CALIFORNIA ENERGY COMMISSION
1516 NINTH STREET
SACRAMENTO, CA 95814-5512

July 15, 1999

Mr. Andrew Welch
High Desert Power Project, LLC
3501 Jamboree Road, South Tower Suite.
Newport Beach, CA 92660

Dear Mr. Welch:

Per staff's June 4, and July 6, 1999 status reports, staff is filing its final hazardous material management and air quality testimony. These testimonies should replace staff testimonies previously submitted in our January 21, 1999, Staff Assessment. Our hazardous material management testimony was modified to reflect the changes in proposed mitigation contained in the May 6, 1999 "Joint Environmental Impact Mitigation Proposal of the Applicant and CURE [California Unions for Reliable Energy]." The air quality testimony was modified to address the Mojave Desert Air Quality Management District's final Determination of Compliance, air quality analyses conducted by CURE and the applicant, and the May 6, 1999 "Joint Environmental Impact Mitigation Proposal of the Applicant and CURE."

If you have any questions, please call me at (916) 653-1614, or E-mail me at rbuell@energy.state.ca.us.

Sincerely,

Richard K. Buell
Siting Project Manager

Enclosure

cc: Proof of Service, 97-AFC-1

RKB:rkb
July 15 Submittals.doc

HAZARDOUS MATERIAL MANAGEMENT

Final Testimony of Rick Tyler and Joseph M. Loyer

INTRODUCTION

The purpose of this analysis is to determine if the proposed High Desert Power Project (HDPP) will have a significant impact on the health and safety of the general public as a result of handling or storing hazardous materials at the facility. The scope of this analysis includes a determination of the project's ability to satisfy the applicable laws, ordinances, regulations and standards (LORS) after certification has been granted. If significant adverse impacts are identified, the Energy Commission staff will evaluate the potential for facility design alternatives or mitigation measures to reduce impacts to the extent feasible. The closely related issues of hazardous waste removal and worker safety are addressed in the areas of Waste Management and Worker Safety.

The following hazardous materials, which are to be used at the facility, have a potential to impact the general public:

- sodium hypochlorite,
- sodium hydroxide,
- sulfuric acid,
- aqueous ammonia, and
- natural gas.

The accidental release or mixing of the substances listed above can result in the release of a toxic or explosive gas. Sodium hypochlorite and sulfuric acid react and can produce chlorine gas. Sodium hydroxide and sulfuric acid react with most metals to release hydrogen gas, which is explosive in air. The use of aqueous ammonia can result in the release of ammonia gas in the event of a spill, due to its relatively high vapor pressure. The use of natural gas can result in fires and/or explosions.

Other hazardous materials, such as scale inhibitors (phosphate), oxygen scavengers, neutralizing amine, biocides, settling aids, drainage aids, water softening and de-chlorinators, will be present at the proposed facility. However, these materials pose minimal potential for off-site impacts, as they will be stored in small quantities. Therefore, they are not considered in this analysis.

The typical methods used, in order of preference, to avoid or minimize impacts from the accidental releases of hazardous materials are as follows:

- use of non-hazardous or less hazardous materials,
- use of engineered controls,
- use of administrative controls, and
- emergency response planning.

APPLICABLE LAWS, ORDINANCES, REGULATIONS, STANDARDS AND POLICIES

FEDERAL

The Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III and Clean Air Act of 1990 established a nationwide emergency planning and response program and imposed reporting requirements for businesses which store, handle, or produce significant quantities of extremely hazardous materials. The Acts (codified in 40 C.F.R., section 68.115, part F) require the states to implement a comprehensive system to inform local agencies and the public when a significant quantity of such materials is stored or handled at a facility. The requirements of these Acts are reflected in the California Health and Safety Code, section 25531 et seq.

STATE

The California Health and Safety Code, section 25534 directs facility owners, storing or handling acutely hazardous materials in reportable quantities, to develop a Risk Management Plan (RMP) and submit it to appropriate local authorities, the United States Environmental Protection Agency (EPA), and the designated local Administering Agency for review and approval. The plan must include an evaluation of the potential impacts associated with an accidental release, the likelihood of an accidental release occurring, the magnitude of potential human exposure, any preexisting evaluations or studies of the material, the likelihood of the substance being handled in the manner indicated, and the accident history of the material. This new, recently developed program supersedes the California Risk Management and Prevention Plan (RMPP).

The California Code of Regulations, Title 8, section 5189 requires facility owners to develop and implement effective safety management plans to insure that large quantities of hazardous materials are handled safely. While such requirements primarily provide for the protection of workers, they also indirectly improve public safety and are coordinated with the RMP process.

California Health and Safety Code, section 41700 requires that “No person shall discharge from any source whatsoever such quantities of air contaminants or other material which causes injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property.”

California Government Code, section 65850.2 restricts the issuance of a certificate of occupancy permit to any new facility involving the handling of acutely hazardous materials until the facility has submitted an RMP to the administering agency with jurisdiction over the facility.

LOCAL AND REGIONAL

The Uniform Fire Code (UFC) contains provisions regarding the storage and handling of hazardous materials. These provisions are contained in Articles 79 and 80. Article 80 was extensively revised in the latest edition. These articles contain requirements that are generally similar to those contained in Health & Safety Code section 25531 et seq. The UFC does, however, contain unique requirements for secondary containment, monitoring, and treatment of toxic gases emitted through emergency venting. These unique requirements are generally restricted to extremely hazardous materials.

The Uniform Building Code (UBC) contains requirements regarding the storage and handling of hazardous materials, in a Seismic Zone 4 area, which restrict the issuance of an occupancy permit until the applicant has demonstrated compliance with section 307.1.6 of the UBC. That section requires a Hazardous Materials Management Plan be completed, which is similar in some respects to the RMP.

ENVIRONMENTAL SETTING

SITE AND VICINITY DESCRIPTION

The HDPP will be located on a portion of the Southern California International Airport (SCIA), formerly the George Air Force Base, in the City of Victorville, California as shown in Figure 5.8-1 of the application (HDPP 1997b, AFC page 5.8-5).

Several factors associated with the location of the project affect its potential for causing public health impacts. These include:

- the local meteorology,
- terrain characteristics,
- special location considerations, and
- the location of population centers and sensitive receptors relative to the project.

Staff considered these factors in assessing the potential impacts to the public, which may occur in the event of an accidental release of hazardous material from the facility. The following sections describe the local conditions affecting public exposure in the area surrounding the proposed project.

METEOROLOGICAL CONDITIONS

Wind speed, wind direction and air temperature affect the extent to which accidentally released hazardous materials would be dispersed into the air and the direction in which they would be transported. This affects the level of public exposure to such materials and the associated health impacts. When wind speeds are low and the atmosphere is stable, dispersion is minimized and can lead to significant health impacts to those exposed.

Recorded wind speeds and ambient air temperatures are discussed in the air quality section of the HDPP AFC (HDPP 1997b, AFC section 5.12.4). This data indicates that low wind speeds of 1 to 3 knots, F stability and temperatures exceeding 100°F, which create worst case circumstances for dispersion, do occur in the project area, as seen in Tables 5.12-9 and -10 of the application (HDPP 1997b, AFC Page 5.12-26).

TERRAIN CHARACTERISTICS

The location of elevated terrain (terrain above the stack height) is often an important factor to be considered in assessing potential exposure. An emission plume resulting from an accidental release may impact high elevations before impacting lower elevations. There is elevated terrain to the northwest and south within 10 miles and east within 3 miles of the project site. However, these elevated terrain areas are sparsely populated and are a significant distance from the project site, so they are not considered in the impacts modeling analysis.

SPECIAL LOCATION CONSIDERATIONS

The project is located on property just east of the SCIA. In the event of an accidental hazardous material release, aircraft taking off, landing or taxiing may be exposed, see Figure 5.8-3 (HDPP 1997b, AFC Page 5.8-26). Equally, aircraft attempting to take off or land may pose a hazard to the facility if the aircraft crashes. The SCIA taxiway is located approximately 1,000 feet (305 meters) from the project site fence line.

The site is located in a UBC Seismic Zone 4 area, the zone of greatest potential shaking. The project will be designed to the Zone 4 requirements or greater.

LOCATION OF EXPOSED POPULATIONS AND SENSITIVE RECEPTORS

The general public includes many sensitive subgroups that may be at greater risk from exposure to hazardous materials. These sensitive subgroups include the very young, the elderly, and those with existing illnesses (Calabrese 1978). Also, the location of the general public in the area surrounding a project site may have a large bearing on exposure risk. Figure 5.8-3 (HDPP 1997b, AFC Page 5.8-26) shows the locations of both the general public and sensitive subgroups in the project vicinity.

IMPACTS

Staff has identified three major types of hazards associated with the proposed project:

- accidental release of ammonia gas,
- chlorine and hydrogen gas release, and
- fire and explosion from the use of natural gas

As discussed below, the release of ammonia is, in staff's opinion, the most likely accident to occur at the facility with the potential for off-site impacts. Staff therefore required modeling of the release. It is staff's opinion that the release of chlorine gas

or explosion from natural gas are extremely unlikely events, and that modeling them would not provide additional useful information.

ACCIDENTAL RELEASE OF AMMONIA GAS

DELIVERY AND STORAGE OF AQUEOUS AMMONIA

The applicant has proposed the use of aqueous ammonia as a substitute for the much more hazardous anhydrous ammonia. The use of aqueous ammonia results in a substantial risk reduction in that anhydrous ammonia is a gas at ambient conditions and has a greater potential to impact public health and safety. However, the accidental release of aqueous ammonia can result in the emission of ammonia gas from the liquid upon loss of containment. This is the result of the relatively high vapor pressure of aqueous ammonia under ambient conditions, which can exist at the time of release. Under certain circumstances, an aqueous ammonia spill can cause significant public health impacts.

The aqueous ammonia storage tank being proposed will be a vertically mounted American Petroleum Institute (API) compliant, double walled tank that will also comply with UBC Seismic Zone 4 requirements. The applicant has proposed to build a diked area around the aqueous ammonia storage tank capable of containing (with a reasonable margin for error) the entire 50,000 gallons of aqueous ammonia stored on site. The applicant further proposes to construct a catchment basin between the delivery truck and the storage tank that will drain into a sump capable of containing an entire delivery of aqueous ammonia (approximately 8,000 gallons). Finally, the applicant proposes to restrict aqueous ammonia deliveries to daylight hours only, which will be included in their business plan, risk management plan and safety audit program.

The applicant will develop an emergency response plan in conjunction with the Victorville Fire Department (VFD) that will incorporate appropriate actions in the case of an aqueous ammonia spill of any kind.

AQUEOUS AMMONIA RELEASE SCENARIOS

Several release scenarios are analyzed to identify and mitigate to the extent feasible any significant risks to public health and safety. These scenarios are not intended to be inclusive of all possible accidents, but instead represent those accidents that are reasonably foreseeable. Each scenario is evaluated for its probable event and significance of impact. If a scenario is a probable event and will result in a significant impact, then those impacts will be mitigated to the extent feasible.

Aqueous Ammonia Transfer Release Scenario

Staff believes that the most likely scenario resulting in a significant impact to public health and safety would involve human errors during the process of transferring aqueous ammonia from the delivery truck to the storage tank. These errors could result in the loss of all of the delivered material (approximately 8,000 gallons). To

evaluate the potential impacts on the public health and safety, the applicant has performed an appropriate modeling analysis (HDPP 1998u).

The applicant modeled the accidental release of aqueous ammonia during delivery (a loss of 8,000 gallons) with the following assumptions (HDPP 1998u). The temperature of the aqueous ammonia is assumed to be 83°F, consistent with a truck traveling from a non-desert area at highway speeds and includes heat transfer from the hot cement catchment basin. The ambient air was modeled at D stability and 3 m/s wind speed to simulate a daylight-delivery-only restriction. The aqueous ammonia spill is assumed to drain into the sump. The results of this modeling show that there are no off-site impacts from a spill of this nature.

Staff recommends the use of four bench-mark, short-term (30 minutes) exposure levels for the modeling of an accidental release of aqueous ammonia: 1) lethality (2,000 parts per million (ppm)), 2) immediately dangerous to life and health (500 ppm), 3) the RMP endpoint required by EPA (200 ppm), and 4) a level considered to be without serious adverse effects on the public (75 ppm). The exposure levels considered by staff and their applicability for modeling the accidental release of ammonia can be found in Appendix A.

Staff further recommends that the nearest public receptor (a member of the general public) be assumed to be at the fence line, not the taxiway of the SCIA as suggested by the applicant. This is a difference of approximately 300 meters. Our reasoning is that the property next to the proposed site is currently planned for development in the near future and a developer is actively being sought. Therefore, it is not unreasonable to expect a member of the public to be near the fence line of the proposed facility. Eliminating these 300 meters of buffer space increases the likelihood of finding a significant impact on public health and safety. However, this does not significantly change the outcome of the modeling results.

Aqueous Ammonia Storage Tank Release Scenario

The aqueous ammonia will be stored in a 50,000-gallon, double walled, atmospheric (vented to the atmosphere), vertically mounted storage tank that will comply with API 650 and Seismic Zone 4 design standards. However, these were not the original design specifications. The original proposal called for a 100,000-gallon storage tank. The original offsite consequence modeling reflected the larger capacity storage tank. That modeling showed significant offsite concentrations of ammonia in the event of a catastrophic storage tank rupture. CURE raised concerns regarding potential public exposure. Even though CURE and the applicant have reduced the capacity of the storage tank, the original modeling for a catastrophic tank failure is still valid. This is because in that event, the resulting pool surface area of the released material is still very similar to that of the original proposal. Therefore, the offsite concentrations of ammonia in the event of complete tank failure are still expected to be significant. However, staff believes that the probability of spontaneous, complete catastrophic failure of the proposed double-walled storage tank is too low to be considered a plausible event.

The probability of a spontaneous catastrophic failure of the currently proposed storage tank is difficult to calculate precisely. Staff contacted API, but no failure rate data exists that adequately represents a storage tank of this nature. Staff considered the following factors to estimate the likelihood of a spontaneous catastrophic failure of the proposed aqueous ammonia storage tank.

