worst case is the hypothetical instantaneous release of a full storage tank induced by some improbable catastrophic event. Regardless of the improbability of the worst-case release scenario, the storage tank is assumed to instantaneously release its full contents of aqueous ammonia into the tank's secondary containment area (see Figure 6.15-1). The secondary containment design serves as a passive control system to limit the potential maximum surface area of volatilization of any accidental release of aqueous ammonia to 1,000 square feet (ft^2).

Because the area available for volatilization directly affects the emission rate, a passive design feature was included to further reduce the emission rate and potential offsite consequences of an accidental release. Two layers of industrial-grade high-density polyethylene (HDPE) balls will be placed in the bottom of the 1,000 ft^2 containment structure (see Figure 6.15-1). The balls will be approximately 1.5 to 3 inches in diameter. If aqueous ammonia were accidentally released from a storage tank, the liquid would pass between the balls and spread out on the concrete base. Based on use of balls with 3 inches in diameter, they would reduce the area available for volatilization to approximately one-tenth (9.4 percent) of the total surface area of liquid. The

balls would not be wetted by the solution because of their hydrophobic property. The balls would also block the wind, another parameter that affects the rate of volatilization, greatly reducing the wind speed at the surface of the liquid. The analysis presented herein overestimates impact distance by neglecting the reduction in wind speed.

Another passive design feature is included to reduce the length of time ammonia could volatilize from the secondary surface containment area. The bottom of the containment is sloped toward its center, where a 24-inch-diameter manhole-sized drain drops directly into an underground tertiary containment vault (see Figure 6.15-1). The same vault is also connected by a 10-inch pipe to a drain in the center of the ramped containment of the tank truck unloading facility. The vault will be able to contain at least the volume of the 10,000 gallons of aqueous ammonia in the storage tank plus the volume of rainwater potentially collected from the 24-hour, 25-year storm. A 1-inch square wire mesh screen is placed on top of each manhole drain to prevent the plastic balls from falling through. Again, the analysis presented herein overestimates impact distance by neglecting the reduction in standing volume resulting from drainage to the manhole drain.

Alternative Release Scenario

The alternative release scenario involves the loss of aqueous ammonia during unloading of a tank truck. Under this scenario, a connector in the unloading piping is assumed to fail, allowing the aqueous ammonia to flow out freely through the 3-inch piping. In this scenario, the rate at which the aqueous ammonia escapes from the tank truck is determined by the 3-inch size of the piping used for unloading. The maximum volume of 8,000 gallons in the tank truck is assumed to flow out into an area 21 feet long (i.e., one-half the length of the truck's tank) by 4 feet wide. The released aqueous ammonia would flow down the sloping base of the concrete ramp before entering the centrally located 10-inch-diameter drain connected to the underground, tertiary containment vault (see Figure 6.15-1). This assumption is overestimates the volume of ammonia released under this scenario because the resulting time period to drain the total 8,000 gallons is 31 minutes. In reality, it is expected that the driver and facility person present during unloading, both of whom are specially trained to respond to emergencies of this nature, will be able to stop such a release within 30 seconds to a few minutes, at most.

The liquid does not accumulate to cover more of the ramp area because the area of the drain is over 11 times larger than the cross-section of the leaking coupling. Also, administrative controls (e.g., written instructions such as standard operating procedures), physical indicators (e.g., truck position beepers), and physical constraints (e.g., unloading pipe length) will assure that the unloading connector is no further than 21 feet from the drain in the center of the ramp.

6.15-A.1.1.2 Emission Rates and Meteorological Conditions

This section provides an estimation of emission rates and selection of meteorological parameters to be used as inputs to the modeling. The fundamental equations and assumptions used to estimate the emission rate of ammonia vapor from an aqueous solution are presented in Tables 6.15A-1 through 6.15A-5 at the end of this appendix.

Estimation of Emission Rates

The ammonia emission rates for the worst case and alternative release scenarios are influenced primarily by the following factors:

- Physical and chemical properties of the aqueous ammonia
- Temperature of the liquid
- Surface area of ammonia exposed to the wind
- Wind speed over the liquid surface

With regard to the physical and chemical properties of the aqueous ammonia, the partial vapor pressure is influenced by the temperature of the liquid. Table 6.15A-2 provides an overview of the temperature correction factor used to estimate the vapor pressure of ammonia at other than standard atmospheric temperature and pressure.

