APPENDIX D

HAZARDS RISK ANALYSIS MODELING ASSUMPTIONS AND RESULTS

Consequence modeling was performed for the following ammonia release and natural gas explosion scenarios:

Case 1: Transfer of aqueous ammonia at the HGS site by pipeline from existing ammonia storage to the new SCR systems location. It is assumed that the new pipeline under Fries Street was ruptured due to a digging accident or an earthquake. The pipeline releases for one hour at a flow rate of 28 gallons per hour before being shut down manually. The release is assumed to spread on the surface in all directions in an unconfined manner.

Case 2: The entire contents of an aqueous ammonia tanker delivery truck are spilled in a vehicle accident at the HGS site. The entire 5,000-gallons of aqueous ammonia spreads in all directions in an unconfined manner to a depth of one centimeter and evaporates. The impact (e.g., consequence) of the accident is similar to the impact of current deliveries but the frequency increases due to increased aqueous ammonia shipments associated with new SCR systems. The incremental risk is estimated.

Case 3: An aqueous ammonia tanker delivery truck is improperly connected/disconnected at HGS site and releases 200 gallons of aqueous ammonia before the emergency shut-off can be activated. The spill spreads in all directions in an unconfined manner to a depth of one centimeter and evaporates. The risk was estimated compared to a zero baseline.

Case 4: The new natural gas connector pipeline supplying the five new CTs is ruptured near the main and releases natural gas that forms a cloud and explodes after ten minutes (73,879 pounds of natural gas). The blast impact is estimated.

Case 5: The entire contents of one of the three new aqueous ammonia tanks (30,000 gallons) at the SGS site are spilled into a dike area that is five feet high and capable of containing the entire contents of the tank plus 20 percent. The liquid in the dike area then evaporates at a rate estimated from USEPA equations. The storage tank failure was assumed to be caused by an external event or degradation of the equipment. The incremental risk was compared with current facility operations.

Case 6: The entire contents of an aqueous ammonia tanker delivery truck are spilled in a vehicle accident at the SGS site. The entire 5,000 gallons of aqueous ammonia spreads in all directions in an unconfined manner to a depth of one centimeter and evaporates. The risk was estimated compared to a zero baseline.

Case 7: An aqueous ammonia tanker delivery truck is improperly connected/disconnected at the SGS site and releases 200 gallons of aqueous ammonia before the emergency shut-off can be activated. The spill spreads in all directions in an unconfined manner to a depth of one centimeter and evaporates. The risk was estimated compared to a zero baseline.

Case 8: The entire contents of one new aqueous ammonia tanks (20,000 gallons) at the VGS site are spilled into a dike area that is five feet high and capable of containing the entire contents of the tank plus 20 percent. The liquid in the dike area then evaporates at a rate estimated from USEPA equations. The storage tank failure was assumed to be caused by an external event or degradation of the equipment. The incremental risk was compared with current facility operations.

Case 9: The entire contents of an aqueous ammonia tanker delivery truck are spilled in a vehicle accident at the VGS site. The entire 5,000 gallons of aqueous ammonia spreads in all directions in an unconfined manner to a depth of one centimeter and evaporates. The risk was estimated compared to a zero baseline.

Case 10: An aqueous ammonia truck is improperly connected/disconnected at VGS and releases 200 gallons of aqueous ammonia before the emergency shut-off can be activated. The spill spreads in an unconfined manner to a depth of one centimeter and evaporates. The risk was estimated compared to a zero baseline.

Case 11: The new natural gas connector pipeline for one new CT is ruptured near the main and releases natural gas that forms a cloud and explodes after ten minutes (14,776 pounds of natural gas). The blast impact is estimated.

Case 12: Alternate scenario. Rather than install a new ammonia pipeline from the existing aqueous ammonia tanks to the new SCR systems at the HGS site, LADWP will install a new 20,000-gallon ammonia storage tank. Under this alternative scenario, it is assumed that the entire contents of the new aqueous ammonia tank (20,000 gallons) are spilled into a dike area that is five feet high and capable of containing the entire contents of the tank plus 20 percent. The liquid in the dike area then evaporates at a rate estimated from USEPA equations. The storage tank failure was assumed to be caused by an external event or degradation of the equipment. The incremental risk was compared with the ammonia pipeline rupture scenario.

The purpose of the hazards risk modeling was to estimate the offsite consequences of releases of toxic and flammable materials from equipment installations and modifications at the proposed project sites.

The modeling was based on EPA's RMP Guidance worst-case estimates for toxic releases and explosions. The RMPComp model was used to calculate the size of the impact zones. The EPA endpoint for explosions is the distance from the explosion that is required to reduce the overpressure to one psi. The EPA endpoint for ammonia exposure is the distance from the spill that is required to reduce the concentration to 200 ppm, the ERPG II endpoint for ammonia. The

RMPComp program estimates were based on 30 percent aqueous ammonia, which is slightly higher concentration than the 29.5 percent ammonia proposed for this project. The 30 percent concentration is built into RMPComp and was the closest selection available for use.

As of the release of this Draft EIR, the aqueous ammonia tanks and the dike areas for the project sites have not yet been designed. However, as a "worst-case" for all ammonia tank release scenarios, the following assumptions were made:

- Ammonia tank dimensions were assumed to be twice as wide as they were high;
- The ammonia tank volume was assumed to be 10 percent larger than the nominal containment volume. (For a tank with 20,000-gallon contents, the tank volume was assumed to be 22,000 gallons);
- All dike areas were assumed to have excess capacity of 20 percent more than the tank contents. (The dike capacity for 20,000-gallon contents was assumed to be 24,000 gallons);
- All dike walls were assumed to be five feet high;
- For unconfined ammonia spills, the liquid was assumed to spread to a thickness of one centimeter in all directions on a flat impervious surface;
- Rural conditions were conservatively assumed to reduce dispersion.

Table D-1 shows the results of the RMPComp model for explosions and spills.

Table D-1
Distance in Meters to Endpoint from Center of Upset

Case	Event	Natural Gas Explosion	Ammonia Release
1	Ruptured Ammonia Pipeline (60 minute release) Unconfined at HGS	NA	200 (default minimum)
2	Ammonia Truck Spill Unconfined (5,000 gallons) at HGS	NA	2,300
3	Bad Connect/Disconnect Unconfined (200 gallons) at HGS	NA	500
4	Ruptured Pipeline Natural Gas at HGS (10 Minute Cloud Plus Explosion)	600	600
5	Aqueous Ammonia Tank Failure to Diked Containment (30,000 gallons) at SGS	NA	600
6	Ammonia Truck Spill Unconfined (5,000 gallons) at SGS	NA	2,300
7	Bad Connect/Disconnect Unconfined (200 gallons) at SGS	NA	500
8	Aqueous Ammonia Tank Failure to Diked Containment (20,000 gallons) at VGS	NA	500
9	Ammonia Truck Spill Unconfined (5,000 gallons) at VGS	NA	2,300
10	Bad Connect/Disconnect Unconfined (200 gallons) at VGS	NA	500
11	Ruptured Pipeline Natural Gas at VGS (10 Minute Cloud Plus Explosion)	NA	300
12	Alternate – Aqueous Ammonia Tank Failure to Diked Containment (20,000 gallons) at HGS	NA	500