First, the failure rate of older API standard tanks is approximately 1/10,000 (Lees 1983), and the failure rate of older pressure vessels is approximately 1/100,000 (Lees 1983). These tanks are not representative of the proposed storage tank, but should have higher failure rates. These tanks predate the current API 650 standards and the Seismic Zone 4 standards. These standards are the most stringent in the world, specifying the wall thickness and anchorage design. Increased wall thickness improves the tank strength, but also aids in crack detection. With thicker walls, a larger crack is required to cause a catastrophic failure; larger cracks are easier to detect and repair during regular inspections.

Secondly, the proposed aqueous ammonia storage tank will be double walled. The most common failure mode for an atmospheric tank is corrosion of the tank wall. A double walled tank protects the interior tank wall so that corrosion is practically eliminated as a failure mode. Additionally, if the inner wall does fail, the outer wall should contain any released aqueous ammonia.

Thirdly, it is not tank failure *per se* that is the primary concern, but rather the probability of significant impact on the public. In order to produce such impacts, this scenario would have to occur in conjunction with very pessimistic meteorological conditions (F stability, 1 meter/second wind speed, winds in a direction of public receptors, and 90-degree F ambient temperatures). Low winds in a direction of nearest public receptors occur about 5% of the time. F stability and 90 degree F ambient temperatures occur less than .025% of the time. Adopting these assumptions results in a significant decrease the downwind impacts. If winds resulted in the transport of released material in a direction where receptors are not present, then no impact would result.

Given these considerations, staff concludes that the risk of catastrophic tank failure is likely to be near or below the *de minimus* level (1 in 1,000,000) and the risk of impacting the public health and safety is well below the *de minimus* level.

Aircraft Collision with Aqueous Ammonia Storage Tank Scenario

Due to the proximity of the proposed facility to the Southern California International Airport (SCIA), staff has investigated the possibility of an aircraft impacting the aqueous ammonia storage tank. If such an impact were to occur, it could result in the total loss of the stored material (50,000 gallons of aqueous ammonia). As discussed above, a release of this nature can present a significant risk to the public health and safety.

Staff has estimated the most conservative probability that a collision between aircraft arriving or departing SCIA and the aqueous ammonia storage tank would occur as 1.21 in 1,000,000. Staff bases this estimate on several assumptions.

First, the aqueous ammonia tank is an 800 square foot target in a 234-acre zone (the sideline safety zone) that has a record of attracting 11% of all aviation accidents (DOT 1993). Second that there are no more than 40,000 flights per year at SCIA (Blomendale 1998, pers. comm.). Third, approximately 0.35 flights out of 100,000 flights at SCIA will crash at the airport (NTSB 1998). Staff used the following calculation:

(800 sq ft/ 10,193,040 sq ft)(.11)(.35)(40,000/100,000)= 1.21 in 1,000,000 per year.

where: 800 sq ft is the area occupied by the tank,
10,193,040 sq ft is the area of the crash zone in which the tank is located,
.11 is the percentage of crashes associated with the crash zone,
.35 is the number of crashes in general at U.S. airports per 100,000 flights (at takeoff and landing), and
40,000 is the number of flights (takeoffs + landings) from the airport.

This estimate is very conservative and does not take into account the fact that the aqueous ammonia storage tank is located interior to the power plant site, away from the fence line. This would make it significantly more difficult for an out-of-control aircraft to impact the tank. Departing aircraft would have to clear the cooling towers and a combustion turbine to impact the tank, which is very unlikely, in staff's opinion. The more likely scenario is for the arriving aircraft to veer off-course, clear or partially impact the water treatment facilities, and then impact the aqueous ammonia storage tank. The estimate also assumes that all the flights arriving at or departing from SCIA do so on the closest (secondary) runway. Staff estimates the actual maximum number of arrivals per year on the secondary runway to be approximately 3,000 (Blomendale 1998, pers. comm.). With these refinements, the estimated probability of an aircraft collision with the aqueous ammonia storage tank drops to approximately 9 in 100,000,000.

(800 sq ft/ 10,193,040 sq ft)(.11)(.35)(3,000/100,000)= 9.065 in 100,000,000 per year.

Multiplying this number by 30 years (the life of the plant) results in an overall risk of 2.72 in 1,000,000, which is slightly above the *de minimus* level (1 in 1,000,000). As mentioned previously, it is not tank failure *per se* that is the primary concern, but rather the probability of significant impact on the public. In order to produce such impacts, this scenario would have to occur in conjunction with very pessimistic meteorological conditions (F stability, 1 meter/second wind speed, winds in a direction of public receptors, and 90-degree F ambient temperatures). Low winds in a direction of nearest public receptors occur about 5% of the time. F stability and 90 degree F ambient temperatures occur less than .025% of the time. Adopting these assumptions result in a significant decrease in the downwind impacts. If winds result in the transport of released material in a direction where receptors are not present, then no impact would result. Staff believes that the use of these additional assumptions more than compensates for the probability of occurrence above the *de minimus* level for this release scenario.

CHLORINE AND HYDROGEN GAS RELEASE

Sodium hypochlorite, sulfuric acid and sodium hydroxide will be used to treat the cooing tower water for biological agents, and for water neutralization and pH level control. The mixture of sodium hypochlorite and sulfuric acid can result in the release of chlorine gas, which is extremely hazardous. Sulfuric acid and sodium hydroxide react with metals to form hydrogen gas, which is explosive in air.

In order to more effectively protect the public health and safety, staff is proposing that the applicant, upon completion of construction of the proposed facility and prior to operation, develop a safety management plan (see proposed Condition of Certification HAZ-4 below). The safety management plan (SMP) will include employee training and safety procedures that will ensure that the probability of accidentally mixing sodium hypochlorite and sulfuric acid will be minimal.

Sodium hypochlorite will be used to treat water to control the growth of algae and other biological agents and to control pH. Staff supports the use of this material in that it poses much less risk than use of anhydrous chlorine, which is more commonly used for this purpose. This material will be stored in a fiber-reinforced tank within a diked area sufficient to contain the entire volume of stored material. A pump will be used to transfer this material through the water treatment system. The pump controls will be designed to automatically adjust the pump stroke and will be equipped with an on/off selector switch for manual tripping that can override any interlocks. The tank will also be equipped with outdoor and remote alarms to indicate tank level. All unloading and liquid transfer operations will be supervised and dry-disconnect transfer hoses and piping connections will be used. Neutralizers and/or absorbers will be kept on-site in case a spill occurs around a containment area.

Sulfuric acid will be used to control pH levels in the cooling tower and feedwater. This material will be stored on-site in reportable quantities in a lined metal tank with a diked area around it sufficient to contain the entire volume of the material stored. A pump will be used to transfer this material through the water treatment system. The pump controls will be designed to automatically adjust the pump stroke and will be equipped with an on/off selector switch for manual tripping that can override any interlocks. The tank will also be equipped with outdoor and remote alarms to indicate tank level. All unloading and liquid transfer operations will be supervised and dry-disconnect transfer hoses and piping connections will be used. Neutralizers and/or absorbers will be kept on-site in case a spill occurs around a containment area.

Sodium hydroxide will be used to control pH levels and for neutralization of the cooling tower water. This material will be stored on-site in reportable quantities in a lined metal tank with a diked area around it sufficient to contain the entire volume of the material stored. A pump will be used to transfer this material through the water treatment system. The pump controls will be designed to automatically adjust the pump stroke and will be equipped with an on/off selector switch for manual tripping that can override any interlocks. The tank will also be equipped with outdoor and remote alarms to indicate tank level. All unloading and liquid transfer operations will

be supervised and dry-disconnect transfer hoses and piping connections will be used. Neutralizers and/or absorbers will be kept on-site in case a spill occurs around a containment area.

With these mitigation measures, staff believes that the potential for accidental mixing of chlorine and subsequent formation of hydrogen gas, and their related off-site impacts, are very remote and not a significant threat to public health and safety.

FIRE AND EXPLOSION FROM THE USE OF NATURAL GAS

Natural gas, which will be used as a fuel for the facility, poses a fire and/or explosion risk as a result of its flammability. While natural gas will be used in significant quantities, it will not be stored on-site. The risk of a fire and/or explosion will be reduced to insignificant levels through adherence to applicable codes and the development and implementation of effective safety management practices. National Fire Protection Association 85A requires: 1) the use of double block and bleed valves for gas shut-off, 2) automated combustion controls, and 3) burner management systems. These measures will significantly reduce the likelihood of an explosion in the heat recovery steam generators. Additionally, start-up procedures will require air purging of gas turbines and fireboxes prior to start-up to preclude the presence of an explosive mixture.

MITIGATION

ACCIDENTAL RELEASE OF AMMONIA GAS

The proposed aqueous ammonia storage tank will be a vertically mounted American Petroleum Institute (API) 650 compliant, UBC Seismic Zone 4 compliant, double walled 50,000-gallon tank. The applicant has proposed to build a diked area around the aqueous ammonia storage tank capable of containing (with a reasonable margin for error) the entire 50,000 gallons of aqueous ammonia stored on site. The applicant further proposes to construct a catchment basin between the delivery truck and the storage tank that will drain into a sump capable of containing an entire delivery of aqueous ammonia (approximately 8,000 gallons). Finally, the applicant proposes to restrict aqueous ammonia deliveries to daylight hours only, which will be included in their business plan, risk management plan and safety audit program.

Given the proposed design and controls for the aqueous ammonia delivered and stored on site, staff recommends no further mitigation.

CHLORINE AND HYDROGEN GAS RELEASE

Sodium hypochlorite, sodium hydroxide and sulfuric acid will be stored in appropriately designed tanks, surrounded by diked areas with enough capacity to contain the entire volume of stored material. Pumps, controls and appropriate safety procedures will be employed in unloading and transferring these materials.

Given the proposed controls for the sodium hypochlorite, sodium hydroxide and sulfuric acid delivered and stored on site, staff recommends no further mitigation.

FIRE AND EXPLOSION FROM THE USE OF NATURAL GAS

Natural gas will be used in significant quantities, but will not be stored on-site. The risk of a fire and/or explosion will be reduced to insignificant levels through adherence to applicable codes and the development and implementation of effective safety management practices.

Given the proposed controls for the use of natural gas, staff recommends no further mitigation.

ADDITIONAL STAFF PROPOSED MITIGATION

Staff proposes (see proposed Condition of Certification Haz-4, below) that HDPP prepare a Safety Management Plan, which should focus on the delivery and handling of the identified hazardous materials, identify management personnel (by job title) who are responsible for developing and implementing the identified safety procedures, and the safety procedures themselves. The plan should include how HDPP will motivate its employees to accomplish safety objectives and detailed procedures used to address the hazards associated with human error during storage and transfer of hazardous materials. It is a commonly accepted fact that most accidents occur as a direct result of human error. The Safety Management Plan would address and minimize that error to the most feasible extent possible.

COMPLIANCE WITH LORS

The applicant will comply with all LORS requirements by developing and implementing a Business Plan and a Risk Management Plan (described below), as well as designing and constructing the proposed power plant to Seismic Zone 4 specifications and applicable ASME codes.

The Business Plan (Health & Safety Code § 25500 et seq.) must include the basic information on the location, type, quantity, and the health risks of hazardous materials handled, used, stored, or disposed of in the state, which could be accidentally released into the environment. It must also include a plan for training new personnel and for annual training of all personnel in safety procedures to follow in the event of a release of hazardous materials. It must include an emergency response plan and identify the business representative able to assist emergency personnel in the event of a release.

The Risk Management Plan (Health & Safety Code § 25531 et seq.) must identify the severity of an accidental release, the likelihood of an accidental release occurring, the magnitude of potential human exposure, any preexisting evaluations or studies of the material, the likelihood of the substance being handled in the manner indicated, and the accident history of the material.

FACILITY CLOSURE

The project will eventually be closed. A power plant is typically intended to serve for twenty, thirty or forty years. At the end of that lifespan, a planned closure typically

occurs, under which the facility is decommissioned in an orderly manner. Natural disasters, such as an earthquake or severe storm, and economic emergencies, such as loss of a fuel supply contract or power sales contract, can cause an unexpected temporary shutdown of the project. If damage to the project is too great, or if the economic problems cannot be solved, the unexpected shutdown may become permanent.

In each of these shutdown scenarios, it is imperative that hazardous materials stored onsite be managed safely. In the Facility Closure portion of the **General Conditions** section of this document, requirements are delineated that will require the project owner to submit to the CPM a Facility Closure Plan in the event of a planned closure of the facility. In addition, the General Conditions section requires the project owner to submit to the CPM, before commercial operation commences, On-site Contingency Plans that address how the hazardous materials will be managed in the event of an unexpected temporary or permanent closure. In order to ensure that hazardous materials are managed safely, the following provisions should be included in the Facility Closure Plan and the On-site Contingency Plan:

- In the case of a planned closure or an unexpected permanent closure, any hazardous materials present shall be removed from the site in accordance with all applicable LORS. One way of accomplishing this may be for the project owner to include, in its contracts with hazardous materials suppliers, a requirement that the supplier remove the materials if requested to do so by the project owner or any competent authority.
- In the case of an unexpected temporary closure, the On-site Contingency Plan shall address how the site and the hazardous materials will be managed safely for the period of closure. Should the temporary closure be declared permanent by the CPM, any hazardous materials present shall be removed from the site in accordance with all applicable LORS.

The above requirements should serve as adequate protection, even in the unlikely event of project abandonment. To ensure that these measures are included in the Facility Closure Plan and the On-site Contingency Plan, a Condition of Certification (HAZ-6) is proposed, below.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Staff concludes that the proposed handling of hazardous materials at the project site will comply with applicable LORS and will not result in a significant risk to public health. Staff proposes the following conditions of certification to ensure that the applicant performs all mitigation measures as proposed in the AFC in addition to the staff proposed mitigation.

RECOMMENDATIONS

Energy Commission staff recommends that the proposed conditions of certification presented herein be adopted by the Energy Commission to ensure that the project is designed, constructed and operated to protect public health and safety and to comply with applicable LORS.

PROPOSED CONDITIONS OF CERTIFICATION

HAZ-1 The project owner shall not use any hazardous material in reportable quantities that is not listed in Appendix B, unless approved by the CPM.

Verification: The project owner shall provide in the Annual Compliance Report a list of hazardous materials used at the facility in reportable quantities.

HAZ-2 The project owner shall accept deliveries of aqueous ammonia no earlier than sunrise and no later than one hour prior to sunset.