Worst-Case Release Scenario

Because the area available for volatilization directly affects the emission rate, a passive design feature was included to further reduce the emission rate and potential offsite consequences of an accidental release. Two layers of industrial-grade high-density polyethylene (HDPE) balls will be placed in the bottom of the 1,000 ft^2 containment structure (see Figure 6.15-1). The balls will be approximately 1.5 to 3 inches in diameter. If aqueous ammonia were accidentally released from a storage tank, the liquid would pass between the balls and spread out on the concrete base. Based on using balls 3 inches in diameter, they would reduce the area available for volatilization to approximately one-tenth (9.4 percent) of the total surface area of liquid. The balls would not be wetted by the solution because of their hydrophobic property. The balls would also block the wind, another parameter that affects the rate of volatilization, greatly reducing the wind speed at the surface of the liquid. The analysis presented herein overestimates impact distance by neglecting the reduction in wind speed. Table 6.15A-3 provides an overview of the methodology used to calculate the effective mitigated surface area of the secondary containment area.

The calculated emission rate for ammonia under the worst case scenario is 3.91 pounds per minute (Table 6.15A-4).

Alternative Release Scenario

The alternative release scenario involves the loss of aqueous ammonia during unloading of a tank truck. Under this scenario, a connector in the unloading piping is assumed to fail, allowing the aqueous ammonia to flow out freely through the 3-inch piping. In this scenario, the rate at which the aqueous ammonia escapes from the tank truck is determined by the 3-inch size of the piping used for unloading. The maximum volume of 8,000 gallons in the tank truck is assumed to flow out into an area 21 feet long (i.e., one-half the length of the truck's tank) by 4 feet wide. This assumption is an overestimate because the resulting time period to drain the total 8,000 gallons is 31 minutes. In reality, it is expected that the driver and facility person present during unloading, both of whom are specially trained to respond to emergencies of this nature, will be able to stop such a release within 30 seconds to a few minutes, at most. The released aqueous ammonia

would flow down the sloping base of the concrete ramp to the centrally located 10-inch-diameter drain connected to the vault.

The calculated emission rate for ammonia under the alternative scenario is 2.25 pounds per minute (Table 6.15A-5).

Meteorological Conditions

The wind speed used in the equation is taken from measurements made at the standard height of 10 meters (33 feet). This wind speed is greater than it would be closer to the surface of the liquid and, hence, results in a higher emission rate.

The temperature of the liquid is assumed to be the same as the air temperature. This assumption overestimates the temperature of the liquid because: (1) the air temperature used in the worst-case meteorological conditions (114degrees Fahrenheit [ºF]) was the highest observed at the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center (NCDC) Temecula Station (Index No. 04-8844-6) on July 22, 2006 during the 3-year period (36 months of existing data) November 2003 through February 2007, and (2) the thermal inertia of a tank of liquid prevents it from heating up as high as the transient maximum air temperature.

Atmospheric stability is another important meteorological parameter used in modeling the dispersion of the ammonia that vaporizes from the liquid. The worst-case stability (i.e., most stable) classification is F, for which the atmosphere has the least mixing and, hence, the ammonia concentration would remain highest as the vapor is carried downwind.

Table 6.15A-1 – Accidental Release Scenarios

METEOROLOGICAL PARAMETER	UNITS	RELEASE SCENARIO	
		WORST-CASE STORAGE TANK LOSS	ALTERNATIVE CASE: TANK TRUCK UNLOADING SPILL
Temperature	Degrees Fahrenheit	114(2)	77(1)
Atmospheric Stability Class(1)	None	6 (very stable)	4 (neutral)
Wind Speed(1)	Meters per second	1.5	3.0
Urban/Rural Dispersion	None	Rural	Rural
Ammonia Containment Area	square feet	1,000	1,000
Effective Surface Area with Mitigation(3)	square feet	93.1	93.1
Ammonia Vapor Pressure in Containment Basin	mm Hg	190	148
Ammonia Emission Rate	pounds/minute	3.91	2.25

(1) Default value of the RMP Offsite Consequence Analysis Guidance (USEPA, 1999).
(2) Temperature is the highest daily maximum temperature (July 22, 2006) during the past 36 months of existing data for the city of Temecula (NOAA NCDC, November 2003 through February 2007).
(3) Mitigated emissions calculated with plastic balls in the aqueous ammonia containment basin minimizes the spill surface area available for evaporation

The requirement that the worst case use combination of the maximum observed temperature and maximum stability results in an implausible combination of conditions. The maximum temperature occurs during the afternoon when the air is unstable (e.g., Classification B for the maximum average temperature of 114°F observed on July 22, 2006). In contrast, F stability occurs during nighttime or early morning before sunrise, when temperature is lowest. The use of the maximum observed temperature and stability conditions results in an overestimation of the actual emission rate and offsite consequence.

The low wind speed of 1.5 meters per second (m/sec) is a Cal-ARP requirement. Low wind speed results in a low volatilization rate, but also results in reduced dispersion of the vapor as it is carried downwind.

6.15-A.1.1.3 DISPERSION MODELING APPROACH

Analysis of the worst case and alternative aqueous ammonia accidental release scenarios was performed using the SCREEN3 computerized dispersion model. This model was provided by the USEPA for preliminary screening analyses of routine or upset emissions of contaminants to the atmosphere. The worst case scenario involves the assumption that the entire contents of the 10,000-gallon aqueous ammonia storage tank is instantaneously released due to a tank rupture. The alternative release scenario evaluates a release of the entire contents of an 8,000-gallon tanker truck during a transfer event. Extreme weather and dispersion conditions that maximize evaporative ammonia emissions are assumed for the worst case scenario. The alternative release scenario incorporates weather and dispersion conditions that are more representative of “typical” conditions.

A summary of the SCREEN3 model input parameters for the worst case and alternative scenarios is provided in Table 6.15A-6.

6.15-A.1.1.4 DISPERSION MODELING RESULTS

At the ERPG-2 concentration (150 ppm) the predicted distances from the release sources are approximately 951 and 213 feet for the worst case and alternative scenarios, respectively. The results of the dispersion modeling for the worst-case and alternative release scenarios indicate that the ERPG-2 concentration of 150 ppm extends beyond the Project fence line in both scenarios. However, neither the ERPG-2 nor STPEL concentrations impact a residence or other public receptor in either the worst case or alternative scenario. Sensitive receptors and emergency response facilities are not located within the area potentially affected by these releases.

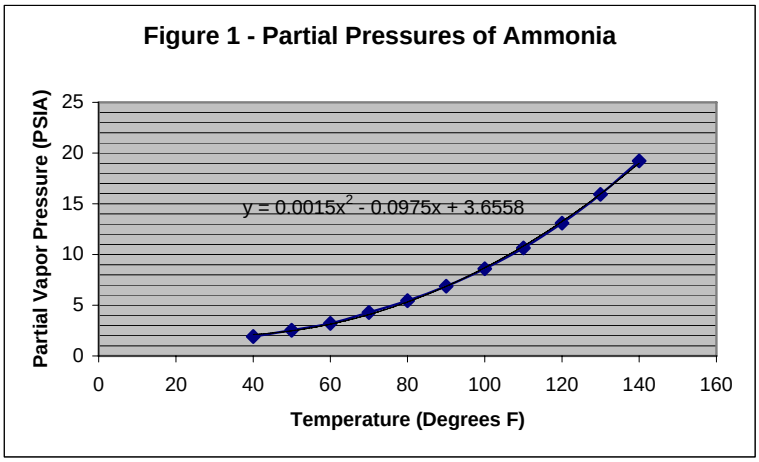
A tabular summary of the concentration endpoints and predicted distance to the concentration endpoints for the worst case and alternative release scenarios is provided in Table 6.15A-7. The SCREEN3 model output is provided in Appendix 6.15-B.

Table 6.15A-2 – Aqueous Ammonia Accidental Release Emission Rate

Aqueous Ammonia Accidental Release Emission Rate
Orange Grove Project - SPPE Application

Partial Vapor Pressure of Aqueous Ammonia Solution (from Perry's Chemical Handbook)

Temperature (Degrees F)	Partial Vapor Pressures of 19.1% Aqueous Ammonia (PSIA)
40	1.92
50	2.53
60	3.21
70	4.28
80	5.45
90	6.88
100	8.6
110	10.64
120	13.09
130	15.93
140	19.23



Temperature Correction Factor (from EPA, 1999)

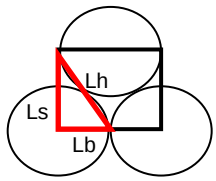
$$TCF_{WC} = \frac{VP_T \times 298}{VP_{298} \times T} \quad \text{Equation 1}$$