Verification: The project owner shall provide in the Annual Compliance Report a list of all deliveries of aqueous ammonia, which is to include at a minimum; amount delivered, time of delivery, time of sunrise and time of sunset.

HAZ-3 The project owner shall submit both the Business Plan and the Risk Management Plan to the CPM for review and approval, and shall also submit these plans and/or procedures to the Victorville Fire Department for review.

Verification: At least sixty (60) days prior to the initial delivery of any hazardous materials in reportable quantities to the facility, the project owner shall submit the Business Plan and Risk Management Plan to the CPM for review and approval. At the same time, the project owner shall submit these plans to the Victorville Fire Department for review. The project owner shall also submit to the CPM the Victorville Fire Department's comments on these plans when available.

HAZ-4 The project owner shall provide a detailed Safety Management Plan (SMP) to the CPM.

Protocol: The Safety Management Plan shall include the following: 1) a description of how each element of the SMP applies to the proposed facility, 2) an explicit chain of command (by job title on final organization chart) for each specific objective identified in the plan (for example, under "Accountability," list who will be responsible for the preparation of the specific statement of expectations, objectives and goals by senior management, daily shift logs and reports of abnormal conditions), 3) a description of how corporate management will ensure proper implementation of the SMP and ensure that production and safety are properly balanced, 4) methods that will be used to motivate employees to accomplish safety objectives, and 5)

detailed procedures to address the hazards associated with human error during storage and transfer of hazardous materials.

Verification: At least sixty (60) days prior to the initial delivery of any hazardous materials in reportable quantities to the facility, the project owner shall provide a detailed Safety Management Plan as described in the Protocol section of this Condition of Certification to the CPM for review and comment.

HAZ-5 The project owner shall design the aqueous ammonia storage facility with the following elements and goals:

1. A vertically mounted double-walled storage tank of no more than 50,000 gallons in capacity, which is designed to UBC Seismic Zone 4 and API 650 standards.
2. A diked area around the tank capable of containing the entire 50,000 gallons of aqueous ammonia plus 10%.
3. A loading area such that any aqueous ammonia spilled there will drain into a sump capable of containing 1 entire truck delivery plus 10%.

Verification: At least sixty (60) days prior to the initial delivery of aqueous ammonia, the project owner shall provide designs for the aqueous ammonia storage facility as described in this Condition of Certification to the CPM for approval.

HAZ-6 Prior to commencement of commercial operation, the project owner shall submit to the CPM for review and approval hazardous materials management plans as described below. These plans may be incorporated into the Facility Closure Plan and the On-site Contingency Plans (which are required under General Conditions).

Protocol: For the event of a planned closure or an unexpected permanent closure of the facility, the On-site Contingency Plan (and the Facility Closure Plan, should one be submitted) shall address how all hazardous materials will be removed from the site in accordance with all applicable LORS.

For the event of an unexpected temporary closure of the facility, the On-site Contingency Plan shall address how the site and the hazardous materials will be secured and maintained safely for the period of closure. For the event in which the temporary closure is declared permanent by the CPM, the On-site Contingency Plan shall address how all hazardous materials will be removed from the site in accordance with all applicable LORS.

Verification: At least 60 days (or other time agreed to by the CPM) prior to commencement of commercial operation, the project owner shall submit the above plans to the CPM for review and approval.

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APPENDIX A

BASIS FOR USE OF 75 PPM AMMONIA EXPOSURE CRITERIA

Staff uses a criterion of 75 ppm to evaluate the significance of impacts associated with potential accidental releases of ammonia. While this criterion is not consistent with the 200 ppm criterion used by EPA and Cal EPA in evaluating such releases pursuant the Federal Risk Management Program and State Accidental Release Program, it is appropriate for use in staff's CEQA analysis. The Federal Risk Management Program and the State Accidental Release Program are administrative programs designed to address emergency planning and ensure that appropriate safety management practices are implemented and actions are taken in response to accidental releases. However, the regulations implementing these programs do not provide clear design changes or other major changes to a proposed facility. The preface to the Emergency Response Planning Guidelines (ERPGs) states that "these values have been derived as planning and emergency response guidelines, **not** exposure guidelines, they do not contain the safety factors normally incorporated into exposure guidelines. Instead they are estimates, by the committee, of the thresholds above which there would be an unacceptable likelihood of observing the defined effects." It is staff's contention that these values apply to adult healthy individuals and are levels that should not be used to evaluate the acceptability of avoidable exposures. While these guidelines are useful in decision making in the event that a release has already occurred (for example, prioritizing evacuations) they are not appropriate and are not binding on discretionary decisions involving proposed facilities where many options for mitigation are feasible. CEQA requires permitting agencies making discretionary decisions to identify and mitigate potentially significant impacts through changes to the proposed project.

Staff has chosen to use the National Research Council's 30 minute Short Term Public Emergency Limits (STPELs) to determine the potential for significant impact. These limits are designed to apply to accidental unanticipated releases and subsequent public exposure. Exposure at these levels should not result in "serious sequelae" but would result in "strong odor, lacrimation, and irritation of the upper respiratory tract (nose and throat), but no incapacitation or prevention of self-rescue." It is staff's opinion that exposures of the general public to concentrations above these levels pose significant risk of adverse health impacts on sensitive members of the general public. It is also staff's position that these exposure limits are the best available criteria to use in gauging the significance of public exposures associated with potential accidental releases. It is, further, staff's opinion that these limits constitute an appropriate balance between public protection and mitigation of unlikely events, and are useful in focusing mitigation efforts on those release scenarios that pose real potential for serious impacts on the public. Table 1 provides a comparison of the intended use and limitations associated with each of the various criteria that staff considered in arriving at the decision to use the 75 ppm STPEL.

ACUTE AMMONIA EXPOSURE GUIDELINES

Guideline	Responsible Authority	Applicable Exposed Group	Allowable Exposure Level	Allowable* Duration of Exposures	Potential Toxicity at Guideline Level/Intended Purpose of Guideline
IDLH[2]	NIOSH	Workplace standard used to identify appropriate respiratory protection.	300 ppm	30 min.	Exposure above this level requires the use of "highly reliable" respiratory protection and poses the risk of death, serious irreversible injury or impairment of the ability to escape.
IDLH/10[1]	EPA, NIOSH	Work place standard adjusted for general population factor of 10 for variation in sensitivity	30 ppm	30 min.	Protects nearly all segments of general population from irreversible effects
STEL[2]	NIOSH	Adult healthy male workers	35 ppm	15 min. 4 times per 8 hr day	No toxicity, including avoidance of irritation
EEGL[3]	NRC	Adult healthy workers, military personnel	100 ppm	Generally less than 60 min.	Significant irritation but no impact on personnel in performance of emergency work; no irreversible health effects in healthy adults. Emergency conditions one time exposure
STPEL[4]	NRC	Most members of general population	50 ppm 75 ppm 100 ppm	60 min. 30 min. 10 min.	Significant irritation but protect nearly all segments of general population from irreversible acute or latent effects. One time accidental exposure
TWA[2]	NIOSH	Adult healthy male workers	25 ppm	8 hr.	No toxicity or irritation on continuous exposure for repeated 8 hr. work shifts
ERPG-2[5]	AIHA	Applicable only to emergency response planning for the general population (evacuation) (not intended as exposure criteria) (see preface attached)	200 ppm	60 min.	Exposures above this level entail** unacceptable risk of irreversible effects in healthy adult members of the general population (no safety margin)

1.(EPA 1987) **2.**(NIOSH 1994) **3.**(NRC 1985) **4.** (NRC 1972) **5.** (AIHA 1989)

- The (NRC 1979), (WHO 1986), and (Henderson and Haggard 1943) all conclude that available data confirm the direct relationship to increases in effect with both increased exposure and increased exposure duration.

** The (NRC 1979) describes a study involving young animals which suggests greater sensitivity to acute exposure in young animals. The (WHO 1986) warns that the young, elderly, asthmatics, those with bronchitis and those that exercise should also be considered at increased risk based on their demonstrated greater susceptibility to other non-specific irritants.

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Abbreviations

ACGIH, American Conference of Governmental and Industrial Hygienists
AIHA, American Industrial Hygienists Association
EEGL, Emergency Exposure Guidance Level
EPA, Environmental Protection Agency
ERPG, Emergency Response Planning Guidlines
IDLH, Immediately Dangerous to Life and Health Level
NIOSH, National Institute of Occupational Health and Safety
NRC, National Research Council
STEL, Short Term Exposure Limit
STPEL, Short Term Public Emergency Limit
TLV, Threshold Limit Value
WHO, World Health Organization

APPENDIX B

HAZARDOUS MATERIALS TO BE USED AND STORED ON-SITE AT THE HIGH DESERT POWER PROJECT

Chemical	Application	Storage Location	Storage Quantity (gallons)	
			Average	Maximum
Sulfuric Acid 93%[1]	pH control of cooling tower water and feed water	Water treatment plant area	5,000 300	10,000 500
		Cooling tower area	55	300
Sodium Hydroxide 50%[2]	pH control Regeneration and water neutralization	Water treatment area	500	500
Volatile oxygen scavenger 30%	Chemical removal of dissolved oxygen	Water treatment area	250	500
Neutralizing amine 20%	Chemical removal of dissolved carbon	Water treatment area	250	500
Phosphate 20%	Removal of dissolved hardness ions (scale deposit control)	Water treatment area	250	500
	Corrosion and scale inhibitor	Water treatment cooling tower area	250	500
Scale control (polymer)	Prevention of hardness forming scales	Water treatment cooling tower area	55	110
Polymeric dispersant	Deposit control and dispersion of suspended mater	Water treatment cooling tower area	250	1,000
Settling aid (polymer)	Suspended mater removal for water clarity	Water treatment cooling tower area	500	1,000
Biocide	Microbiological control to reduce biological growth	Water treatment cooling tower area	250	500
Primary coagulant (polymer)	Suspended mater removal for water clarity	Raw water treatment clarifier area	1,000	5,000
Coagulant aid (polymer)	Suspended mater removal for water clarity	Raw water treatment clarifier area	500	1,000
Settling aid (polymer)	Suspended mater removal for water clarity	Raw water treatment clarifier area	500	1,000
		Cooling tower area	500	1,000
Drainage aid (polymer)	Suspended mater removal for water clarity	Raw water treatment clarifier area	500	1,000
Sodium Hypochlorite 12% to 15% solution	Primary biological control to reduce organic growth	Raw water treatment clarifier area	500	1,000

Chemical	Application	Storage Location	Storage Quantity (gallons)	
			Average	Maximum
Soda ash	Water Softening	Cooling tower blowdown treatment clarifier	1200	2,000
Hydrated lime	Water Softening	Cooling tower blowdown treatment clarifier	1200	2,000
Sodium bisulfite	De chlorinator chlorine residual removal	Water treatment cooling tower area	100	300
Natural gas	Fuel for power plant	Piped into plant on as-needed basis	NA	NA
Aqueous ammonia (25% solution)[1]	Air pollution control system (emission control) to control nitrogen oxides	SCR system	75	100,000[3]
Hydraulic fluid	Equipment	Throughout plant	Initial fill	Initial fill
Insulating oil (heat transfer)	Electric equipment	--	Initial fill	Initial fill
Lubricating oil	Rotating equipment	Throughout plant	Initial fill (<5 gpd)	Initial fill
Battery acid	Batteries	--	Initial fill	Initial fill
Carbon dioxide	Fire protection, generator purging	--	8,000 lbs Initial fill	--
Hydrogen	Generator cooling	--	Initial fill	--

1 California acutely hazardous material
2 Material would be transported to the site using 5,000 to 6,000 gallon tanker trucks.
3 Material would be transported to the site using 8,000 gallon tanker trucks.

Source: HDPP 1997b, AFC Tables 5.8-4 and 5.8-5

AIR QUALITY

Testimony of Tuan Ngo

INTRODUCTION

This analysis addresses the potential air quality impacts resulting from criteria air pollutant emissions created by the construction and operation of the High Desert Power Project (HDPP). Criteria air pollutants are those for which a state or federal standard has been established. They include nitrogen dioxide (NO2), sulfur dioxide (SO2), carbon monoxide (CO), ozone (O3) and its precursors (NOx and VOC), volatile organic compounds (VOC), particulate matter less than 10 microns in diameter (PM10) and its precursors: NOx, VOC, SOx, and lead (Pb).

Specifically, staff addresses the following questions:

- Whether the project is likely to conform with applicable air quality laws, ordinances, regulations and standards,
- Whether the process equipment and the pollution control devices are properly sized and will perform their functions as expected,
- Whether the project directly emitted pollutants are likely to cause significant adverse environmental effects; that is, cause new violations, or contributions to existing violations, of the applicable ambient air quality standards,
- Whether any identified significant adverse effects are adequately mitigated, and
- Whether any specific project configurations, including gas turbines, associate generating equipment, or emission control devices, alone or in combination, will result in lesser impacts to the environment than the project as proposed, and thus should be considered as potential mitigation measures.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

FEDERAL

A new, major facility, located in a non-attainment area, is subject to the federal New Source Review (NSR) program. The proposed project is located in an area that is designated as non-attainment for ozone and PM10, and is therefore subject to the NSR requirements for these pollutants. The Mojave Desert Air Quality Management District (District) implements these requirements through its Regulation 13. Under NSR, the HDPP must comply with the Lowest Achievable Emission Rate (LAER) for NOx, PM10, VOC, SO2 and provide offsets for emissions of these pollutants because they contribute directly or indirectly to ambient levels of ozone and PM10. In addition, the applicant must certify that all facilities that are owned and operated by it comply with applicable requirements in the State Implementation Plan.

The HDPP facility is located in an attainment area for NO2, SO2 and CO, and is therefore subject to the federal Prevention of Significant Deterioration (PSD) review for those air contaminants. In general, the project must comply with Best Available Control Technology (BACT) for NO2, SO2 and CO and demonstrate that its emission impacts will not significantly degrade the existing ambient air quality in the region. This program is administered by the Environmental Protection Agency (EPA).

The power plant's gas turbines are also subject to the federal New Source Performance Standards (NSPS). These standards include a NOx emissions concentration of no more than 75 ppm at 15 percent excess oxygen (ppm@15%O2), and a SOx emissions concentration of no more than 150 ppm@15%O2.