SYMBOLS AND DESCRIPTION	UNITS	VALUE	RATIONALE
T = temperature of worst case scenario	Degrees F	114	Highest daily maximum temp (July 22, 2006) during past 36 months of existing data for the city of Temecula (NCDC, November 2003 to February 2007)
	Degrees K	319	Conversion = (F + 459.67) x 5/9
VPT = vapor pressure of ammonia at temperature of worst case scenario	PSIA	12.0	Figure 1 using 114 degrees F (319 K)
	mmHg	621	Conversion = 51.56 mmHg / PSIA
VP298 = vapor pressure of ammonia at SATP	PSIA	5.04	Figure 1 using 77 degrees F (298 K)
	mmHg	260	Conversion = 51.56 mmHg / PSIA
TCFWC = temperature correction factor for worst case scenario	unitless	2.23	Equation 1

Notes: F = Fahrenheit; K = Kelvin; PSIA = pounds per square inch absolute; SATP = standard ambient temperature and pressure; mmHg = millimeters of mercury

Table 6.15A-3 – Mitigation – Plastic Floating Balls

Mitigation - Plastic Floating Balls



SYMBOLS AND DESCRIPTION (WORST CASE SCENARIO)	UNITS	VALUE	EQUATION
r = radius of ball	in	1.5	
A_{Ball} = area of ball	in^2	7.1	πr^2
L_b = Length of base of triangle	in	1.5	
L_h = Lenth of hypotenuse of triangle	in	3.0	
L_s = Length of side of triangle	in	2.6	$Ls^2 = Lh^2 - Lb^2$
A_{Box} = area of box*	in^2	7.8	Ls x 2r
E = empty space	in^2	0.73	$A_{Ball} - A_{Box}$
Percent Empty Space	percent	9.36	$E / A_{Box} * 100$

Notes: in = inches; in^2 = square inches

* = the base of the box has a length that runs from the origin of one circle to the origin of one circle to the origin of the second circle, thereby representing two times the radius (3 inches); the height of the box has a length that is based on the Pythagorean Theorem (for the red triangle) with a base equal to the radius of one circle and a hypotenuse equal to the twice the radius (or diameter) of the circle.

Table 6.15A-4 – Emission Rate of Aqueous Ammonia Solutions – Worst Case Scenario

$$QR_{WCS} = \frac{0.284 \times U^{0.78} \times MW^{2/3} \times A \times VP \times TCF}{82.05 \times T} \quad \textbf{Equation 2}$$

SYMBOLS AND DESCRIPTION (WORSE CASE SCENARIO)	UNITS	VALUE	RATIONALE
U = windspeed	m/s	1.5	Worst case scenario default value (EPA, 1999)
MW = molecular weight	g/g-mol	17.0	Molecular weight of Ammonia
A = exposed area	ft2	93.6	Based on a 1000 ft2 containment berm and 9.36% empty space (From Page 2)
VP = 10 minute average vapor pressure	mmHg	190	EPA, 1999 - Exhibit B-3 (10-min average vapor pressure for wind speed of 1.5 m/s)
T = temperature	Kelvin	319	From Page 1
TCF = temperature correction factor	unitless	2.23	From Page 1
QRWCS = emission rate for worse case scenario	lb/min	3.91	Equation 2

Notes: m/s = meters per second; g/g-mole = grams per grams-mole; ft^2 = square feet
mmHg = millimeters of Mercury; lb/min = pounds per minute

Table 6.15A-5 – Emission Rate of Aqueous Ammonia Solutions – Alternative Scenario

$$QR_{AS} = \frac{0.284 \times U^{0.78} \times MW^{2/3} \times A \times VP}{82.05 \times T} \quad \textbf{Equation 3}$$

SYMBOLS AND DESCRIPTION (ALTERNATE SCENARIO)	UNITS	VALUE	RATIONALE
U = windspeed	m/s	3	Alternate scenario default value (EPA, 1999)
MW = molecular weight	g/g-mol	17.0	Molecular weight of Ammonia
A = exposed area	ft2	84	Based on a 21 foot long x 4 foot wide release area
VP = 10 minute average vapor pressure	mmHg	148	EPA, 1999 - Exhibit B-3 (10-min average vapor pressure for wind speed of 3 m/s)
T = temperature	Kelvin	298	Alternate scenario default value (EPA, 1999)
QRAC = emission rate for alternate scenario	lb/min	2.25	Equation 3