STATE

California State Health and Safety Code, Section 41700, requires that: "no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerate number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property."

LOCAL

The proposed facility is subject to the following District rules and regulations:

Rule 102: Prohibits any person from circumventing any applicable section of rules and regulations.

Rule 201: Requires District's authorization prior to construction of the new facility.

Rule 203: Requires District's authorization before commencing operation of the new facility.

Rule 401: Limits the discharge of air contaminants into the atmosphere through visible emissions and opacity.

Rule 402: Protects the public's health and welfare from the emission of air contaminants, which constitute a nuisance.

Rule 403: Regulates operations, which periodically may cause fugitive dust emissions into the atmosphere.

Rule 406: Limits the emissions of sulfur compounds to no greater than 500 ppmv, and other contaminants to specific ppmv levels.

Rule 407: Limits CO emissions to 2,000 ppm over a 15-minute averaging period.

Rule 409: Limits discharging of combustion contaminants (PM10) to no greater than 0.1 grains per dry standard cubic foot (gr/dscf).

Rule 431: Limits sulfur content of gaseous fuel to 800 ppm, and liquid or solid fuel to 0.5 percent by weight.

Rule 475: Limits the NOx emissions of any electrical power generating equipment to no more than 80 ppm, 160 ppm and 225 ppm if using gaseous, liquid and solid fuel, respectively.

Rule 476: Limits the emissions of any fuel combustion equipment to no more than 200 pounds per hour of SOx, 140 pounds per hour of NOx, or 10 pounds per hour of combustion contaminants.

Rule 900: Establishes requirements for general definitions, monitoring, records, and administrative requirements applicable to the federal New Source Performance Standard (NSPS).

Also establishes limits for NO2 and SO2 from new or modified stationary gas turbines with a designed heat rate input of 10 MMBtu/hr or more. The proposed turbines' NOx concentrations shall not exceed 75 ppm dry at 15% oxygen, and SO2 concentrations shall not exceed 150 ppm dry at 15% oxygen.

Rule 1000: Establishes the general definitions, monitoring and administrative requirements applicable to the federal National Emission Standards for Hazardous Air Pollutants (NESHAP).

Rule 1158: Establishes NOx emission standards and other requirements for electric utility operations, including installation of an approved continuous emission monitoring system, reporting and an approved emission control plan.

Rule 1200: Establishes administrative requirements for obtaining a federal operating permit (Title V operating permit).

Rule 1300: Provides general discussions of the NSR purposes, applicability, exemption, and interaction with other Federal, State and District rules, regulations and plans. The NSR applies to all new and modified stationary sources that are required to have permits to construct and operate within the Mojave Desert AQMD.

Rule 1301: Provides various definitions for the NSR regulations.

Rule 1302: Provides administrative procedures for the processing of applications for permits to construct and operate of new and modified stationary sources.

Section 1302 (C)(3) “Determination of Offsets”, part (b) states “[u]pon receipt of the notification [from the district regarding specific amount and type of offset required], the applicant shall provide the APCO a proposed Offset package which contains evidence of Offset eligibility for use pursuant to the provisions of District Rule 1305.”

Section 1302 (C)(3)(b)(iii) also states “[a]fter determining that the Offsets are real, enforceable, surplus, permanent and quantifiable and after any permit modifications required pursuant to District Rule 1305 or Regulation XIV have been made, the APCO shall approve the use of the Offsets subject to the approval of CARB and USEPA during the comment period required pursuant to subsection (D)(2) below.”

Rule 1303: Provides specific requirements for new or modified stationary sources including Best Available Control Technology (BACT) and offsets.

Rule 1304: Provides methods to calculate emissions changes from the new or modified stationary sources.

Rule 1305: Provides the procedures and formulas for quantifying and determining the eligibility of emission reduction credits (ERC) available for use as offsets in accordance to Rule 1303.

Rule 1306: Provides administrative requirements for new or modified power plants that are required to obtain licensing from the California Energy Commission.

Rule 1401: Provides various definitions for the banking rules.

Section (N) defines the historic actual emissions of a facility would be its emissions averaged from the most recent two year period, or from any two years of the previous five years, prior to the date of application for ERC.

Rule 1402: Provides administrative procedures for the registration of ERC for stationary sources. The requirements include the specific timing of an application for ERC and criteria for approval of ERC.

Section (A)(1)(e)(ii) defines that emission reductions can be eligible for ERC if such reductions are actual emission reductions and be either recognized by the District in writing and were included in the emission inventory after the shut down or modification occurred.

Section (B)(1)(c)(i) requires that an application for ERC for emission reductions, which occurred prior to June 28, 1995 must be submitted within one year after June 28, 1995.

Section (B)(1)(c)(iii) requires a timely application for ERC for military bases subject to closure or realignment shall be determined pursuant to

the provisions of State Health and Safety Code (H&SC) 40709.7. H&SC 40709.7 states that the ERC may only be used for base reuse within the jurisdiction of the District.

Section (C)(1) requires that ERC must be real, enforceable, permanent, quantifiable and surplus.

Rule 1404: Provides methods to calculate the ERC available, which according to Section (A)(2)(c), shall be the different between the historical actual emissions and the proposed emissions.

SETTING

METEOROLOGICAL CONDITIONS

The project is located in the southern Mojave Desert, at an elevation of approximately 2,850 feet above sea level. Relatively high daytime temperatures, large variations in relative humidity, large and rapid diurnal temperature changes and occasional high winds, sand and dust storms, and thunderstorms characterize the climate of the Mojave Desert area.

The aridity of the region is caused by the influence of a sub-tropical high-pressure system off the coast of California and topographical barriers that effectively block the flow of moisture to the region. Seasonally, the precipitation totals in the area range from a minimum of 0.5 inch in the spring to a relative maximum of 2.0 inches in winter. Total annual precipitation averages about 4 inches.

The most recent meteorological (weather) data was collected at George Air Force Base in 1992. The measured wind data are graphically represented by quarterly wind roses, provided in Appendix A. These wind roses show that for most of the year, the winds are predominately from the south and the west, although between July to September, high winds are predominately from the south.

Mixing heights in the area, which represent the altitudes to which different air masses mix together, have been estimated to be 70 meters in the morning to as high as 1,600 meters in the afternoon.

EXISTING AMBIENT AIR QUALITY

The ambient air quality standards (AAQS) represent the allowable maximum ambient concentrations of air pollutants, and are established by both the U.S. Environmental Protection Agency (EPA) and the California State Air Resources Board (CARB). The state AAQS, established by CARB, are typically lower than those established by EPA. The state and federal air quality standards are listed in **AIR QUALITY Table 1**. The averaging times for the various air quality standards (the times over which they are measured) range from one-hour to one year. The standards are expressed either as a concentration, in parts per million (ppm), or as a weighted mass of material per a volume of air, in milligrams or micrograms of pollutant in a cubic meter of air (mg/m^3 and $\mu g/m^3$).

AIR QUALITY Table 1
Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards	Federal Standards	
			Primary	Secondary
Ozone (O3)	1-hour	0.09 ppm (180 μg/m^3)	0.12 ppm (235 μg/m^3)	same as primary
	8-hour	---	0.08 ppm (157 μg/m^3)	
Particulate Matter (PM10)	Ann.Geo. Mean	30 μg/m^3		same as primary
	24-hour	50 μg/m^3	150 μg/m^3	
	Ann.Arit. Mean	---	50 μg/m^3	
Fine Particulate Matter (PM2.5)	24-hour	No state standard	65 μg/m^3	same as primary
	Ann.Arit. Mean		15 μg/m^3	
Carbon Monoxide (CO)	1-hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	None
	8-hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	
Nitrogen Dioxide (NO2)	1-hour	0.25 ppm (470 μg/m^3)	---	same as primary
	Ann.Arit. Mean	---	0.053 ppm (100 μg/m^3)	
Lead (Pb)	30-day	1.5 μg/m^3	---	same as primary
	Cal. quarter	---	1.5 μg/m^3	
Sulfur Dioxide (SO2)	Ann.Arit. Mean	---	0.03 ppm (80 μg/m^3)	---
	24-hour	0.04 ppm (105 μg/m^3)	0.147 ppm (365 μg/m^3)	---
	3-hour	---	---	0.5 ppm (1300 μg/m^3)
	1-hour	0.25 ppm (655 μg/m^3)	---	---
Sulfates	24-hour	25 μg/m^3	No federal standard	
H_2S	1-hour	0.03 ppm (42 μg/m^3)	No federal standard	

Source: California Air Resources Board

In general, an area is designated as attainment if the concentrations of a particular air contaminant do not exceed the standard. Likewise, an area is designated as non-attainment for an air contaminant if that standard is violated. Where not enough ambient data are available to support designation as either attainment or non-attainment, the area can be designated as unclassified. Unclassified areas are normally treated the same as attainment areas for regulatory purposes. An area

can be attainment for one air contaminant while non-attainment for another, or attainment for the federal standard and non-attainment for the state standard for the same contaminant. The entire area within the boundaries of a district is usually evaluated to determine the district's attainment status. The HDPP is located in the Mojave Desert Air Basin and is under the jurisdiction of the Mojave Desert Air Quality Management District. This area is designated as non-attainment for both the state and the federal ozone and PM10 standards, attainment for the state's CO, NO2, SO2, SO4 and Pb standards, and unclassified for the federal CO, NO2 and SO2 standards (ARB 1995). A new standard for PM2.5 was adopted by EPA in 1998, but specific district rules implementing those standards will not occur until 2003. The District is expected to be non-attainment for the PM2.5 standard, but its attainment status will not be determined until 3 years of ambient data have been collected, beginning in 1999.

Ambient air quality monitoring data for ozone, CO, NO2, SO2, and PM10, showing the highest readings recorded between 1991 through 1996 (the last year for which data is currently available) at the Amargosa Road (Victorville) monitoring station are tabulated in **AIR QUALITY Table 2**. This monitoring station is located 8 miles southwest of the project site, and is operated by the District staff. Although there are other ambient air quality monitoring stations in the vicinity of the proposed project site, staff chose to use the data from the Victorville monitoring station because the other stations are either located too far away or are upwind of the project site. Thus the measured data at the other monitoring stations may not represent the conditions of existing ambient air quality in the project vicinity, or these stations may not be affected by the emissions from the proposed project.

The data in **AIR QUALITY Table 2** indicate that the ambient concentrations of the criteria air contaminants in the proposed project vicinity, with the exception of ozone and PM10, are below the most restrictive ambient air quality standards.

Ozone is not directly emitted from stationary or mobile sources, but is formed as the results of chemical reactions in the atmosphere between directly emitted air pollutants. Nitrogen oxides (NOx) and hydrocarbons (Volatile Organic Compounds [VOC]) interact in the presence of sunlight to form ozone. **AIR QUALITY Table 2** shows that violations of the state 1-hour ambient air quality standard for ozone occurred from 41 to 76 times every year from 1991 to 1996, with the highest ozone reading of 19 pphm recorded in 1991 and 1992. Peak ozone levels and numbers of violations of the state 1-hour ozone standard have remained relatively constant since 1993. The collected air quality data (not shown in **Air Quality Table 2**) indicate that the ozone violations occurred primarily during the period June through September.

The ARB report: "Second Triennial Review of the Assessment of the Impacts of Transported Pollutants on Ozone Concentrations in California" (ARB 1996) provided the following observations regarding ozone violations in the Mojave Desert area:

- The ozone and ozone precursors from the South Coast air basin contribute overwhelmingly to ozone violations in the Mojave Desert air basin.

AIR QUALITY Table 2
Ambient Air Quality Data Recorded at the Victorville Monitoring Station
(1991 through 1996)

Pollutant	Averaging time	1996	1995	1994	1993	1992	1991	Most Restrictive Ambient Air Quality Standard
Ozone (pphm)	1-hr	16[1]	15	16	16	19	19	9 (CAAQS)
No. of violations		61	41	63	64	76	59	
PM_{10} ($\mu g/m^3$)	24-hr	67	80	108	62	62	88	50 (CAAQS)
	Annual	25	20	36	29	NA	NA	30 (CAAQS)
No. of violations		3	1	16	6	5	9	
NO2 ($\mu g/m^3$)	1-hr	162	207	226	244	NA	NA	470 (CAAQS)
	Annual	40	43	51	49	NA	NA	100 (NAAQS)
CO ($\mu g/m^3$)	1-hr	9600	3450	5750	4600	NA	NA	23000 (CAAQS)
	8-hr	8300	3450	2760	3450	NA	NA	10000 (CAAQS & NAAQS)
SO2 ($\mu g/m^3$)	1-hr	35	52	105	52	78	52	655 (CAAQS)
	24-hr	21	26	26	13	38	33	105 (CAAQS)
Sulfates (SO_4) ($\mu g/m^3$)	24-hr	NA	5	5	7	NA	NA	25 (CAAQS)

Notes: CAAQS = California Ambient Air Quality Standard
NAAQS = National Ambient Air Quality Standard
[1] Highest measured ambient pollutant concentration.
NA = data are not available

Source: CARB: California Air Quality Data.

- There are days when a combination of local emissions and transported ozone or precursors contribute to the violations of 1-hour ozone standards,

There is a possibility that on at least one day of the year the violations of the 1-hour ozone standards are the direct result of local source emissions.

The area is also non-attainment for PM10. PM10 can be emitted directly or it can be formed many miles downwind from emission sources when various precursor pollutants interact in the atmosphere. Gaseous emissions of pollutants like NOx, SOx and VOC from the turbines, and NH3 from the NOx control equipment can,

given the right meteorological conditions, form particulate matter known as nitrates (NO3), sulfates (SO4), and organic compounds. These pollutants are known as secondary particulates, because they are not directly emitted but are formed through complex chemical reactions between directly emitted pollutants in the atmosphere.

AIR QUALITY Table 2 indicates that the state 24-hour ambient air quality standard for PM10 was exceeded every year from 1991 through 1996, with no reductions in peak PM10 levels since 1992. The state's annual PM10 air quality standard was only exceeded in 1994. The Federal PM10 air quality standards were not violated from 1991 through 1996.

The available ambient PM10 data indicate that violations of the state 24-hour PM10 standard tend to spread out over the year, with peaks occurring during different months for different years.

PROJECT EMISSIONS

CONSTRUCTION ACTIVITIES

The construction of the proposed project will last approximately 18 months, and generally consists of two major activities; site preparation, and construction and installation of major equipment and structures. Staff reviewed the applicant's estimated construction emissions, and believes that they are reasonable. Because either project configuration proposed would be constructed at the same site using similar construction equipment, staff believes that the construction impacts for both configurations are similar.

In addition to fugitive dust emissions resulting from the site preparation, emissions from construction equipment exhausts, such as vehicles and internal combustion engines, are also expected during the project construction phase, which would last approximately 18 months. Also, a small amount of hydrocarbon emissions may occur as a result of the temporary storage of petroleum fuel at the site. Estimated peak hourly, daily and annual construction equipment exhaust emissions were provided by the applicant (HDPP 1997b, Table 5.12-24 and HDDP 1998s and t), and are tabulated in **AIR QUALITY Table 3**.

Site preparation, which would last for approximately two-and-one-half months, involves clearing and grading of the site, which is approximately 23 acres, and completion of the facility's foundations. Construction equipment used at this phase include a motor grader, four tractors, one excavator hydraulic crawler, one vibrator compactor, three cranes, and various heavy duty construction equipment and trucks, including concrete and water spray trucks. The fugitive dust PM10 emissions estimates from site preparation provided by the applicant (HDPP 1997b, Tables 5.12-22) are tabulated in **AIR QUALITY Table 3** for each activity, including excavation, compacting, grading, back-filling, wind erosion, and construction vehicles traveling on unpaved areas.

AIR QUALITY Table 3
Maximum Daily Construction Emissions (lbs/day)

Construction Emission Sources	NOx	SO2	VOC	CO	PM10
Facility Construction					
Equipment & Delivery Trucks	380	35	97	1,026	40
Worker Vehicles	14	Neg.	10	74	6
Wind Erosion					20
Fugitive Dust					117
Total	394	35	107	1,100	183
Water Pipeline					
Equipment	54	5	7	44	3
Trucks	51	6	15	24	5
Wind Erosion					13
Fugitive Dust					73
Total	105	11	22	68	94
Natural Gas Pipeline					
Equipment	59	6	8	47	4
Trucks	51	6	15	24	5
Wind Erosion					16
Fugitive Dust					73
Total	110	12	23	71	98
Transmission Line					
Equipment	200	18	23	128	15
Trucks	312	28	69	321	25
Wind Erosion					2
Fugitive Dust					90
Total	**512**	**46**	**92**	**449**	**132**
Sources: AFC Tables 5.12-17 through 5.12-24, and the Applicant's January 15, 1998 Data Request Response, Tables AQ-2, 3, 3a, 3b, 3c.					

In addition to construction of the main facility, there will be a new water line, two new natural gas pipelines and a new transmission line, all of which will be built and operated by entities other than the applicant. The estimated emissions from these construction activities were also provided by the applicant (HDPP 1998b, Data Responses, Tables AQ-2 through AQ-3 a, and b) and are tabulated in **AIR QUALITY Table 3** below.

For the water and natural gas pipelines, construction activities will consist of excavation/trenching, pipe laying, back filling and compaction. Equipment used in the construction of the water and natural gas pipeline include two backhoes, two trenchers, two compactors, one welding machine and various trucks for supplies and water. It is assumed that the construction activities of these two linear facilities will be a continuous 8 hrs/day, five days per week for the entire construction period

of these two facilities (approximately 17 weeks). The construction emissions estimates provided by the applicant (HDPP 1998b, Data Responses, Tables AQ-2 through AQ-3a and b, and HDDP 1998s and t) are tabulated in Air Quality Table 3.

Construction of the transmission line includes preparation of access roads and tower pads, material spotting, pile excavation, structure assembly and erection, conductor stringing and clean up. Equipment used in these activities includes various trucks, two bulldozers, a backhoe, two mobile cranes, and various small internal combustion engines used to power specialized equipment and compressors. The applicant assumed that some equipment would be utilized on an 8-hours/day basis while others will be operated on 2, 4 or 6 hours/day in the calculations of daily emissions from the construction of the transmission line. The transmission line construction emissions (HDPP 1997b, Data Responses, Tables AQ-3 a and b, and HDDP 1998s and t) provided by the applicant are tabulated in **AIR QUALITY Table 3**.

PROJECT OPERATION

The proposed project will be built with either a 720 MW or a 678 MW combined cycle configuration (HDPP 1998s). The applicant, citing rapid technology advancement and economic advantages, wishes to delay the selection of the specific project configuration, the specific turbine generators, and the control devices, until approximately 6 months prior to construction of the facility.

720 MW COMBINED CYCLE

The major components of this scenario consist of:

- Three frame 7F natural gas fired combustion turbines (from GE or Westinghouse) operating in combined cycle mode to produce approximately 720 MW of electricity. The facility is expected to be at least 95 percent available and can operate up 6,750 hours per year,

- Three heat recovery steam generators (HRSG) each equipped with a duct burner to increase steam production,

- Three steam turbines, and

- Three cooling towers.

The applicant proposes to equip each combustion turbine with a dry low NOx combustion technology and a selective catalytic reduction (SCR) system in the HSRG, which limit the NOx emissions to 2.5 ppm@15%O2. To control the CO and VOC emissions, the applicant also proposes to equip each combustion turbine/HRSG with a high-temperature oxidation catalyst system, which limits the CO emissions to 4 ppm and the VOC emissions to 1 ppm.

678 MW COMBINED CYCLE

The major components of this scenario consist of:

- Two Westinghouse 501G, natural gas fired combustion turbines operating in combined cycle mode to produce approximately 678 MW of electricity. The facility is expected to be at least 95 percent available and can operate up 6,750 hours per year,

- Two heat recovery steam generators (HRSG) each equipped with a duct burner to increase steam production,

- Two steam turbines, and

- Two cooling towers.

- The applicant proposes to equip each combustion turbine with a dry low NOx combustion technology and a selective catalytic reduction (SCR) system in the HSRG, which limit the NOx emissions to 2.5 ppm@15%O2. To control the CO and VOC emissions, the applicant also proposes to equip each combustion turbine/HRSG with a high-temperature oxidation catalyst system, which limits the CO emissions to 4 ppm and the VOC emissions to 1 ppm.

The total facility emissions, provided by the applicant in consultation with the turbine manufacturers, and emissions for each individual turbine models (Westinghouse 501G, 501F, and GE7F), are tabulated **AIR QUALITY Table 4**.

The cooling tower emissions are estimated from a recirculation rate of 65,000 gallons per minute (gpm) for the GE7F and the Westinghouse 501F configurations, and 80,000 gpm for the Westinghouse 501 G configuration.

The cooling towers will be equipped with drift eliminators, which will effectively maintain the drift rate at 0.0006 percent.

The recirculation water has a 5,000 ppm total dissolved solids (TDS) content.

IMPACTS

The applicant has provided staff with their own modeling analysis and results. Air dispersion models provide a means of predicting the location and magnitude of the air contaminant impacts at ground level. These models consist of several complex series of mathematical equations, which are repeatedly calculated by a computer for many ambient conditions. The model results are often described as a unit of mass per volume of air, such as micrograms per cubic meter ($\mu g/m^3$). They are an estimate of the concentration of the pollutant emitted by the project that will occur at ground level.

AIR QUALITY Table 4
Estimated Worst Case Facility Emissions

Turbine	Pollutant	Cold-Start	Hot-Start	Warm-Start	Shut Down	Normal[1]	Total Emissions		
		lbs/event	Lbs/event	lbs/event	lbs/event	lbs/hr	per Unit[2]	Facility[3] lbs/day[5]	Facility[3] tons/yr
GE7FA	NOx	183	138	168	97	18	68.33	2,544	205
	VOC	680	710	686	5.2	2.51	43	4,344	129
	CO	3,541	3,730	3,596	239	17.53	250	24,216	750
	SO2						4.47	80	13.4
	PM10						72.67	1,305	233.2
Cooling Tower[4]	PM10						4.82		
W501G	NOx	561	215	269	133	24.55	94.5	2,990	189
	VOC	1,046	524.8	700	6.4	3.42	41.5	3,296	83
	CO	6,890	2,711	3,177	188	23.91	242	20,638	484
	SO2						6	72	12
	PM10						102.5	1,220	205
Cooling Tower[4]	PM10						7.01		

Notes:

1. Normal emissions were calculated using 2.5 ppm NOx, 1 ppm VOC and 4 ppm CO.
2. Unit emissions, which are in ton per year, were calculated using 5 cold-starts, 35 warm-starts, 60 hot-starts, and 100 shutdown events per year.
3. Facility emissions represent the annual emission caps for the facility and include all turbines and cooling towers.
4. Cooling tower emissions were calculated using re-circulation rates of 57,300 gpm for F model turbines and 73,540 gpm for G model turbines, 4,000 ppm TDS and 0.0006 percent drift rate. Reference: HDDP 1999a.
5. Facility daily emissions represent worst-case maximum, which assuming one cold, one hot start, two shut downs, and 18.5 hours of operation.

An air quality impact analysis usually starts with a screening type model, such as SCREEN3. This type of model uses simple calculations and is based on conservative assumptions which are likely to over-predict the possible emission impacts. Thus, if a screening model predicts an impact that staff concludes is insignificant, no further modeling is needed. On the other hand, if the screening model predicts a significant impact, a more detailed and complex models should be used to analyze the impacts. Because of its simplicity and ability to evaluate the impacts of area-wide emission sources, staff used the SCREEN3 model to estimate the impacts associated with the construction of the project.

The more refined ISCST3 model was used to estimate the project's operating emissions impacts. The major difference between this model and SCREEN3 is that

ISCST3 uses actual measured meteorological data instead of mathematical simulations of the ambient conditions. Using measured meteorological data more accurately predicts impacts at a particular site. EPA approves the use of the ISCST3 model for regulatory purposes.

Staff performed air dispersion modeling to estimate the impacts of the project's NOx, PM10, CO and SOx emissions resulting from construction and operation. We then added these impacts to the highest ambient concentrations measured during the previous three years at the nearest monitoring station (Victorville). We then compared the results with the air quality standards for each respective air contaminant to determine whether the project's emission impacts would cause a new violation of the ambient air quality standards or contribute to an existing violation.

Inputs for the modeling include stack information (exhaust flow rate, temperature, stack dimensions), specific turbine emission data, meteorological data, such as wind speed, atmospheric conditions, and the site elevation description. For this project, the meteorological data used as input for the modeling included the hourly wind speed and direction data measured at the George Air Force Base.

CONSTRUCTION IMPACTS

The power plant site construction impacts were analyzed using the SCREEN3 model. The results are tabulated in **AIR QUALITY Table 4**. The modeling analyses included both the fugitive dust and vehicle exhaust emissions, which include PM10, NOx and CO. In **AIR QUALITY Table 4**, which presents staff's modeling results, the first column represents the air contaminant, i.e., NO2, PM10, and CO. The second column presents the time averaging for each air contaminant analyzed. The third column presents the project emission impacts. The fourth column presents the highest measured concentration of the criteria air contaminants in the ambient air (background). The fifth column presents the total impact, i.e., the sum of project emission impact and background measured concentration. As indicated in **AIR QUALITY Table 5**, the emission impacts from the construction of the facility are not expected to create any new violations of any NO2 or CO ambient air quality standards. However, the project construction PM10 emissions could contribute to existing violations of the state 24-hour PM10 standard. Staff believes that this PM10 emission impact, which is common for this type of construction activity, is of short duration and unavoidable.

AIR QUALITY Table 5
Facility Construction Impacts

Pollutants	Avg. Period	Impacts (ug/m^3)	Background (ug/m^3)	Total Impacts (ug/m^3)	Standards (ug/m^3)	Percent of Standard
NO2	1-hr.	186	244	430[1]	470	91%
CO	1-hr.	950	5,750	6,700	23,000	29%
	8-hr.	237	3,450	3,687	10,000	37%
PM10	24-hr.	14	122	122	50	244%

Note: (1) 1-hour NO2 emission impacts were estimated using the ozone-limiting method.

Because the NOx emissions from the turbine are mostly in the form of nitrogen oxide (NO), staff used the EPA recommended Ozone Limiting Method (OLM) to refine estimations of NO2 emission impacts. The California Air Pollution Control Officer's Association (CAPCOA 1987) also recommends the use of the OLM for refining the estimation of NO2 emission impacts on ambient pollutant levels.

The OLM assumes that approximately ten percent of the oxides of nitrogen emissions from a combustion source are NO2, and that conversion of the remaining 90 percent of NO to NO2 is strongly influenced by the available ozone. If the concentration of ozone in the atmosphere is less than 90 percent of the maximum estimated NOx impact identified by the model, the NO2 impact can be estimated using the following formula:

[NO2max] = [O3ambient] + 0.1[NOxmax]
where:
[NO2max] = maximum 1-hour NO2 impact (ppm)
[O3ambient] = background ambient ozone concentration (ppm)
[NOxmax] = maximum oxides of nitrogen impacts from modeling (ppm).

Because the observed ambient ozone level is lower than 90 percent of the identified NOx impact, staff used this equation to determine the NO-to-NO2 conversion rate. Staff calculated the estimated maximum 1-hour NO2 impacts at a given hour by adding the measured ambient concentration of ozone to the corresponding hourly measured background NO2. Using this method, staff estimated the NO2 impact by using the NOx modeling results with each 1-hour measurement of background ozone and NO2 in 1992 and 1993 (these are the two years ambient data measurement available without a large gap of data). The highest estimated NO2 impact is entered in **AIR QUALITY Table 5** as the total impact. This value is 91 percent of the standard, indicating that construction of the facility will not cause a new violation of the short-term 1-hour NO2 standards.

OPERATION IMPACTS

The applicant provided staff with a modeling analysis of the project's operating emissions impacts from directly emitted pollutants, which they believe demonstrates that no violations of ambient air quality standards will be caused by the project. Staff reviewed the applicant's modeling analysis and concluded that it is adequate.

AIR QUALITY Table 6 presents the results of the modeling analysis using worst case turbine emissions.