Notes: m/s = meters per second; g/g-mole = grams per grams-mole; ft^2 = square feet
mmHg = millimeters of Mercury; lb/min = pounds per minute

Table 6.15A-6 – SCREEN 3 Model Input for Worst Case and Alternate Scenarios

MODEL INPUT	UNITS OR CHOICE	WORST CASE	ALTERNATE	SOURCE/RATIONALE
Emission Rate	lb/min	3.91	2.25	From Tables 3 and 4, respectively
	g/s*m^2	0.32	2.18	Convert to g/s and divide by exposed area (Worst Case = 93.6 ft^2 or 8.649 m$^{2;}$ Alternative Case = 84 ft^2 or 7.8 m^2)
Release Height	m	0.00	0.00	Default value of ground level (EPA, 1999)
Side Length	m	15.20	6.40	Worst Case =1,000 square foot containment basin (50' x 20'); Alternative Case = 21 feet (6.4 meters)
Side Width	m	6.08	1.22	Worst Case =1,000 square foot containment basin (50' x 20'); Alternative Case = 4 feet (1.2 meters)
Receptor Height	m	0.00	0.00	Default value of ground level (EPA, 1999)
Urban/Rural	U or R	Rural	Rural	Community of Pala considered to be a rural area (flat terrain topography)
Search through range of wind directions?	Yes/No	Yes	Yes	Default (EPA, 1999)
Choice of Meteorology	1, 2, 3	3	3	Default value of single stability class and wind speed input for meteorology (EPA, 1999)
Stability Class	1 thru 6	6	4	Default values for worst case & alternate scenarios (F & D, respectively) (EPA, 1999)
Wind Speed	m/s	1.5	3	Default values for worst case & alternate scenarios (EPA, 1999)

Notes: lb/min = pounds per minute; g/s*m2 = grams per second meters squared;
m = meters; m/s = meters per second

Table 6.15A-7 – Endpoint Concentration and Distances

LEVEL	CONCEN-TRATION (PPM)	CONCEN-TRATION (UG/M3)	PREDICTED DISTANCE FOR WORST CASE SCENARIO (FEET)	PREDICTED DISTANCE FOR ALTERNATE SCENARIO (FEET)
IDLH - Immediately Dangerous to Life and Health	300	.209E+06	627	144
ERPG-2 - Emergency Response Planning Guideline Level 2	150	.104E+06	951	213
STPEL - Short-Term Public Emergency Limit	75	.521E+05	1434	312
OSHA PEL - Occupational Safety & Health Permissible Exposure Level	50	.348E+05	1818	387

6.15-B. B

APPENDIX 6.15-B – MODELING OUTPUTS

```
06/06/07

14:19:23
  ***  SCREEN3 MODEL RUN  ***
  *** VERSION DATED 96043 ***

 ORANGE GROVE PROJECT - ALTERNATE SCENARIO

 SIMPLE TERRAIN INPUTS:
    SOURCE TYPE                =         AREA
    EMISSION RATE (G/(S-M**2)) =      2.18000
    SOURCE HEIGHT (M)          =        .0000
    LENGTH OF LARGER SIDE (M)  =       6.4000
    LENGTH OF SMALLER SIDE (M) =       1.2200
    RECEPTOR HEIGHT (M)        =        .0000
    URBAN/RURAL OPTION         =        RURAL
 THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
 THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

    MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION


 BUOY. FLUX =     .000 M**4/S**3;  MOM. FLUX =     .000 M**4/S**2.

 *** STABILITY CLASS  4 ONLY ***
 *** ANEMOMETER HEIGHT WIND SPEED OF   3.00 M/S ONLY ***

 **********************************
 *** SCREEN AUTOMATED DISTANCES ***
 **********************************

 *** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES
***

   DIST     CONC             U10M   USTK  MIX HT   PLUME  MAX DIR
    (M)   (UG/M**3)   STAB  (M/S)  (M/S)    (M)   HT (M)   (DEG)
 -------  ----------  ----  -----  -----  ------  ------  -------
      1.   .1041E+08    4     3.0    3.0   960.0     .00      1.
    100.   .4719E+05    4     3.0    3.0   960.0     .00      1.
    200.   .1360E+05    4     3.0    3.0   960.0     .00      1.
    300.   6580.        4     3.0    3.0   960.0     .00      1.
    400.   4000.        4     3.0    3.0   960.0     .00      1.
    500.   2721.        4     3.0    3.0   960.0     .00      1.
    600.   1985.        4     3.0    3.0   960.0     .00      1.
    700.   1522.        4     3.0    3.0   960.0     .00      1.
    800.   1209.        4     3.0    3.0   960.0     .00      1.
    900.   986.6        4     3.0    3.0   960.0     .00      1.
   1000.   823.0        4     3.0    3.0   960.0     .00      1.

 MAXIMUM 1-HR CONCENTRATION AT OR BEYOND     1. M:
      4.   .1378E+08    4     3.0    3.0   960.0     .00      0.
```

```
*********************************
 *** SCREEN DISCRETE DISTANCES ***
 *********************************

 *** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES
***
```