AIR QUALITY Table 6
Worst Case Facility Emission Impacts on Ambient Air Quality

Pollutants	Avg. Period	Impacts ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Impacts ($\mu g/m^3$)	Standards ($\mu g/m^3$)	Percent of Standard
NO2	1-hour	235	24	259	470	55%
	Annual	1	51	52	100	52%
SO2	1-hour	4	105	109	655	16%
	24-hour	1	26	27	105	26%
CO	1-hour	8,000	9,200	17,200	23,000	76%
	8-hour	900	8,300	9,200	10,000	92%
PM10	24-hour	9	108	117	50	230%
	Annual	1	42	43	30	140%

Notes: (1) 1-hour NO2 emission impacts were estimated using ozone-limiting method.

AIR QUALITY Table 6 shows that although the project does not cause a new violation of the 8-hour CO air quality standard, the modeling indicates that the total impacts could be as high as 92 percent of the standard.

Staff does not believe that the project itself causes a violation of either the 24-hour or the annual PM10 air quality standard; However, because the area is classified as non-attainment for PM10, project emissions of both directly emitted PM10 and PM10 precursors could contribute to existing violations of the air quality standards.

Staff believes that the project's contribution to ambient ozone levels will be addressed in the cumulative impacts section because ozone is not a directly emitted pollutant. [Ozone is formed in the atmosphere through a complex chain of reactions, involving NOx, VOC and sunlight].

CUMULATIVE IMPACTS

Staff's cumulative impacts assessment is composed of two types of analysis; the first being a discussion of the project's directly emitted pollutants along with similar emissions from other foreseeable future projects, and the second being a discussion of the project's potential contribution to the formation of secondary pollutant ozone.

To evaluate the direct emission impacts of the HDPP along with other probable future projects, staff needs specific information about these other projects. This information is part of a modeling analysis that is included when the project applicant files an application with the District for a permit. Therefore, we evaluate those probable future projects in our cumulative impacts analysis that are currently under construction, or are currently under District review. Projects located up to six miles from the proposed facility usually need to be included in the analysis. Impacts from projects beyond six miles would not effect the modeling analysis on a cumulative basis. Staff reviewed the District permit files and found that there are no sources with the necessary modeling input information currently being built or proposed to

be built within the six mile radius of the project site. Therefore, a directly emitted pollutant cumulative impact analysis was not performed.

Staff does not believe that the project itself causes a violation of the ozone air quality standard. By itself, staff does not believe that the ozone contribution to ambient ozone levels is even measurable with the current monitoring instrument; however, because the area is overwhelmingly impacted by emissions from the South Coast air basin, the HDPP NOx and VOC emissions could potentially contribute to ozone violations in the areas down wind of the project (i.e., Barstow).

The HDPP NOx emissions will scavenge ozone in the vicinity of the project, thus reducing ambient ozone concentrations in the "near field". Such scavenging is an air quality benefit, although it will generally effect a smaller area than project's ozone impacts in the "far field".

VISIBILITY IMPACTS

The applicant has provided and the District approved a visibility impact analysis, which shows that the project is not expected to exceed any significant visibility impairment increment inside any nearby PSD Class I areas (MDAQMD,1999a).

MITIGATION

APPLICANT'S PROPOSED MITIGATION

CONSTRUCTION PHASE

The applicant proposes to water the unpaved roads and stockpiles, to apply soil stabilization and re-vegetation, and to use soil binding products to keep the PM10 emissions to a minimum. The proposed dust control measures include:

- frequent watering of unpaved roads and disturbed areas (at least twice a day),
- limiting speed of vehicles on the construction areas to no more than 10 MPH,
- limiting accumulated mud or dirt deposited upon public roadways by vehicle tires washing and gravel rams prior to entering a public roadway,
- treatment of the entrance roadways to the construction site with soil stabilization compounds,
- placement of sandbags to prevent run-off to public roadways.
- install windbreakers at the windward sides of construction areas prior to the soil being disturbed. The windbreakers shall remain in place until the soil is stabilized or permanently covered.

- the use of dust sweeping vehicles to regularly sweep the public roadways that are used by construction and worker vehicles (at least twice a day),
- regular sweeping of newly paved roads (at least twice weekly),
- limit on equipment idle times (no more than five minutes),
- the use of electric motors for construction equipment when feasible,
- application of covers or dust suppressants to storage piles and disturbed areas that remain inactive over long periods,
- the pre-wetting of the soil to be excavated during construction.

Because the construction emissions are short-term, no emission reduction credits are proposed as offsets.

OPERATION PHASES

The applicant proposes to mitigate the emission increases from the proposed facility using a combination of clean fuel, emission control devices and emission reduction credits.

The applicant proposes to use a combination of dry low-NOx combustion design, Selective Catalytic Reduction (SCR) and high-temperature CO oxidation catalyst technology for each of the combined cycle turbine trains to minimize its NOx and CO emissions. The proposed control devices are designed to maintain the turbine/duct burner emissions to 2.5 ppm NOx, 4 ppm CO, and 1 ppm VOC. The ammonia slip emissions (from unreacted ammonia in the SCR) will be maintained at 10 ppm or less. Natural gas will be the only fuel used, which should minimize the project's PM10 and SOx emissions. In addition, the applicant will equipped the cooling towers with high efficiency drift eliminators that could limits the drift rate to 0.0006 percent, which in effect, minimizes the cooling towers' PM10 emissions. Below is a brief description of the mitigation technology the HDPP will employ.

DRY LOW-NOX COMBUSTORS

Over the last 20 years, combustion turbine manufacturers have focused their attention on limiting the NOx formed during combustion. Because of the expense and efficiency losses due to steam or water injection in the combustor cans to reduce combustion temperatures and the formation of NOx, CTG manufacturers are presently choosing to limit NOx formation through the use of dry low-NOx technologies. In this process, firing temperatures remain somewhat low, thus minimizing NOx formation, while thermal efficiencies remain high.

FLUE GAS CONTROLS

To further reduce the emissions from the combustion turbines before they are exhausted into the atmosphere, flue gas controls, primarily catalyst systems, will be installed in the HRSG. HDPP is proposing two catalyst systems, a selective

catalytic reduction system (SCR) to reduce NOx, and an oxidizing system to reduce CO.

Selective Catalytic Reduction (SCR)

Selective catalytic reduction refers to a process that chemically reduces NOx by injecting ammonia into the flue gas stream over a catalyst in the presence of oxygen. The process is termed selective because the ammonia reducing agent preferentially reacts with NOx rather than oxygen, producing inert nitrogen and water vapor. The performance and effectiveness of SCR systems are related to operating temperatures, which may vary with catalyst designs. Flue gas temperatures from a combustion turbine typically range from 950 to 1100°F.

Catalysts generally operate between 600 to 750°F (ARB 1992), and are normally placed inside the HRSG where the flue gas temperature has cooled. At temperatures lower than 600°F, the ammonia reaction rate may start to decline, resulting in increasing ammonia emissions, called ammonia slip. At temperatures above about 800°F, depending on the type of material used in the catalyst, damage to some catalysts can occur. The catalyst material most commonly used is titanium dioxide, but materials such as vanadium pentoxide, zeolite, or a noble metal are also used. These newer catalysts (versus the older alumina-based catalysts) are resistant to fuel sulfur fouling at temperatures below 770°F (EPRI 1990).

Regardless of the type of catalyst used, efficient conversion of NO_x to nitrogen and water vapor requires uniform mixing of ammonia into the exhaust gas stream. Also, the catalyst surface has to be large enough to ensure sufficient time for the reaction to take place.

HDPP proposes to use a combination of the dry low-NO_x combustor and SCR system to produce a NO_x concentration exiting the HRSG stack of 2.5 ppm, corrected to 15 percent excess oxygen averaged over a 1-hour period.

Oxidizing Catalyst

To reduce the turbine carbon monoxide (CO) emissions, HDPP proposes to install an oxidizing catalyst, which is similar in concept to catalytic converters used in automobiles. The catalyst is usually coated with a noble metal, such as platinum, which will oxidize unburned hydrocarbons and CO to water vapor and carbon dioxide (CO2). The CO catalyst is proposed to limit the CO concentrations to 4 ppm at 15 percent O2.

Cooling Tower

Cooling tower drift consists of small water droplets, which contain particulate matter that originate from the total dissolved solids in the circulating water. To limit these particulate emissions, drift eliminators are installed in the cooling tower to capture these water droplets. HDPP intends to use drift eliminators on the cooling tower, with a design efficiency of 0.0006 percent. This is a very high level of efficiency for cooling tower drift eliminators. Similar cooling tower designs have been used successfully by a number of other projects licensed by the Energy Commission in recent years.

OFFSETS

The District's Rule 1303 requires that emission offsets be provided for the project's NOx, VOC, and PM10 emissions. According to this rule, the applicant is required to provide 267 TPY of NOx, 168 TPY of VOC, and 234 TPY of PM10 if the 720 MW combined cycle option is built. If the 678 MW combined cycle option is built, 245 TPY of NOx, 108 TPY of VOC and 205 TPY of PM10 emissions offsets must be provided.

The applicant is proposing a combination of emission offsets from within the Mojave Desert AQMD and from sources in the upwind neighboring South Coast Air Quality Management District (SCAQMD). For some of the NOx offset liability, the applicant proposes recently banked ERC from the Southern California International Airport (SCIA). The rest of the NOx offsets will be provided from ERC of various sources in the SCAQMD. District rules (Rule 1305) and State law (Section 40709.6 of the Health and Safety Code) allow for the use of emission offsets from an upwind district being used as an ERC for a source located in a downwind district (inter-basin offsets). As discussed in the Setting section of this analysis, there are meteorological circumstances where ozone and ozone precursor (NOx and VOC) emissions from the South Coast District cause an overwhelming contribution to ozone violations in the Mojave Desert AQMD. Therefore, the applicant is proposing to use ERC from the South Coast to offset a portion of their NOx emission liability. In addition, the applicant is proposing a process known as inter-pollutant trading, under which the ERC obtained from the South Coast will be for VOC. As both the VOC and NOx are ozone precursors, the Mojave Desert AQMD allows this process (Rule 1135). South Coast VOC credits for both the project's NOx and VOC liability include General Motors, Mobil Oil, Chemoil Refining, Crown Cork & Seal and BASF. The applicant proposes an inter-basin, inter-pollutant ratio of 2.1 pounds of VOC for every pound of NOx emission liability. Some VOC credits are also originating from SCIA. For PM10, the applicant proposed to purchase from the City of Adelanto, PM10 ERC generated by paving of dirt roads in the nearby City of Adelanto. Below is a specific description of the applicant's proposed offsets:

NOx OFFSETS:

Due to the unavailability of NOx ERC in the Mojave District, the applicant proposes to provide VOC ERC from the South Coast District. This type of emission offsetting is referred to as inter-pollutant/inter-basin emission trading. Both Districts' regulations, and state and federal laws allow such an approach.

To support its case, the applicant has provided an analysis based, in part, on modeling performed by South Coast District, using the Urban Airshed Model (UAM), to support its AQMP. The following is a summary of the circumstances affecting the adequacy of the HDPP proposed inter-basin/inter-pollutant offsets strategy:

- Violations of the ambient air quality standard for ozone in the Mojave Desert AQMD (Mojave District) are due, in part, to transport of pollution from the South Coast Air Quality Management District (South Coast District).
- Rule 1305 (B)(5)(b) allows the use of inter-basin emission reductions from the South Coast District to offset project emissions provided:

- ♦ The emissions reductions from the South Coast District are obtained in a non-attainment area which has a greater classification than the area where the Offsets are to be used [Rule 1305 (B)(5)(b)(i)], and
- ♦ The emissions from the South Coast District contribute to a violation of the Ambient Air Quality Standards in the area where the Offsets are to be used. [Rule 1305 (B)(5)(b)(ii)].

- VOC emission reductions in the South Coast District will reduce ozone formation in the South Coast District. Such VOC reductions may also reduce transport of ozone to Mojave District. Reduction of ozone formation in the South Coast District and reduced transport to the Mojave District constitutes an air quality benefit.
- The magnitude of the reduction of transported ozone concentration in the Mojave District will depend on where, when and under what meteorological conditions the reductions within the South Coast District will occur. Those emission reductions that are nearer or more directly upwind of the Victorville area will result in greater reductions of transported ozone.

ERC from SCIA: The applicant proposes to purchase 134 TPY of NOx ERC that were recently banked with the District. These ERC were generated as a result of the shutdown of the equipment associated with the closure of the former George Air Force Base. Because these ERCs had not until recently been banked, option contracts to purchase these ERCs were not available. Contracts or option contracts for the SCIA ERC must be provided prior to evidentiary hearings.

Other ERC from the South Coast: The applicant has provided option contracts to purchase a total of 503 TPY of VOC ERC from General Motors (in Van Nuys), Mobil Oil Corp. (in Torrance), Chemoil Refining (in Carson), Crown Cork & Seal (in Los Angeles), and BASF (in Orange County). All ERC except those from Chemoil Refining are the result of the shut down of equipment.

VOC OFFSETS:

ERC from SCIA: The applicant proposes to purchase 151 TPY of VOC ERC that were recently banked with the District. These ERC were generated as a result of the shutdown of the former George Air Force Base. Contracts or option contracts to purchase these recently banked ERC should be provided prior to the evidentiary hearings.

Other ERC from the South Coast: The applicant has provided option contrasts to secure the VOC ERC from the same sources in the South Coast air basin identified earlier to offset the VOC emission increase from the facility. The applicant has proposed, and the District approved, an inter-basin offset ratio of 1.3 pound of South Coast VOC for every pound of new VOC emissions from the facility.

PM10 OFFSETS:

The applicant proposes to purchase the ERC generated from the City of Adelanto paving approximately one mile of dirt roads. They state that candidate roads have been identified by the City, and estimate the possible ERC available from each road

segment (HDPP 1998r). The applicant has entered into a contract with the City of Adelanto for these ERC.

ADEQUACY OF PROPOSED MITIGATION MEASURES

CONSTRUCTION PHASE MITIGATIONS

As mentioned earlier in the impacts section, the project construction will contribute PM10 emissions, which will add to the existing violations of the ambient PM10 air quality standard. Staff believes that because of the conservatism of the modeling analysis, the applicant proposed all feasible dust control measures (HDPP, 1998a and CURE 1999a), and that the impacts are short-term in nature, the project construction impacts on the ambient PM10 air quality standard are not significant.