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
40.	.2459E+06	4	3.0	3.0	960.0	.00	0.
42.	.2252E+06	4	3.0	3.0	960.0	.00	0.
43.	.2158E+06	4	3.0	3.0	960.0	.00	0.
44.	.2070E+06	4	3.0	3.0	960.0	.00	0.
46.	.1911E+06	4	3.0	3.0	960.0	.00	0.
48.	.1770E+06	4	3.0	3.0	960.0	.00	0.
50.	.1644E+06	4	3.0	3.0	960.0	.00	0.
53.	.1480E+06	4	3.0	3.0	960.0	.00	0.
56.	.1341E+06	4	3.0	3.0	960.0	.00	0.
60.	.1184E+06	4	3.0	3.0	960.0	.00	0.
61.	.1150E+06	4	3.0	3.0	960.0	.00	0.
63.	.1085E+06	4	3.0	3.0	960.0	.00	0.
64.	.1053E+06	4	3.0	3.0	960.0	.00	1.
65.	.1024E+06	4	3.0	3.0	960.0	.00	1.
75.	.7917E+05	4	3.0	3.0	960.0	.00	1.
80.	.7049E+05	4	3.0	3.0	960.0	.00	1.
90.	.5703E+05	4	3.0	3.0	960.0	.00	1.
94.	.5274E+05	4	3.0	3.0	960.0	.00	1.
95.	.5175E+05	4	3.0	3.0	960.0	.00	1.
98.	.4893E+05	4	3.0	3.0	960.0	.00	1.
100.	.4719E+05	4	3.0	3.0	960.0	.00	1.
105.	.4323E+05	4	3.0	3.0	960.0	.00	1.
115.	.3671E+05	4	3.0	3.0	960.0	.00	1.
116.	.3614E+05	4	3.0	3.0	960.0	.00	1.
117.	.3559E+05	4	3.0	3.0	960.0	.00	1.
118.	.3505E+05	4	3.0	3.0	960.0	.00	1.
119.	.3452E+05	4	3.0	3.0	960.0	.00	1.

```
      ***************************************
      *** SUMMARY OF SCREEN MODEL RESULTS ***
      ***************************************
```

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.1378E+08	4.	0.

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***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************
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```
06/06/07

14:13:58
  ***  SCREEN3 MODEL RUN  ***
  *** VERSION DATED 96043 ***

 ORANGE GROVE PROJECT - WORST CASE SCENARIO

 SIMPLE TERRAIN INPUTS:
    SOURCE TYPE                =         AREA
    EMISSION RATE (G/(S-M**2)) =      .320000
    SOURCE HEIGHT (M)          =        .0000
    LENGTH OF LARGER SIDE (M)  =      15.2000
    LENGTH OF SMALLER SIDE (M) =       6.0800
    RECEPTOR HEIGHT (M)        =        .0000
    URBAN/RURAL OPTION         =        RURAL
 THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
 THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

    MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION


 BUOY. FLUX =     .000 M**4/S**3;  MOM. FLUX =     .000 M**4/S**2.

 *** STABILITY CLASS  6 ONLY ***
 *** ANEMOMETER HEIGHT WIND SPEED OF   1.50 M/S ONLY ***

 **********************************
 *** SCREEN AUTOMATED DISTANCES ***
 **********************************

 *** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES
***
```

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1.	.8413E+07	6	1.5	1.5	10000.0	.00	18.
100.	.6081E+06	6	1.5	1.5	10000.0	.00	0.
200.	.1937E+06	6	1.5	1.5	10000.0	.00	0.
300.	.9808E+05	6	1.5	1.5	10000.0	.00	0.
400.	.6042E+05	6	1.5	1.5	10000.0	.00	0.
500.	.4139E+05	6	1.5	1.5	10000.0	.00	0.
600.	.3037E+05	6	1.5	1.5	10000.0	.00	0.
700.	.2340E+05	6	1.5	1.5	10000.0	.00	0.
800.	.1891E+05	6	1.5	1.5	10000.0	.00	0.
900.	.1567E+05	6	1.5	1.5	10000.0	.00	0.
1000.	.1324E+05	6	1.5	1.5	10000.0	.00	0.
1100.	.1143E+05	6	1.5	1.5	10000.0	.00	0.
1200.	9993.	6	1.5	1.5	10000.0	.00	0.
1300.	8831.	6	1.5	1.5	10000.0	.00	0.
1400.	7877.	6	1.5	1.5	10000.0	.00	0.
1500.	7082.	6	1.5	1.5	10000.0	.00	0.
1600.	6411.	6	1.5	1.5	10000.0	.00	0.

```
   1700.   5839.        6     1.5    1.5 10000.0     .00      0.
   1800.   5347.        6     1.5    1.5 10000.0     .00      0.
   1900.   4920.        6     1.5    1.5 10000.0     .00      0.
   2000.   4547.        6     1.5    1.5 10000.0     .00      0.
MAXIMUM 1-HR CONCENTRATION AT OR BEYOND     1. M:
      9.   .1150E+08    6     1.5    1.5 10000.0     .00     15.

 ********************************
 *** SCREEN DISCRETE DISTANCES ***
 ********************************

 *** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES
***

   DIST     CONC             U10M   USTK  MIX HT   PLUME  MAX DIR
    (M)   (UG/M**3)   STAB  (M/S)  (M/S)    (M)   HT (M)   (DEG)
 -------  ----------  ----  -----  -----  ------  ------  -------
    175.   .2424E+06    6     1.5    1.5 10000.0     .00      0.
    180.   .2312E+06    6     1.5    1.5 10000.0     .00      0.
    190.   .2112E+06    6     1.5    1.5 10000.0     .00      0.
    191.   .2093E+06    6     1.5    1.5 10000.0     .00      0.
    192.   .2075E+06    6     1.5    1.5 10000.0     .00      0.
    250.   .1333E+06    6     1.5    1.5 10000.0     .00      0.
    275.   .1136E+06    6     1.5    1.5 10000.0     .00      0.
    280.   .1102E+06    6     1.5    1.5 10000.0     .00      0.
    281.   .1095E+06    6     1.5    1.5 10000.0     .00      0.
    282.   .1089E+06    6     1.5    1.5 10000.0     .00      0.
    283.   .1082E+06    6     1.5    1.5 10000.0     .00      0.
    285.   .1070E+06    6     1.5    1.5 10000.0     .00      0.
    287.   .1057E+06    6     1.5    1.5 10000.0     .00      0.
    288.   .1051E+06    6     1.5    1.5 10000.0     .00      0.
    289.   .1045E+06    6     1.5    1.5 10000.0     .00      0.
    290.   .1039E+06    6     1.5    1.5 10000.0     .00      0.
    400.   .6042E+05    6     1.5    1.5 10000.0     .00      0.
    430.   .5347E+05    6     1.5    1.5 10000.0     .00      0.
    435.   .5243E+05    6     1.5    1.5 10000.0     .00      0.
    436.   .5223E+05    6     1.5    1.5 10000.0     .00      0.
    437.   .5203E+05    6     1.5    1.5 10000.0     .00      0.
    550.   .3520E+05    6     1.5    1.5 10000.0     .00      0.
    554.   .3477E+05    6     1.5    1.5 10000.0     .00      0.
    553.   .3488E+05    6     1.5    1.5 10000.0     .00      0.

      ****************************************
      *** SUMMARY OF SCREEN MODEL RESULTS ***
      ****************************************

  CALCULATION        MAX CONC    DIST TO   TERRAIN
   PROCEDURE        (UG/M**3)    MAX (M)    HT (M)
 --------------    -----------   -------   -------
 SIMPLE TERRAIN      .1150E+08        9.        0.


 ****************************************************
 ** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
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