OPERATION PHASE MITIGATIONS

NOx Control Technology Mitigation: The applicant proposes a combination of dry low-NOx and SCR technology that will maintain the combustion turbine and duct burner exhaust emissions at a maximum of 2.5 ppmvd@15% O2, averaged over a 1-hour period. Ammonia slip emissions will be maintained at 10 ppm at the exhaust stacks.

Staff believes that the proposed dry low-NOx and SCR system control level represents a feasible mitigation, and is consistent with the District, the ARB and EPA recommendations for BACT.

VOC and CO Control Technology Mitigation: The applicant proposes the use of a CO oxidation catalyst system to minimize VOC and CO emissions, and has committed to a CO emission level of 4 ppm, and a VOC level to 1 ppm. Staff believes that the proposed CO oxidation catalyst system is consistent with the District, the ARB and EPA recommendations for BACT.

PM10 Control Technology Mitigation: The applicant proposes the use of a high efficiency drift eliminators in the cooling towers, which is consistent with the District, the ARB and EPA recommendations for BACT.

OFFSETS

The applicant has provided contracts to purchase ERC to offset the facility's potential emission increases of NOx, PM10 and VOC as required by the District NSR. As mentioned earlier, the offset package for NOx will include a portion of NOx ERC from SCIA at a ratio of 1.3 to 1, and inter-basin/inter-pollutant ratio of 2.1 to 1 VOC to NOx. VOC offsets will be from ERC from SCIA and those ERC obtained from South Coast, and is proposed at a ratio of 1.3 to 1.

The proposed inter-basin/inter-pollutant offset ratio (VOC from South Coast for NOx) was developed as the result of a consensus effort between all the parties involved, including the EPA, ARB, CEC, District staff, the applicant and CURE, in numerous meetings. The proposed offset ratio is approved by EPA and the District staff, and is consistent with the District NSR rule.

Based on the limited available ambient air quality data, CEC staff does not believe that the proposed offset package will completely mitigate the ozone impacts caused by new NOx and VOC emissions from the HDPP facility, especially impacts in areas downwind of the project site. However, staff cannot accurately define the exact impacts of the project emissions nor the potential benefits of the offsets using the current impact analysis methods. Nevertheless, staff recognizes that the proposed offsets are intended to provide reductions of ozone levels to mitigate, to a certain degree, the impacts on ambient ozone levels that are cause by the HDPP. Staff acknowledges that, in the long run, the new emissions from HDPP will be included in the District emission inventory and will be dealt with in the District's attempts to bring the entire area into attainment to satisfy the requirements of the federal and the state Clean Air Act. Staff also acknowledges that the ozone air quality standard violations in the Mojave Desert area are overwhelmingly caused by emissions from South Coast (ARB, 1996). After considering all these facts, staff concludes that the project's incremental effects, including offsets and control mitigation measures, are not cumulatively considerable.

Based on the list of potential sources, the ERC appear to be in sufficient quantity to offset the facility emissions to satisfy the District NSR rule requirements.

COMPLIANCE WITH LORS

FEDERAL

The applicant has submitted to the EPA an application for the federal PSD permit, and that the EPA staff has actively participated early in the Commission licensing project to ensure that issue that could affect the issuance of the PSD permit, are adequately addressed. EPA published their draft PSD permit for the HDPP on July 9, 1999. No outstanding issues were identified in the draft PSD permit.

In addition, the HDPP is required to obtain a Federal Operating Permit (Title V) within one month after the project starts to operate. HDPP is also required to submit an acid rain application (Title IV) to EPA at least 24 months prior to the project generating electricity. Compliance with both of the federal titles will be determined at a later date, and staff does not expect any problem with obtaining these federal permits.

STATE

Base on this analysis, staff believes that the project is expected to comply with Section 41700 of the California State Health and Safety Code. Staff also believes that the project, if operated properly, will not cause any public nuisance problem; therefore, compliance with applicable State Laws is expected.

LOCAL

The District has issued a Final DOC, which states that the HDPP project is expected to comply with all applicable District Rules and Regulations, and that all offsets will be provided prior to start construction of the project. (MDAQMD 1999a).

CONCLUSIONS AND RECOMMENDATIONS

The project emissions will be fully offset as required by the Mojave Desert AQMD NSR requirements. The project will be built using BACT (SCR and CO oxidation catalyst systems). The project is not likely to cause new violations of NO2, SO2, or CO ambient air quality standards, and therefore, its NOx, Sox and CO emission impacts are not significant. The project's construction impacts on PM10 will be mitigated to non-significant levels.

The project is expected to minimize its direct PM10 emissions which are not likely to make existing PM10 violations worse because offsets will be provided. Therefore, the potential for direct and secondary PM10 emission impacts is reduced to a level of insignificance.

Staff believes that the project has a potential to contribute to the violations of the state and federal ozone air quality standards. Recognizing that the impact to which the project is contributing is cumulative in nature, that the project contribution is small, that offsets will be provided, and that the HDPP emissions will be added to the District emission inventory and thus will be dealt with in future program planning efforts to bring the area into attainment; staff believes that the project's incremental effects, including offsets and control mitigation measures, are not cumulatively considerable. Staff believes that the applicant's proposed offset package would satisfy the District and EPA; therefore, staff recommends certification of the project.

The District has submitted a Final Determination of Compliance that concludes that the HDPP project would comply with all applicable District rules and regulations and therefore has proposed a set of conditions, which are presented here as Conditions AQ-2, AQ-5, AQ-7 through AQ-16, and AQ-18 through AQ-39.

CEC staff recommends the inclusion of conditions (AQ-1, AQ-3, AQ-4, AQ-6, and AQ-17) that addresses construction related impacts and operational compliance circumstances. Staff therefore recommends certification of the High Desert Power Plant with the following Proposed Conditions of Certification.

CONDITIONS OF CERTIFICATION

(The conditions that are appeared in **bold *italic*** are those that are recommended by the CEC staff. All other conditions are proposed by the Mojave Desert Air Quality Management District.)

AQ-1. The facility shall be constructed with either one of the following configurations:

A. A 720 MW combined cycle consisting of three (3) combustion turbines (GE frame 7F or Westinghouse 501F), each equipped with a duct burner, selective catalytic reduction (SCR) system, a CO oxidation catalyst system and a cooling tower.

B. A 678 MW combined cycle consisting of two (2) Westinghouse 501 G combustion turbines, each equipped with a duct burner, an SCR system, a CO oxidation catalyst system and a cooling tower.

Verification: ***Six months prior to start construction of the project, the project owner shall submit the final selection of turbines and associated equipment, including all drawings and manufacturer data to the District, the EPA and the CEC CPM for approval.***

AQ-2. Operation of this equipment shall be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.

Verification: The project owner shall prepare quarterly reports for the preceding calendar quarters by January 30, April 30, July 30, and October 30, and an annual compliance report. These reports shall include all information required and specified in Condition AQ-20. The reports shall be submitted to the District, the CEC Compliance Project Manager (CPM) and the EPA staff.

AQ-3. The project owner shall perform the following mitigation measures during the construction phase of the project:

a. The areas of disturbance within the construction site shall be watered so that they are visibly wet, twice or more daily, as necessary. This condition shall not apply on rainy days when precipitation exceeds 0.1 inch.

b. No dry rotary brushes shall be used, unless accompanied by sufficient wetting, in the removal of dragged-on mud from public streets adjacent to the construction site.

c. No blower devices shall be used.

d. Sandbags and other erosion control measures shall be placed to prevent silt runoff to public streets adjacent to the construction site.

e. Windbreaks shall be installed at windward sides of the construction areas where soil disturbance is scheduled, and prior to the soil being disturbed.

f. Gravel pads shall be installed at all access points to prevent tracking of mud onto public streets.

g. All waste materials transported offsite shall be covered or sufficiently wetted to limit dust emissions.

h. Any graded areas where construction ceases shall be treated with a magnesium chloride (or equivalent) dust suppressant within fifteen days, or sooner if windy conditions create visible dust beyond the project site boundary.

i.Magnesium chloride (or equivalent) dust suppressant or fabric covers shall be applied to any dirt storage pile within three days after the pile is formed, or sooner if windy conditions create visible dust beyond the project site boundary.

j.Prior to entering public roadways, all truck tires shall be visually inspected, and, if found to be dirty, cleaned of dirt using water spraying or methods of equivalent effectiveness, subject to CPM approval.

k. At least 500 yards from construction site entrances, public roadways shall be cleaned on a weekly basis, or when there are visible dirt tracks on the public roadways, by either mechanical sweeping or water flushing.

l.A speed limit sign shall be posted at the entrance of the construction site, to limit vehicle speed to no more than 10 miles per hour on unpaved areas.

m. All construction equipment shall be properly maintained to detect and prevent mechanical problems that may cause excess emissions.

n. No construction equipment shall be kept idling when not in use for more than 5 minutes.

<u>Verification</u>: The project owner shall maintain a daily log of water truck activities, including record of the frequency of public road cleaning. These logs and records shall be available for inspection by the CPM during the construction period. The project owner shall identify in the monthly construction reports, the area(s) that the project owner shall cover or treat with dust suppressants. The project owner shall make the construction site available to the District staff and the CPM for inspection and monitoring.

AQ-4. For all utility trenching activities, the project owner shall implement the following control measures if necessary to prevent fugitive dust emissions:

a. ***The top layer of soil shall be pre-wetted prior to excavation,***

b. Travel surfaces shall be wetted with the use of a water truck, and

c. All exposed soil areas shall be wetted by the use of hose spraying.

<u>Verification</u>: District staff and the CPM may inspect utility trenching sites at any time to monitor compliance for this condition.

AQ-5. The turbines and duct burners shall be exclusively fueled with pipeline quality natural gas with a sulfur content not exceeding 0.2 grains per 100 dscf on a rolling twelve month average basis, and shall be operated and maintained in strict accord with the recommendations of its manufacturer or supplier and/or sound engineering principles. The duct burner shall not be operated unless the associated turbine power train and selective catalytic reduction system are in operation

<u>Verification:</u> The project owner shall maintain, on a monthly basis, a laboratory analysis showing the sulfur content of the natural gas being burned at the facility. The monthly sulfur analysis shall be incorporated into the quarterly and annual compliance reports as mentioned in AQ-20.

AQ-6. Each turbine/duct burner shall be equipped with a functional continuously recording fuel gas flowmeter.

<u>Verification</u>: See verification for Condition AQ-1.

AQ-7. Fuel use by this equipment shall be recorded and maintained on site for a minimum of five (5) years and shall be provided to MDAQMD personnel on request.

<u>Verification:</u> The project owner shall make the site available for inspection by representatives of the District, ARB, EPA and the CEC.

AQ-8. This equipment is subject to the federal NSPS codified at 40 CFR Part 60, Subparts A (General Provisions) and GG (Standards of Performance for Stationary Gas Turbines). This equipment is also subject to the Prevention of Significant Deterioration (40 CFR 51.166) and Federal Acid Rain (Title IV) programs. Compliance with all applicable provisions of these regulations is required.

<u>Verification:</u> At least 90 days prior to construction of the project, the project owner shall provide the District, the ARB and the CEC CPM copies of the federal PSD and Acid Rain permits.

AQ-9. Particulate emissions from this equipment shall not exceed an opacity equal to or greater than twenty percent (20%) for a period aggregating more than three (3) minutes in any one (1) hour, excluding uncombined water vapor.

<u>Verification:</u> See verification for condition AQ-7.

AQ-10. This equipment shall exhaust through a stack at a minimum height of 130 feet.

Verification: Six months prior to start construction of the project, the project owner shall submit the final selection of turbines and associated equipment including any and all drawings and manufacturer data to the District, the EPA and the CEC CPM for approval.

AQ-11. The project owner shall not operate this equipment without the selective catalytic NO_x reduction and VOC and CO oxidation catalyst systems installed and fully functional.

Verification: See Condition AQ-20 and its verification.

AQ-12. Ammonia shall be injected whenever the selective catalytic reduction system has reached or exceeded 550° Fahrenheit except for periods of equipment malfunction. Except during periods of startup, shutdown and malfunction, ammonia slip shall not exceed 10 ppm by volume, dry at 15 percent O_2.

Verification: See Condition AQ-20 and its verification.

AQ-13. Ammonia injection by this equipment in pounds per hour shall be recorded and maintained on site for a minimum of five (5) years and shall be provided to MDAQMD personnel on request.

Verification: See verification for Condition AQ-7.

AQ-14. Emissions of NO_x, CO, O_2 and ammonia slip shall be monitored using a Continuous Emissions Monitoring System (CEMS). Turbine fuel consumption shall be monitored using a continuous monitoring system. Stack gas flow rate shall be monitored using a Continuous Emission Rate Monitoring System (CERMS). The project owner shall install, calibrate, maintain, and operate these monitoring systems according to an MDAQMD-approved monitoring plan and MDAQMD Rule 218, and shall be installed prior to initial equipment startup. Six (6) months prior to installation the operator shall submit a monitoring plan for MDAQMD review and approval.

Verification: Six months prior to installation of the monitoring system, the project owner shall submit drawings and manufacturer data of the monitoring systems, to the District, the EPA and the CEC CPM for review and approval.

AQ-15. The project owner shall conduct all required compliance/certification tests in accordance with an MDAQMD-approved test plan. Thirty (30) days prior to the compliance/certification tests the operator shall provide a written test plan for MDAQMD review and approval. Written notice of the compliance/certification test shall be provided to the MDAQMD ten (10) days prior to the tests so that an observer may be present. A written report

with the results of such compliance/certification tests shall be submitted to the MDAQMD within forty-five (45) days after testing.

Verification: Forty five (45) days after testing the project owner shall provide the CEC CPM a copy of the source test results.

AQ-16. The project owner shall perform the following annual compliance tests in accordance with the MDAQMD Compliance Test Procedural Manual. The test report shall be submitted to the MDAQMD no later than six weeks prior to the expiration date of this permit. The following compliance tests are required:

a. NO_x as NO_2 in ppmvd at 15% O_2 and lb/hr (measured per USEPA Reference Methods 19 and 20).
b. VOC as CH_4 in ppmvd at 15% O_2 and lb/hr (measured per USEPA Reference Methods 25A and 18).
c. SO_x as SO_2 in ppmvd at 15% O_2 and lb/hr.
d. CO in ppmvd at 15% O_2 and lb/hr (measured per USEPA Reference Method 10).
e. PM_{10} in mg/m^3 at 15% O_2 and lb/hr (measured per USEPA Reference Methods 5 and 202 or CARB Method 5).
f. Flue gas flow rate in scfmd.
g. Opacity (measured per USEPA reference Method 9).
h. Ammonia slip in ppmvd at 15% O_2.

Verification: See verification for Condition AQ-15.

AQ-17. The compliance test plan shall include a method for measuring CO/VOC surrogate relationship that can be use to demonstrate compliance with VOC hourly, daily and annual emission limits.

Verification: See verification for Condition AQ-15.

AQ-18. The project owner shall, at least as often as once every five years (commencing with the initial compliance test), include the following supplemental source tests in the annual compliance testing:

a. Characterization of cold startup VOC emissions;
b. Characterization of warm startup VOC emissions;
c. Characterization of hot startup VOC emissions; and
d. Characterization of shutdown VOC emissions.

Verification: See verification for Condition AQ-15.

AQ-19. Continuous monitoring systems shall meet the following acceptability testing requirements from 40 CFR 60 Appendix B:

a. For NO_x, Performance Specification 2.
b. For O_2, Performance Specification 3.

c. For CO, Performance Specification 4.
d. For stack gas flow rate, Performance Specification 6.
e. For ammonia, a District approved procedure that is to be submitted by the project owner.

Verification: See verification for Condition AQ-14.

AQ-20. The project owner shall submit to the APCO and USEPA Region IX the following information for the preceding calendar quarter by January 30, April 30, July 30 and October 30 of each year this permit is in effect. Each January 30 submittal shall include a summary of the reported information for the previous year. This information shall be maintained on site for a minimum of five (5) years and shall be provided to District personnel on request.

a. Operating parameters of emission control equipment, including but not limited to ammonia injection rate, NO_x emission rate and ammonia slip.
b. Total plant operation time (hours), number of startups, hours in cold startup, hours in warm startup, hours in hot startup, and hours in shutdown.
c. Date and time of the beginning and end of each startup and shutdown period.
d. Average plant operation schedule (hours per day, days per week, weeks per year).
e. All continuous emissions data reduced and reported in accordance with the District approved CEMS protocol.
f. Maximum hourly, maximum daily, total quarterly, and total calendar year emissions of NO_x, CO, PM_{10}, VOC and SO_x (including calculation protocol).
g. Fuel sulfur content (monthly laboratory analyses, monthly natural gas sulfur content reports from the natural gas supplier(s), or the results of a custom fuel monitoring schedule approved by USEPA for compliance with the fuel monitoring provisions of 40 CFR 60 Subpart GG)
h. A log of all excess emissions, including the information regarding malfunctions/breakdowns required by Rule 430.
i. Any permanent changes made in the plant process or production, which would affect air pollutant emissions, and indicate when changes were made.
j. Any maintenance to any air pollutant control system (recorded on an as-performed basis).

Verification: The project owner shall prepare quarterly reports for the preceding calendar quarters by January 30, April 30, July 30 and October 30 with the January 30 report including an annual summary. The reports shall be submitted to the District, EPA and the CEC.

AQ-21. NO_x, CO, VOC and ammonia concentration limits shall not apply to these equipment during an initial commissioning period of no more than 120 days, commencing with the first firing of fuel in this equipment.

Verification: See Condition AQ-20 and its verification.

AQ-22. The project owner shall provide stack sampling ports and platforms necessary to perform source tests required to verify compliance with District rules, regulations and permit conditions. The location of these ports and platforms shall be subject to District approval.

Verification: The project owner shall make the site available for inspection by the District, ARB, EPA and CEC staff.

AQ-23. Within 60 days after achieving the maximum firing rate at which the facility will be operated, but not later than 180 days after initial startup, the operator shall perform an initial compliance test. This test shall demonstrate that this equipment is capable of operation at 100% load in compliance with the emission limits in Condition AQ-28 for the 3F configuration or condition AQ-34 for the 2G configuration.

Verification: See Condition AQ-15 and its verification.

AQ-24. The initial compliance test shall include tests for the following. The results of the initial compliance test shall be used to prepare a supplemental health risk analysis.

a. Aldehydes and acrolein (measured per CARB method 430);
b. Certification of CEMS and CERMS at 100% load, startup modes and shutdown mode;
c. Characterization of cold startup VOC emissions;
d. Characterization of warm startup VOC emissions;
e. Characterization of hot startup VOC emissions; and
f. Characterization of shutdown VOC emissions.

Verification: See Condition AQ-15 and its verification.

AQ-25. The project owner shall conduct all required cooling tower water quality tests in accordance with an MDAQMD-approved test and emissions calculation protocol. Thirty (30) days prior to the first such test the operator shall provide a written test and emissions calculation protocol for MDAQMD review and approval.

Verification: Thirty (30) days prior to performing the required test, the project owner shall provide the CEC CPM a test and emissions calculations protocol.

AQ-26. The operator shall perform weekly tests of the blow-down water quality. The operator shall maintain a log, which contains the date and result of each blow-down water quality test, and the resulting mass emission rate.

This log shall be maintained on site for a minimum of five (5) years and shall be provided to MDAQMD personnel on request.

Verification: See verification for Condition AQ-7.

AQ-27. A maintenance procedure shall be established that states how often and what procedures will be used to ensure the integrity of the drift eliminators. This procedure is to be kept on-site and be available to MDAQMD personnel on request.

Verification: See verification for Condition AQ-7.

The following conditions AQ-29 to AQ-33 are specific to the 720 MW (3F) combined cycle configurations:

AQ-28. Emissions from this equipment (including its associated duct burner) shall not exceed the following emission limits at any firing rate, except for CO, NO_x and VOC during periods of startup, shutdown and malfunction:

a. Hourly rates, computed every 15 minutes, verified by CEMS and annual compliance tests:
   i. NO_x as NO_2 – 18.00 lb/hr (based on 2.5 ppmvd corrected to 15% O_2)
   ii. CO – 17.53 lb/hr (based on 4.0 ppmvd corrected to 15% O_2)
   iii. Ammonia Slip – 10 ppmvd (corrected to 15% O_2)

b. Hourly rates, verified by annual compliance tests or other compliance methods in the case of SOx:
   i. VOC as CH_4 – 2.51 lb/hr (based on 1 ppmvd corrected to 15% O_2)
   ii. SO_x as SO_2 – 1.11 lb/hr (based on 0.00064 lb/MMBtu (lower heating value))
   iii. PM_{10} – 18.14 lb/hr

Verification: See Condition AQ-20 and its verification.

AQ-29. Emissions of CO and NO_x from this equipment may exceed the limits contained in Condition AQ-28 during startup and shutdown periods as follows:

a. Startup shall be defined as the period beginning with ignition and lasting until the equipment has reached operating permit limits. Cold startup means a startup when the CTG has not been in operation during the preceding 72 hours. Hot startup means a startup when the CTG has been in operation during the preceding 8 hours. Warm startup means a startup that is not a hot or cold startup. Shutdown shall be defined as the period beginning with the lowering of equipment from base load and lasting until fuel flow is completely off and combustion has ceased.

b. Transient conditions shall not exceed the following durations:
   i. Cold startup – 4.5 hours
   ii. Warm startup – 2.6 hours
   iii. Hot startup – 1.9 hours
   iv. Shutdown – 1 hour

c. During a cold startup emissions shall not exceed the following, verified by CEMS:
   i. NO_x – 183 lb
   ii. CO – 3541 lb

d. During a warm startup emissions shall not exceed the following, verified by CEMS:
   i. NO_x – 168 lb
   ii. CO – 3596 lb

e. During a hot startup emissions shall not exceed the following, verified by CEMS:
   i. NO_x – 138 lb
   ii. CO – 3729 lb

f. During a shutdown emissions shall not exceed the following, verified by CEMS:
   i. NO_x – 97 lb
   ii. CO – 239 lb

Verification: See Condition AQ-20 and its verification.

AQ-30. Emissions from this equipment, including the duct burner, may not exceed the following emission limits, based on a calendar day summary:

a. NO_x – 848 lb/day, verified by CEMS
b. CO – 8072 lb/day, verified by CEMS
c. VOC as CH_4 – 1448 lb/day, verified by compliance tests and hours of operation
d. SO_x as SO_2 – 26.7 lb/day, verified by fuel sulfur content and fuel use data
e. PM_{10} – 435 lb/day, verified by compliance tests and hours of operation

Verification: See Condition AQ-20 and its verification.

AQ-31. Emissions from this facility, including the cooling towers, may not exceed the following emission limits, based on a rolling 12 month summary:

a. NO_x – 205 tons/year, verified by CEMS
b. CO – 750 tons/year, verified by CEMS
c. VOC as CH_4 – 129 tons/year, verified by compliance tests and hours of operation

d. SO_x as SO_2 – 14 tons/year, verified by fuel sulfur content and fuel use data
e. PM_{10} – 233.2 tons/year, verified by compliance tests and hours of operation

Verification: See Condition AQ-20 and its verification.

AQ-32. The drift rate shall not exceed 0.0006 percent with a maximum circulation rate of 57,300 gallons per minute. The maximum hourly PM_{10} emission rate shall not exceed 1.1 pounds per hour, as calculated per the written District-approved protocol.

Verification: See Condition AQ-20 and its verification.

AQ-33. The project owner must surrender to the District sufficient valid Emission Reduction Credits for this equipment before the start of construction of any part of the project for which this equipment is intended to be used. In accordance with Regulation XIII the operator shall obtain 267 tons of NO_x, 168 tons of VOC, and 234 tons of PM_{10} offsets (VOC ERCs from SCAQMD may be used as VOC ERCs at a rate of 1:1 or may be substituted for NO_x ERCs at a rate of 1.6:1).

Verification: The project owner shall provide copies of all necessary ERC certificates to the CPM no later than 30 days prior to commencement of construction.

The following conditions AQ-34 to AQ-39 are specific to the 678 MW (2G) combined cycle configurations:

AQ-34. Emissions from this equipment (including its associated duct burner) shall not be exceed the following emission limits at any firing rate, except for CO, NO_x and VOC during periods of startup, shutdown and malfunction:

a. Hourly rates, computed every 15 minutes, verified by CEMS and annual compliance tests:

i. NO_x as NO_2 – 24.55 lb/hr (based on 2.5 ppmvd corrected to 15% O_2)
ii. CO – 23.91 lb/hr (based on 4.0 ppmvd corrected to 15% O_2)
iii. Ammonia Slip – 10 ppmvd (corrected to 15% O_2)

b. Hourly rates, verified by annual compliance tests or other compliance methods in the case of SOx:

i. VOC as CH4 – 3.42 lb/hr (based on 1 ppmvd corrected to 15% O2)
ii SOx as SO2 – 1.51 lb/hr (based on 0.00064 lb/MMBtu (lower heating value))

iii. PM10 – 25.41 lb/hr

Verification: See Condition AQ-20 and its verification.

AQ-35. Emissions of CO and NO_x from this equipment may exceed the limits contained in Condition AQ-34 during startup and shutdown periods as follows:

a. Startup shall be defined as the period beginning with ignition and lasting until the equipment has reached operating permit limits. Cold startup means a startup when the CTG has not been in operation during the preceding 72 hours. Hot startup means a startup when the CTG has been in operation during the preceding 8 hours. Warm startup means a startup that is not a hot or cold startup. Shutdown shall be defined as the period beginning with the lowering of equipment from base load and lasting until fuel flow is completely off and combustion has ceased.

b. Transient conditions shall not exceed the following durations:
   i. Cold startup – 4.5 hours
   ii. Warm startup – 2.6 hours
   iii. Hot startup – 1.9 hours
   iv. Shutdown – 1 hour

c. During a cold startup emissions shall not exceed the following, verified by CEMS:
   i. NO_x – 561 lb
   ii. CO – 6890 lb

d. During a warm startup emissions shall not exceed the following, verified by CEMS:
   i. NOx – 269 lb
   ii. CO – 3177 lb

e. During a hot startup emissions shall not exceed the following, verified by CEMS:
   i. NOx – 215 lb
   ii. CO – 2711 lb

f. During a shutdown emissions shall not exceed the following, verified by CEMS:
   i. NO_x – 133 lb
   ii. CO – 288 lb

Verification: See Condition AQ-20 and its verification.

AQ-36. Emissions from this equipment, including the duct burner, may not exceed the following emission limits, based on a calendar day summary:

a. NO_x – 1495 lb/day, verified by CEMS
b. CO – 10619 lb/day, verified by CEMS
c. VOC as CH_4 – 1648 lb/day, verified by compliance tests and hours of operation

d. SO_x as SO_2 – 36.2 lb/day, verified by fuel sulfur content and fuel use data
e. PM_{10} – 610 lb/day, verified by compliance tests and hours of operation

Verification: See Condition AQ-20 and its verification.

AQ-37. Emissions from this facility, including the cooling towers, may not exceed the following emission limits, based on a rolling 12 month summary:

a. NOx – 189 tons/year, verified by CEMS
b. CO – 484 tons/year, verified by CEMS
c. VOC as CH4 – 83 tons/year, verified by compliance tests and hours of operation
d. SOx as SO2 – 12 tons/year, verified by fuel sulfur content and fuel use data
e. PM_{10} – 219 tons/year, verified by compliance tests and hours of operation

Verification: See Condition AQ-20 and its verification.

AQ-38. The drift rate shall not exceed 0.0006 percent with a maximum circulation rate of 73,540 gallons per minute. The maximum hourly PM_{10} emission rate shall not exceed 1.6 pounds per hour, as calculated per the written District-approved protocol.

Verification: See Condition AQ-20 and its verification.

AQ-39. The project owner must surrender to the District sufficient valid Emission Reduction Credits for this equipment before the start of construction of any part of the project for which this equipment is intended to be used. In accordance with Regulation XIII the operator shall obtain 246 tons of NO_x, 108 tons of VOC, and 219 tons of PM_{10} offsets (VOC ERCs from SCAQMD may be used as VOC ERCs at a rate of 1:1 or may be substituted for NO_x ERCs at a rate of 1.6:1).

Verification: The project owner shall provide copies of all necessary ERC certificates to the CPM no later than 30 days prior to commencement of construction.

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APPENDIX A

Quarterly and Annual Wind Roses Recorded at George Air Force Base